

Essegbemon Akpo · Chris O. Ojiewo
Issoufou Kapran · Lucky O. Omoigui
Agathe Diamo · Rajeev K. Varshney *Editors*

Enhancing Smallholder Farmers' Access to Seed of Improved Legume Varieties Through Multi-Stakeholder Platforms

Learning from the TLIII Project
Experiences in sub-Saharan Africa and
South Asia

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Editors

Essegbemon Akpo
International Crops Research Institute for
the Semi-Arid Tropics (ICRISAT)
Nairobi, Kenya

Issoufou Kapran
RP-WCA, ICRISAT
Bamako, Mali

Agathe Diama
RP-WCA, ICRISAT
Bamako, Mali

Chris O. Ojiewo
International Crops Research Institute for
the Semi-Arid Tropics (ICRISAT)
Nairobi, Kenya

Lucky O. Omoigui
International Institute of Tropical
Agriculture
Kano, Nigeria

Rajeev K. Varshney
Research Program – Genetic Gains
International Crops Research Institute for
the Semi-Arid Tropics (ICRISAT)
Patancheru, India



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Foreword

The International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) has been investing in seed systems development for increased farmer access to quality seed of legume crops across the dryland areas of sub-Saharan Africa and South Asia. With close to half of the farmers in the semi-arid tropics living below the poverty line (US\$1.90 per day), access to quality seed of improved and recently released legume varieties is a critical contribution to their livelihoods but remains a major challenge to these households. With the arable land rapidly being replaced by settlements, one major way of feeding the growing population in an ever-changing and variable climate is increasing the sustainable farm productivity. The hundreds of millions of smallholder farmers and their communities in remote semi-arid areas need the support of game-changing agricultural technologies. The semi-arid tropics are already disadvantaged by the existing natural environmental conditions, which will be worsened by climate change. Further, there is a wide range of biotic and abiotic stresses that limit crop production, besides the long-standing challenge of poor access to quality seed of adapted varieties that exacerbates the existing constraints to productivity.

Through its research for development agenda over the decades, ICRISAT has developed and tested various mechanisms to enhance farmers' access to quality seed of improved varieties. ICRISAT fulfills its mission through various donor-funded Research for Development Projects in partnership with public and private sector institutions. Funded by the Bill & Melinda Gates Foundation and led by ICRISAT in collaboration with the International Center for Tropical Agriculture (CIAT), the International Institute of Tropical Agriculture (IITA) and national partners in Ethiopia, Tanzania, and Uganda in East Africa, Nigeria, Mali, Burkina Faso, and Ghana in West Africa, and Uttar Pradesh State in India, the Tropical Legumes Project used an innovation platform approach to deliver innovations and systemic social and economic change. The project facilitated closer interactions among key participants along the target grain legume commodity value chains, with access to seed of newly released varieties as a central theme. Seed demand is derived from grain demand—demand-driven—in the semi-arid tropics as in the rest of the world. Off-farm grain aggregators, exporters, local traders, and processors are critical in driving the seed value chain. On-farm decisions are guided by the end use of the product, whether for markets or for subsistence. Farmers choose the fraction of scarce resources to allocate to the right crop, the right variety, and the right inputs,

including seed. Bringing seed enterprises, farmers, and off-farm actors together in innovation platforms ensures that quantity and quality standards for inputs and outputs are aligned along the value chain. This incentivizes farmers to invest in high-quality seed as they are assured of the market for high-quality grain from their farms. Sharing the diverse experiences from various crops and countries with the broader global research and development community is the focus of this book, which will be an important reference for scholars, practitioners, and other professionals.

I commend the efforts of past and present staff of ICRISAT and other CGIAR centers, their national partners, the various value chain participants, and other stakeholders who formed the innovation platforms, for supporting our joint commitment through strong partnerships to make semi-arid tropical communities more food, nutrition, and income secure. I strongly believe that readers of this book will be able to draw on the information and lessons-learned to apply to their own situations. This can serve as the basis for informed design and implementation of future seed delivery mechanisms for grain legumes and dryland cereals, for which farmers are still struggling to increase productivity and production. It is a great honor for me to preface this publication that adds significant knowledge to the existing body of literature.

ICRISAT
Hyderabad, Telangana, India

Jacqueline d'Arros Hughes

Foreword

The challenge of alleviating hunger and improving food and nutrition security for millions of farmers in sub-Saharan Africa (SSA) is a long-standing challenge for the research and development practitioners. The sustainable development goals (SDG), specifically SDG 2 commits to end hunger by 2030.

Given that this book is now published in the COVID-19 era, the 2020 pandemic as a global phenomenon is very likely to be with us for a long time to come requiring innovative approaches to attain global food and nutrition security. Within this context, the least secured and most vulnerable people groups will require concerted efforts to sustain meaningful and productive livelihoods. Aside from the complications of the global pandemic, these people are already encumbered by poor access to technologies, climate-related stresses, pests and diseases, and a myriad of other abiotic stressors.

Within the context of the Science Agenda for Agriculture in Africa (S3A), the compelling role of the agricultural sector in curbing the current trends of food and nutrition insecurity is widely acknowledged and reflected in the development agenda of most SSA countries. Agricultural productivity is highly dependent on quality inputs and most of all, quality seed of modern varieties. Most importantly, legume crops represent a great asset to cropping systems, food, and nutrition quality. Improved drought tolerant or short duration and nutritious legume varieties that are better adapted to different agroecological zones are key ingredients to optimizing farming output produce and quality of human life.

Finding the best approach and model to get seed to farmer remains a major challenge. In this regard, many models have been developed and implemented to enhance smallholder farmers' access to the substantial outputs and achievements of the breeding programs. The agricultural innovation systems (AIS) approach, championed by the Forum for Agricultural Research in Africa (FARA) and used by many other research and development organizations, is one of the approaches extensively used over a decade to deliver quality seed and other technologies to farmers in SSA. I note with gratitude that the Tropical Legumes Project Phase III (TLIII) is also borrowed from the AIS approach by using innovation platforms across its target countries to facilitate access to quality seed of modern legume varieties to farmers, specifically the hard-to-reach small farmers in remote areas. TLIII responded to the need for effective, more coherent, and well-articulated design and delivery seed technologies of food legume crops, by using Innovation Platform (IP) approach to

broker partnerships among stakeholders in various legume value chains to popularize and enhance the availability of quality seed. The experiences that the various partners gained through TLIII interventions have been very well elaborated in the current book.

This book entitled “Enhancing Smallholder Farmer Access to Seed of Improved Legume Varieties Through Multi-stakeholder Platforms: Learning from TLIII Project Experiences in sub-Saharan Africa and South Asia” comprehensively reports on the experiences of TLIII project, funded by the Bill & Melinda Gates Foundation (BMGF) that has ended on 30th April 2019. I understand that TLIII was part of a 12-year research and development project, implemented in three phases (TLII-Phase I, TLII-Phase II, and TLIII). I am pleased to note that TLIII used the Innovation Platform approach in target countries to facilitate access to quality seed of modern legume varieties to farmers in eight select countries, including, Burkina Faso, Ghana, Nigeria, Mali (West Africa region), Ethiopia, Tanzania, Uganda (East Africa region), and one state of India (South Asia region).

The critical roles of legume crops in smallholder farming cannot be overemphasized. Legumes form cost-effective option for improving the diets of low-income consumers, balancing proteins, starch, vitamins, and micronutrients. Often cultivated by women, legume harvests are consumed at home but also commercialized to augment household income to address other family needs in terms of education, housing, and health. By complementing starch-rich staples in agrifood systems of smallholder farmers, legumes help intensify and diversify smallholder farming systems as well as address protein-calorie-malnutrition issues. By increasing cropping intensity, fixing nitrogen, immobilizing and availing fixed phosphorus, and improving soil health, legumes further enhance the overall farm productivity and smallholder incomes. The injection of modern legume varieties with early maturity and variable harvest windows (TLIII) has helped to deliver greater stability in the cropping systems under ever-changing production environments. Thus, this book presents a great stimulus for struggling communities to become self-resilient and self-sufficient for food, nutrition, and income security. This has a significance toward realizing SDG 2 in target countries.

With our unreserved endorsement of this publication, it is gratifying that ICRISAT and its partners in SSA and SA are now providing the research and development communities with substantial resources to guide the implementation of their own seed delivery initiatives to boost farmers, legume seed value chain actors, crop commodities, and the entire food and agriculture systems.

FARA
Accra, Ghana
12 June 2020

Yemi Akinbamijo

Preface

Innovation platforms have been used for decades to solve the systemic problems faced by farming communities and value chain actors. Used in a wide variety of ways and geographies, the power of innovation platforms to unlock opportunities for various actors is really immense. The multiple actors' perspective of innovation platform provides a complementarity space for various actors to challenges and resolve common livelihood issues. Particularly, the platforms help with upstream linkages of the producers and suppliers from the push end of the chain and downstream linkages of off-takers and consumers from the pull end, mutually setting and meeting quality standards, with farmers in the middle. This publication provides the reader with diverse field experiences from multiple years' interventions. Specifically, the reported cases in this book come from the semi-arid areas of sub-Saharan Africa and South Asia where the majority of farmers are still struggling to make an everyday living. Each chapter sets the scene by presenting the context of the innovation platform, the approaches used, the key activities implemented, the achievements for both male and female beneficiaries, and sometimes the youth. Some critical reflections were made to zoom in areas that need more attention, going forward. We believe that the readers will get deep insights that will be useful for their future research and development work.

Nairobi, Kenya
Nairobi, Kenya
Bamako, Mali
Kano, Nigeria
Bamako, Mali
Patancheru, India

Essegbemon Akpo
Chris O. Ojiewo
Issoufou Kapran
Lucky O. Omoigui
Agathe Diama
Rajeev K. Varshney

Acknowledgments

This book would have not been effective without the usual collaboration of the country legume improvement programs of Burkina Faso, Ghana, Mali, Nigeria, Ethiopia, Tanzania, and India. The editors appreciate their hard work and time to report their experiences and share their side of innovation platform experiences which enrich the content of this book.

To all stakeholders, especially farmers in remote communities, staff of development organizations, and every direct and indirect commodity value chain actor, who made the reported experiences here possible, the editors express our deepest appreciations.

The editors are grateful to Dr. Emmanuel Monyo, former Coordinator of TLIII project, for assisting to review the different book chapters.

The support of Springer Nature team, namely Aakanksha Tyagi and Vaishnavi Venkatesh during the book publication process was commendable. The editors express their gratitude to the team for their helpful guidelines.

The editors also express their appreciation to Dr. Yemi Akinbamijo, Executive Director, Forum for Agricultural Research in Africa (FARA), and Dr. Jacqueline d'Arros Hughes, Director General, International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) for prefacing this book.

Finally, the editors express their gratitude to the Bill & Melinda Gates Foundation (BMGF) for the financial investments that permitted to implement the innovation platform interventions along various legume seed value chains, upon which the reported experiences developed.

Améliorer l'accès des petits exploitants agricoles aux variétés améliorées de légumiseuses à travers des plateformes multi-acteurs. Leçons apprises dans le cadre du Projet TLIII en Afrique subsaharienne et en Asie du sud

Chapitre 1. Contexte général de l'accès des petits exploitants agricoles aux semences de variétés améliorées de légumineuses et perspectives des plateformes d'innovations

Résumé

Contexte général de l'accès des petits exploitants agricoles aux semences de variétés améliorées de légumineuses et perspectives des plateformes d'innovations

Le pourcentage élevé d'exploitants agricoles (80%-90%), y compris les plus pauvres vivant dans des zones reculées, dépourvus d'accès aux variétés améliorées à haut rendement, atteste de l'échec des différents modèles de diffusion de semences mis en oeuvre jusqu'à nos jours. Le modèle idéal de commercialisation des cultures qui faciliterait l'accès des agriculteurs à des semences de variétés améliorées de légumineuses, a toujours été un sujet difficile pour les organisations de développement. Des études antérieures prouvent que l'intégration complète et équilibrée des connaissances et contextes des différents acteurs clés dans le processus de développement des technologies agricoles, contribue à améliorer l'adoption et l'appropriation par les utilisateurs finaux.

Chapitre 2. Production et distribution de semences d'arachide par le biais de plateformes multi-acteurs dans le sud de la Tanzanie

Résumé

Production et distribution de semences d'arachide par le biais de plateformes multi-acteurs dans le sud de la Tanzanie

La Plateforme d'Arachide au Sud de la Tanzanie a été créée en 2016 afin d'améliorer l'accès aux semences de variétés améliorées et leur adoption par les agriculteurs. La plateforme, qui dessert tous les districts de Lindi, Mtwara et un district (Tunduru) à Ruvuma, compte 53 membres dont 22 femmes et 31 hommes. Depuis sa création, il ya eu une amélioration conséquente des services de conseils agricoles fournis par les agents de vulgarisation étatiques, communautaires et les paysans leaders. Les réseaux de production et de distribution de semences d'arachide ont augmenté avec la participation d'acteurs issus des ONGs, des sociétés semencières, des organisations de producteurs et des producteurs semenciers individuels. L'accès accru aux semences des agriculteurs de la zone sud a contribué à une

augmentation de 11% de la superficie cultivée, résultant en une augmentation de 15% de la production d'arachide dans le district de Nanyumbu entre 2012 et 2018. L'établissement de nouvelles relations commerciales a contribué à améliorer les prix des produits agricoles de 80% (de 1000 à 1800 Tshs). La plateforme a également introduit 29 nouvelles technologies d'économie de la main d'oeuvre, qui ont permis de réduire la corvée des femmes et d'augmenter les choix variétaux offerts aux agriculteurs avec 3 à 11 nouvelles variétés homologuées entre 2009 et 2018.

Chapitre 3. Analyse des acquis de la plateforme d'innovation d'arachide dans la diffusion des variétés améliorées auprès des communautés durant le projet TLIII au Burkina Faso

Résumé

Analyse des acquis de la plateforme d'innovation d'arachide dans la diffusion des variétés améliorées auprès des communautés durant le projet TLIII au Burkina Faso

L'accès aux semences de variétés améliorées d'arachide est le plus important défi auxquels sont confrontés les agriculteurs du Burkina Faso. D'une part, la majorité ne connaît pas l'existence de variétés améliorées et d'autre part, le prix ne leur est pas abordable. Sur la base de ce qui précède, l'équipe des sélectionneurs d'arachide de l'INERA a mis en place quatre plateformes d'innovation d'arachide dans les régions du Centre-Est, du Centre-Nord, du Centre-Ouest et de la Boucle de Mouhoun. Grâce à ces plateformes, des semences de qualité déclarée (QDS) ont été produites pour la première fois au Burkina Faso en 2016 avec le soutien de la phase III du projet sur les légumineuses tropicales (TLIII). Depuis lors, les QDS et les semences certifiées ont été produites, emballées dans des mini-sachets vendus à prix abordables aux communautés locales. Ces mini-sachets ont rendu les semences améliorées plus accessibles aux agriculteurs pauvres. A présent, environ 10 000 personnes ont été touchées par ces mini-sachets de semences. Les agriculteurs, les agents de vulgarisation agricole et le personnel des ONG ont été formés à la production de semences d'arachide, ont pris part à des démonstrations, aux journées paysannes et à la Sélection Variétale Participative pour promouvoir les variétés améliorées et les meilleures pratiques agronomiques. Les rendements des agriculteurs sont passés de 500-700 kg/ha à 1200-1500 kg/ha, augmentant ainsi les revenus des femmes et des jeunes de 200 USD à 800 USD/an uniquement pour ceux qui produisent l'arachide pendant la saison des pluies. Ceux qui produisent l'arachide pendant la saison des pluies et la saison sèche ont pu augmenter leurs revenus de l'ordre de 1200 à 1500 USD. La mise en relation avec les institutions financières a facilité l'accès au crédit pour ces agriculteurs. À l'avenir, la durabilité de la plateforme sera assurée grâce aux contributions financières annuelles des membres et à de solides contrats de production entre les commerçants, les transformateurs et les agriculteurs.

Chapitre 4. Interventions et acquis de la plateforme d'innovation d'arachide de Kolokani dans le cadre du projet TLIII au Mali

Résumé

Les interventions et acquis de la plateforme d'innovation dans le cadre du projet TLIII au Mali

La production d'arachide avait commencé à baisser au Mali malgré l'homologation de plusieurs nouvelles variétés améliorées. Le principal problème est la faiblesse du système d'approvisionnement en semences. Comme solution, une plateforme multi-acteurs a été créée en 2012 et réorganisée avec le soutien du projet TLIII en 2015 pour impliquer davantage d'acteurs de la chaîne de valeur d'arachide - les agriculteurs et en particulier les femmes, organisations de producteurs, sociétés coopératives, producteurs semenciers, distributeurs d'intrants agricoles, vendeurs de grains, transformateurs, services de recherche et de vulgarisation.

Quatre nouvelles variétés Fleur11, ICGV 86124, ICGV 86015 et ICGV 86024 ont été fournies à la plateforme pour la Sélection Variétale Participative Paysanne (SVPP). Parmi celles-ci, les variétés Fleur 11 et ICGV 86124 ont été préférées par les agriculteurs pour leurs rendements élevés et la grosseur de leurs graines dans les conditions de production paysanne. Grâce à la formation des formateurs, les différents membres de la plateforme ont réussi à toucher 1246 agriculteurs, dont 928 femmes, à travers la production de semences améliorées d'arachide, la gestion de l'aflatoxine, le développement de plans d'affaires pour la commercialisation des semences et la mécanisation à petite échelle. Au total, 47 SVPP, 50 démonstrations et 3 essais variétaux multi-locaux ont été menés par an de 2016 à 2018. La plateforme de Kolokani a joué un rôle important dans le développement de la chaîne de valeur arachidière en produisant et en commercialisant 85 tonnes de semences certifiées d'arachide annuellement pour les agriculteurs. Cela devrait contribuer à arrêter le déclin de la productivité nationale tout en améliorant les moyens de subsistance et l'état nutritionnel et le bien-être des membres de la plateforme.

Chapitre 5. Amélioration de l'accès aux semences de qualité de variétés améliorées d'arachide par des plateformes multi-acteurs dans le nord du Ghana

Résumé

Amélioration de l'accès aux semences de qualité de variétés améliorées d'arachide par des plateformes multi-acteurs dans le nord du Ghana

L'une des principales contraintes à la production d'arachide a été l'utilisation de variétés à faible rendement, sensibles aux stress biotiques et abiotiques. Les plateformes multi-acteurs ont été utilisées par les organisations de recherche agricole pour aider à rendre leurs recherches plus pertinentes et pour faciliter l'adaptation et la diffusion des résultats. Dans la mise en œuvre du projet TLIII au Ghana, huit plateformes ont été mises en place dans le but d'améliorer la productivité de l'arachide grâce à un meilleur accès aux variétés et aux technologies connexes. Au cours des formations, des démonstrations et des journées paysannes, les 347 membres de la plateforme (dont 55% des femmes), ont été exposés à deux variétés améliorées existantes d'arachide et à plusieurs variétés candidates qui n'avaient pas encore été homologuées. Ces acteurs sont devenus d'importants fournisseurs de semences d'arachide de qualité dans leurs communautés et au-delà avec la production de 5 tonnes de semences des nouvelles variétés. Les parcelles de productions

semencières où des variétés améliorées ont été cultivées et gérées en utilisant de bonnes pratiques agronomiques (BPAs), ont donné des rendements allant jusqu'à 1,6 t/ha, soit une augmentation de 70% par rapport à l'utilisation de leurs anciennes variétés et pratiques dans leurs champs de production qui ont donné moins de 0,5 t/ha. Cette approche d'apprentissage sur le terrain s'est avérée très utile dans la volonté des membres de la plateforme d'adopter les technologies. D'autres avantages inattendus sont que grâce à l'utilisation des fonds collectés par les associations, l'assainissement et la santé de certains membres et de leurs familles ont été améliorés, et beaucoup d'entre eux se sont engagés dans des entreprises non agricoles. À l'avenir, de bonnes compétences en résolution de conflits et l'accès à des fonds de soutien aux activités de la plateforme et les projets individuels des membres seraient très importants pour la durabilité de ces plateformes.

Chapitre 6. Evaluation de l'impact du développement d'un système semencier arachidier efficace et durable dans le cadre du projet légumineuses tropicales (TLIII) dans le nord du Nigéria

Résumé

Evaluation de l'impact du développement d'un système semencier arachidier efficace et durable dans le cadre du projet légumineuses tropicales (TLIII) dans le nord du Nigéria

Le projet Légumineuses Tropicales III en tant qu'action de développement s'est concentré sur l'amélioration de l'accès des petits exploitants agricoles aux semences de variétés améliorées d'arachide à l'aide de plateformes multi-acteurs. L'outil électronique *Open Data Kit* a été utilisé pour collecter les informations auprès des membres de la plateforme à l'aide de questionnaires structurés et de discussions de groupes cibles. Des statistiques descriptives et le taux d'adoption ont été utilisés pour analyser les données. La sélection d'un site approprié pour le projet, des bénéficiaires fiables, un approvisionnement en semences en temps opportun et une formation aux bonnes pratiques agronomiques (BPAs) et une supervision efficace de la production ont été les principaux facteurs de succès du projet TLIII. Les résultats ont indiqué que les membres ont généré des revenus supplémentaires allant de 214 US\$ à 453 US\$ par hectare pendant la saison humide. Aussi, en raison de l'intervention du projet, une augmentation du revenu des bénéficiaires pendant la saison sèche, de 193 US\$ à 823 US\$ par hectare a-t-elle été reportée. En outre, les résultats ont indiqué un accès accru des agriculteurs aux services (par exemple, semences améliorées, services de vulgarisation, facilités de crédit, marché, etc.) et une productivité accrue (taille du champ, rendement en gousses et en fourrage). Les résultats ont aussi révélé une augmentation moyenne du prix de vente de 21,5% et 18% pour la production d'arachide durant respectivement les saisons sèche et humide. Il y avait un taux d'adoption élevé (78%) de semences améliorées et d'autres BPAs. L'étude recommande la nécessité de reproduire des interventions similaires dans d'autres zones. Le renforcement continu des capacités sur les BPAs et l'amélioration des compétences en gestion d'entreprise des agents de vulgarisation et des organisations de producteurs contribueront à la durabilité des succès du projet TLIII.

Chapitre 7. Amélioration de la production et de la productivité du pois chiche grâce à l'approche de la plateforme d'innovation en Ethiopie

Résumé

Amélioration de la production et de la productivité du pois chiche grâce à l'approche de la plateforme d'innovation en Ethiopie

Le pois chiche (*Cicer arietinum* L.) est la troisième légumineuse en superficie et en production après le haricot et les féveroles en Éthiopie. Cependant, en raison de la non-utilisation de variétés et de technologies améliorées générées par le système de recherche, la productivité de la culture était très faible par rapport à son potentiel. Pour relever l'utilisation des technologies améliorées issues de la recherche, une plateforme nationale d'innovation du pois chiche a été créée en 2013 dans le but de rassembler différents acteurs agissant sur la chaîne de valeur afin d'identifier les principaux défis et de trouver des solutions qui seraient mises en œuvre par des efforts conjoints. La plateforme a identifié la pénurie de semences comme un goulot d'étranglement majeur dans le secteur. Ce problème a été résolu par la création d'associations de producteurs de semences, aidés par des partenaires de la Recherche pour le Développement (R&D), et qui sont devenus les principaux fournisseurs semenciers du pays suite à cette expérience. Cette plateforme a simultanément renforcé les efforts de vulgarisation et déclenché la diffusion de technologies améliorées auprès d'un grand nombre d'agriculteurs. En conséquence, la productivité des agriculteurs modèles a triplé et quadruplé tandis que la productivité nationale a doublé pour atteindre près de 2 tonnes/ha⁻¹ au cours de la dernière décennie. La plateforme a également travaillé sur l'amélioration de l'accès au marché et, depuis peu, le pois chiche fait partie de la Bourse des Valeurs Agricoles en Ethiopie. Consciente de l'énorme potentiel de développement de cette culture, la plateforme s'efforce désormais de renforcer davantage l'intervention et de saisir les opportunités.

Chapitre 8. Des producteurs mieux organisés vers l'autosuffisance en semences de pois chiche dans la région du Bundelkhand en Inde

Résumé

Des producteurs mieux organisés vers l'autosuffisance en semences de pois chiche dans la région du Bundelkhand en Inde

Afin de relever le défi de la faible disponibilité de semences de qualité de variétés améliorées de pois chiche dans la région de Bundelkhand de l'état d'Uttar Pradesh, en Inde, des petits exploitants, partenaires du projet TLIII ont été organisés en quatre sociétés semencières agréées d'agriculteurs. Ces sociétés semencières formées dans les districts de Banda, Hamirpur et Chitrakoot ont contribué au renforcement du système semencier formel de pois chiche en fournissant 21,8 tonnes de semences de pois chiche (semences de base / semences étiquées) des variétés recommandées (kabuli: Ujjawal, Shubhra; Desi: JG 14, JG 16 & JAKI 9218) qu'elles ont vendu auprès de sociétés semencières institutionnalisées. Plus de 1 500 agriculteurs ont directement reçu les semences améliorées par le biais des sociétés semencières payannes tandis que 1788 agriculteurs non-partenaires les ont reçues indirectement via les relations sociales. Les interventions ont augmenté la productivité du pois chiche de 0,78 à 1,19 t/ha dans les villages d'interventions du projet. Les efforts des

sociétés semencières paysannes ont permis de renforcer le système semencier informel grâce à une diffusion horizontale de paysan à paysan qui, a contribué à augmenter la superficie cultivée en variétés de pois chiche introduit jusqu'à 68% dans les villages du projet tout en mettant en place un système d'approvisionnement en semences améliorées de pois chiche, ce qui peut être reproduit dans d'autres districts de l'Inde.

Chapitre 9. Développement d'un système semencier durable de niébé pour les petits exploitants agricoles via les plateformes d'innovation au Nigéria: une expérience du projet TLIII

Résumé

Développement d'un système semencier durable de niébé pour les petits exploitants agricoles via des plateformes d'innovation au Nigéria: une expérience du projet TLIII

L'accès et l'utilisation limités de semences de qualité de variétés améliorées figurent parmi les principales causes de la persistance de faibles rendements de niébé au Nigéria. Cet article présente les expériences du projet Légumineuses Tropicales III (TLIII) visant à faciliter l'accès des petits exploitants aux semences de variétés améliorées de niébé grâce à la mise en place des plateformes d'innovation (IPs) qui ont été introduites en 2015 dans le cadre des activités du projet TLIII. Les agriculteurs ont adopté et utilisé rapidement des variétés nouvelles, commercialisées grâce à une sensibilisation accrue par le biais d'outils et stratégies de communication multi-médias adaptées. Au cours des quatre années du projet (2015-2018), sept plateformes multi-acteurs (MSP), comprenant six sociétés semencières, 46 organisations de producteurs, cinq entreprises semencières publiques, deux ONG et 718 entrepreneurs semenciers individuels et d'autres acteurs ont été établies et/ou renforcées afin de relier les acteurs de la chaîne de valeur du niébé. Les producteurs de semences communautaires ont été mis en relation avec des sociétés semencières tandis que celles-ci étaient reliées à des instituts de recherche pour l'accès aux semences de premières générations. Ces activités ont conduit à la production de plus de 532 tonnes de semences de base et de 8366 tonnes de semences certifiées / QDS de variétés améliorées de niébé qui ont été injectées dans le système semencier. Le rendement a presque doublé, passant de 500 à 900 kg / ha dans les champs des agriculteurs. Les revenus des femmes et des jeunes ont augmenté grâce aux activités de production semencière. L'approche des mini-sachets de semences a été un moyen efficace et peu coûteux pour atteindre plus d'agriculteurs avec des quantités à cout abordable et une large gamme de variétés.

Chapitre 10. La plateforme d'innovation de semence de niébé: un espoir pour les petits producteurs de semences au Mali

Résumé

La plateforme d'innovation de semence de niébé: un espoir pour les petits producteurs de semences au Mali

Le niébé est une culture vivrière très importante pour la population Malienne, en raison de sa contribution à la sécurité alimentaire, à l'amélioration des revenus des

producteurs et de son prix supérieur à celui des céréales sur le marché. Il joue également un rôle important dans les relations sociales. Cependant, la disponibilité de semences de bonne qualité est un obstacle majeur à sa production et productivité. Les semences étant le principal intrant agricole, une plateforme d'innovation a été créée à la station de recherche agronomique de Cinzana en mai 2016 afin d'améliorer la production et la distribution des semences de niébé au Mali. Cette plateforme qui regroupe des agriculteurs, des distributeurs d'intrants, des transporteurs, des services financiers et techniques et des ONG a favorisé un meilleur partage d'informations et de connaissances entre les différents acteurs impliqués dans la chaîne de valeur des semences de niébé. Deux organes de gouvernance ont été créés : le Comité de planification et le Bureau exécutif. Des résultats significatifs ont été obtenus en trois ans d'existence : le nombre de variétés utilisées est passé de 5 à 12. La quantité de semences de base produites annuellement est passée de 1 tonne à plus de 20 tonnes. La stratégie de vente des semences emballées en mini-sachets s'est avérée très efficace pour atteindre plus d'agriculteurs. Les activités promotionnelles ont impliqué 25 sessions de formation de 1097 agriculteurs sur différents aspects de la chaîne de valeur et 299 démonstrations qui ont enregistré la participation de 2934 producteurs et bénéficiées à 12193 agriculteurs.

Chapitre 11. Interventions et acquis de la plateforme d'innovation du niébé dans le cadre du projet TLIII au Burkina Faso

Résumé

Interventions et acquis de la plateforme d'innovation du niébé dans le cadre du projet TLIII au Burkina Faso

En juin 2015, quatre plateformes multi-acteurs (Sanguie, Zondoma, Soum et Association Yiye) ont été créées dans différentes régions du Burkina Faso pour la promotion des activités agricoles. C'est ainsi qu'en 2018, plus de 200 agriculteurs ont été formés sur différents aspects de la chaîne de valeur du niébé, la production de grains, le stockage et la transformation alimentaire. Par le biais de démonstrations, de journées de visites, des médias de masse et des relations sociales, les plateformes ont joué un rôle clé dans la diffusion de nouvelles variétés de niébé. Environ 160 démonstrations/an ont été mises en place par les membres des plateformes de 2015 à 2018. Chaque plateforme a été accompagnée pour produire des semences certifiées sur 10 ha totalisant 40 ha par an et 160 ha au cours de la période de quatre ans. En raison de la demande de semences de base qui augmentait d'année en année au Burkina Faso et avec l'incapacité de l'INERA à produire suffisamment de semences, les membres de la plateforme les plus performants ont été contractés par l'unité des semences de l'INERA pour produire des semences de base afin de répondre à la forte demande de semences certifiées dans le pays. Bien qu'il n'y ait pas de statistiques officielles sur la demande en semences certifiées produites au Burkina Faso, les événements récents attestent d'une augmentation de leur production. Par exemple, en 2018, environ 1000 tonnes de semences certifiées ont été produites par rapport aux années précédentes au cours desquelles moins de 700 tonnes avaient été enregistrées.

Chapitre 12. Impacts des plateformes d'innovation du niébé dans la durabilité des gains du projet TLIII au Ghana

Résumé

Impacts des plateformes d'innovation du niébé dans la durabilité des gains du projet TLIII au Ghana

Au cours des dernières décennies, les rendements de niébé au niveau des exploitations sont restés faibles (0,6–0,8 t/ha) comparé à ce qui est observé dans les parcelles de recherche (1,8–2,5 t/ha). Le manque d'accès des agriculteurs aux semences de qualité des variétés améliorées et des pratiques culturales inappropriées sont les principaux facteurs responsables de cette faible productivité du niébé. L'utilisation de plateformes d'innovations (IPs) comme stratégie de facilitation de l'accès des agriculteurs à des semences de qualité a donc été envisagée dans le cadre du projet Légumineuses Tropicales III (TLIII) et du Projet de vulagrification à grande échelle du niébé de l'USAID dans le nord du Ghana. Les activités de la plateforme ont commencé en 2016 avec un total de 100 membres ; un nombre qui a augmenté régulièrement pour atteindre 820 membres en décembre 2018. L'équipe de recherche du Conseil de la Recherche Scientifique et Industrielle- Institut Agricole de Recherche des Savanes (CSIR-SARI) a formé les membres de la plateforme dans la production des semences certifiées pour les communautés cibles, améliorant ainsi l'accès des petits exploitants aux variétés améliorées. Au total, 1848 membres de la plateforme ont été formés aux différentes opérations d'une exploitation agricole. Un système a été mis en place dans lequel chaque groupement de producteurs agricoles a été approvisionné en semences améliorées et, après la récolte, a retourné l'équivalent des semences reçues à la plateforme. Ayant été formés pour produire leurs propres semences, les membres de la plateforme ont gagné leur autonomie dans l'acquisition de semences améliorées et sont activement engagés dans diverses opérations en faveur de la durabilité des gains des deux projets qui sont à leur terme.

Chapitre 13. Une analyse croisée des expériences des plateformes d'innovation dans sept pays d'Afrique de l'Ouest et de l'Est et d'Asie du Sud

Résumé

Une analyse croisée des expériences des plateformes d'innovation dans sept pays d'Afrique de l'Ouest et de l'Est et d'Asie du Sud

Le projet Légumineuses Tropicales (TLIII), financé par la Fondation Bill et Melinda Gates (BMGF) a été mis en œuvre dans sept pays d'Afrique subsaharienne (Burkina Faso, Ghana, Mali, Nigéria, Éthiopie, Tanzanie et Ouganda) et en Inde en Asie du Sud. La pénurie de semences de variétés améliorées avait été identifiée comme le plus grand obstacle à l'adoption des nouvelles technologies agricoles par les agriculteurs. Cet article compare les différentes approches suivies par différents pays dans la mise en place de plateformes multi-acteurs pour la fourniture de semences améliorées de légumineuses aux agriculteurs. Les impacts de cette initiative sont mitigés et multidimensionnels. Les détails ci-dessous fournissent au lecteur un aperçu des raisons pour lesquelles cette stratégie a réussi dans certains pays et pas autant dans d'autres ainsi que ses implications pour la diffusion des technologies agricoles auprès des petits exploitants. Les principaux acquis sont notamment,

le renforcement des liens entre les différents acteurs de la chaîne de valeur des semences de légumineuses, la participation de plusieurs producteurs de semences à un système semencier décentralisé ayant entraîné une augmentation significative de la production de semences de légumineuses certifiées et de qualité déclarée ainsi que l'adoption et l'utilisation rapides de variétés nouvelles par les petits exploitants agricoles. En ce qui concerne les domaines où l'initiative n'a pas produit les résultats escomptés, il est conclu qu'à moins qu'une approche globale et bien pensée définissant les rôles clés de chaque acteur de la chaîne de valeur ne soit développée, les pénuries actuelles de semences se poursuivront, affectant les opportunités de marché émergentes et les bonnes intentions des partenaires au développement. Le lecteur est invité à consulter chaque article pour d'amples informations sur le processus suivi par chaque pays et par culture dans l'établissement des plateformes, leur composition, leurs principales réalisations, les défis et les leçons apprises pour l'amélioration globale des systèmes semenciers nationaux de légumineuses.

Chapitre 14. Plateforme d'innovation pour catalyser l'accès aux semences de variétés améliorées de légumineuses par les petits exploitants agricoles

Résumé

Plateforme d'innovation pour catalyser l'accès aux semences de variétés améliorées de légumineuses par les petits exploitants agricoles

La plateforme d'innovation résout des problèmes systémiques et ouvre des opportunités pour les acteurs des chaînes de valeur des commodités. Elle favorise le changement dans une grande gamme de domaines, y compris les barrières technologiques à l'augmentation des gains génétiques au champ, des services financiers et des privilèges pour le bon fonctionnement des activités semencières et d'autres activités agricoles, le changement social et l'égalité des genres dans la société. Elle engendre aussi de nouvelles opportunités sur le marché des commodités, contribue à des interactions accrues entre les acteurs clés, l'usage des services électroniques pour une productivité et une production accrues des cultures, la durabilité des systèmes de production et de fourniture de différentes classes de semences par le biais d'une game d'acteurs clés.

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Editors and Contributors

About the Editors

Essegbemon Akpo has expertise in Plant production, Seed systems, Innovation studies, Participatory action research, and Multi-stakeholder processes. He graduated with Master and PhD degrees from “Université d’Abomey-Calavi, UAC”, Benin and Wageningen University (WUR), Netherlands, Respectively. He previously worked for Benin National Agricultural Research Institute as Junior Scientist, and GRAD Consulting Group as Seed and Innovation Platform Expert. His experiences in agricultural research for development covered improved seed access facilitation for smallholder farmers, connection between biophysical, social and institutional landscapes, participatory technology development, innovation platform support, capacity building for farmers’ organizations, youth and women. He earned several academic awards from UAC and WUR that permitted him to pursue graduate studies. Dr Akpo works for ICRISAT as seed systems scientist. He also teaches seed and plant production at “Université Nationale d’Agriculture, UNA”, Benin, capacitating young generation in quality seed delivery to farming communities. Dr Akpo published dozens of papers.

Chris O. Ojiewo is a skilled scientist with over 15 years professional experiences in sub-Saharan Africa and Asia on basic, applied, and adaptive plant breeding and seed systems research and development aimed at developing and delivering high yielding, nutrient dense, climate-smart, market-preferred varieties of vegetables, legumes and cereals. Promotion of vegetable-legume-cereal-livestock based family garden intensification systems, improving productivity and profitability for smallholder farmers, gender equity, youth empowerment, nutrition security, knowledge sharing and solving the perpetual problem of food and nutrition insecurity of resource-poor smallholder farmers, especially women and youth in rural and peri-urban semi-arid tropics are core to his sense of purpose. Together with various co-workers, he has researched and published over 100 scientific, technical and policy articles in his area of expertise. Chris obtained both M.Sc and PhD in Plant breeding from Okayama University, Japan; and his BSc. (1st Class) in Horticulture from JKUAT, Nairobi, Kenya.

Issoufou Kapran is Senior Scientist-Seed Systems Specialist at the West and Central Africa Regional Hub of the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT). Previously, he was Seed Officer and Coordinator for the West Africa Program of the Alliance for a Green Revolution in Africa (AGRA). He helped more than 40 seed companies and cooperatives of West Africa improve their technical capacity and financial leverage towards greater farmer access to quality seeds of improved varieties. Dr. Kapran's career started as a sorghum breeder and program leader at the "Institut National de la Recherche Agronomique du Niger (INRAN)". He released several varieties and hybrids, launched a seed unit, and co-organized the first West African Hybrid Sorghum and Pearl Millet Seed Workshop in Niamey, Niger. Dr. Kapran holds a PhD in plant breeding from Purdue University in the USA, and later a Distinguished Alumnus Award by the same university.

Lucky O. Omoigui graduated from the Ahmadu Bello University, Zaria, Nigeria. He is a Plant Breeder/Seed Systems Expert working at the International Institute of Tropical Agriculture (IITA), Kano, Nigeria. He has more than 80 peer reviewed international publications and has delivered numerous oral and posters presentations in many international meetings. Dr. Omoigui is currently leading the cowpea seed delivery component of the Accelerated Varietal Improvement and Seed Delivery of Legumes and Cereals in Africa (AVISA) project. Prior to joining IITA, Dr. Omoigui worked as a Professor of Plant Breeding and Genetics at the Department of Plant Breeding and Seed Science, Federal University of Agriculture Makurdi. He was awarded Arthur Anderson Best Graduating student. He received Recognition for Excellent Research contribution to West Africa Cowpea Consortium. He was also recognized as Outstanding Researcher at the University of Agriculture Makurdi. He is a Member of Agronomy/Crop Science Society of America.

Agathe Diama is the Head of Regional Information for ICRISAT, West and Central Africa Programme. She is based in Bamako, Mali where she coordinates and oversees the implementation of communication activities for ICRISAT-WCA. Agathe is a graduate from the University of Bamako in Sociology and Anthropology. She holds also a Diploma in journalism from the Institute Jesse Louis Jackson, a Master degree in Economic and social administration from the "Institut Supérieur de Technologies Appliquées (TechnoLAB-ISTA)", Bamako, and a specialized MBA in Communication from ESG Group, Paris. Agathe has worked previously with the Voice of America (VOA) and with the International Finance Corporation—IFC (World Bank Group) as a Communication specialist. Since joining ICRISAT as lead regional communication in West and Central Africa, Agathe Diama is currently the Regional Coordinator of ICRISAT's Smart Food campaign in West and Central Africa as well.

Rajeev K. Varshney an agricultural scientist, is Research Program Director, Genetic Gains at ICRISAT. He has over 20 years research experience in international agriculture. Before joining ICRISAT, he worked at IPK-Gatersleben, Germany. He provided strategic leadership, as Principal Investigator for Tropical

Legumes II and Tropical Legumes III projects that facilitated the release of 177 varieties touching 11.2 million lives in sub-Saharan Africa and Asia. Prof. Varshney is recognized as a leader in genome-sequencing, genomics-assisted breeding, translational genomics and capacity building in international agriculture. He has genome sequences of nine crops and several molecular breeding products in legume crops to his credit. Prof. Varshney, a highly prolific author and a frequent invited speaker is an elected Fellow of several leading international and Indian academies/societies. He provides leadership by serving as member/chair for several committees, editorial boards, funding organizations and advisory boards in international agriculture research, development and capacity building.

Contributors

Sanou Ouedraogo Adelaide Institut de l'Environnement et de Recherche Agricole (INERA), Ouagadougou, Burkina Faso

Temitope Ademulegun International Institute of Tropical Agriculture, Kano, Nigeria

Desmond Adobaba Consortium for Scientific and Industrial Research-Savanna Agricultural Research Institute (CSIR-SARI), Tamale, Ghana

Desmond S. Adogoba CSIR-Savanna Agricultural Research Institute (CSIR-SARI), Tamale, Ghana

H. A. Ajeigbe International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Kano, Nigeria

Essegbemon Akpo International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Nairobi, Kenya

Gerald Alex Tanzania Agricultural Research Institute Naliendele (TARI), Dodoma, Tanzania

Ibrahim K. D. Atokple Consortium for Scientific and Industrial Research-Savanna Agricultural Research Institute (CSIR-SARI), Tamale, Ghana

Joseph B. Batiéno Institut de l'Environnement et de Recherche Agricole (INERA), Ouagadougou, Burkina Faso

S. K. Chaturvedi ICAR-Indian Institute of Pulses Research (ICAR), Kanpur, India

Mekasha Chichaybelu Ethiopian Institute of Agricultural Research (EIAR), Addis Ababa, Ethiopia

Wubishet Chiche Ethiopian Institute of Agricultural Research (EIAR), Addis Ababa, Ethiopia

Kléouforo M. Dao Cinzana Agronomic Research Station, Ségou, Mali

Happy Daudi Tanzania Agricultural Research Institute (TARI), Dodoma, Tanzania

Kaly Diakite Group of Research and Support to Seed Producers, Kathmandu, Nepal

Fodé Diallo Institut d'Economie Rurale (IER), Kayes, Mali

Agathe Diama RP-WCA, ICRISAT, Bamako, Mali

Gabriel A. Diasso Institut de l'Environnement et de Recherches Agricoles, Station de Kamboinsè (INERA), Ouagadougou, Burkina Faso

G. P. Dixit ICAR-Indian Institute of Pulses Research (ICAR), Kanpur, India

Busagri Douglas CSIR-Savanna Agricultural Research Institute (CSIR-SARI), Tamale, Ghana

Folocoum Doumbia Institut d'Economie Rurale (IER), Kayes, Mali

Compaore Evelyne Institut de l'Environnement et de Recherche Agricole (INERA), Ouagadougou, Burkina Faso

Moussa Fané Institut d'Economie Rurale (IER), Kayes, Mali

Asnake Fikre International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Hyderabad, India

Umar Garba Kano State Agricultural and Rural Development Programme, Kano, Nigeria

Pooran Gaur International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Patancheru, India

Tesfaye Geleta Ethiopian Institute of Agricultural Research (EIAR), Addis Ababa, Ethiopia

Bekele Gemechu Ethiopian Institute of Agricultural Research (EIAR), Addis Ababa, Ethiopia

Nigusie Girma Ethiopian Institute of Agricultural Research (EIAR), Addis Ababa, Ethiopia

M. Halliru Department of Agricultural Economics and Extension, Bayero University, Kano, Nigeria

Sidibe Hamadou Institut de l'Environnement et de Recherche Agricole (INERA), Ouagadougou, Burkina Faso

Zongo Hamadou Institut de l'Environnement et de Recherche Agricole (INERA), Ouagadougou, Burkina Faso

Bashiru Haruna Consortium for Scientific and Industrial Research-Savanna Agricultural Research Institute (CSIR-SARI), Tamale, Ghana

Mohammed Haruna Consortium for Scientific and Industrial Research-Savanna Agricultural Research Institute (CSIR-SARI), Tamale, Ghana

Teryima Iorlamen Federal University of Agriculture Makurdi, Makurdi, Nigeria

Abdul Rashid Issah CSIR-Savanna Agricultural Research Institute (CSIR-SARI), Tamale, Ghana

Nater Iyorkaa Federal University of Agriculture Makurdi, Makurdi, Nigeria

Neya B. James Institut de l'Environnement et de Recherche Agricole (INERA), Ouagadougou, Burkina Faso

J. M. Jibrin Centre for Dryland Agriculture, Bayero University, Kano, Nigeria

Alhassan Nuhu Jinbaani CSIR-Savanna Agricultural Research Institute (CSIR-SARI), Tamale, Ghana

Athanas Joseph Tanzania Agricultural Research Institute (TARI), Dodoma, Tanzania

Alpha Y. Kamara International Institute of Tropical Agriculture, Ibadan, Nigeria

Issoufou Kapran RP-WCA, ICRISAT, Bamako, Mali

Gnankambary Karidiatou Institut de l'Environnement et de Recherche Agricole (INERA), Ouagadougou, Burkina Faso

Benjamin Karikari CSIR-SARI, Tamale, Ghana

Consortium for Scientific and Industrial Research-Savanna Agricultural Research Institute (CSIR-SARI), Tamale, Ghana

Yamba Kienthéga Direction Provinciale de l'Agriculture et des Aménagements Hydrauliques de la Sissili, Sissili, Burkina Faso

Zoumana Kouyate Cinzana Agronomic Research Station, Ségou, Mali

Poda S. Leandre Institut de l'Environnement et de Recherche Agricole (INERA), Ouagadougou, Burkina Faso

Abdoul Karim Malle Cooperative Society of Agricultural Services (Zamoho/Koutiala), Koutiala, Mali

Oumar Malle Cooperative of Seeds Producers at Dakoumani/Bla, Bla, Mali

Tiruaynet Mekuriaw Ethiopian Institute of Agricultural Research (EIAR), Addis Ababa, Ethiopia

Amos Miningou Institut de l'Environnement et de Recherches Agricoles, Station de Kamboinsè (INERA), Ouagadougou, Burkina Faso

Charles Mkandawile Tanzania Agricultural Research Institute (TARI), Dodoma, Tanzania

Humphrey George Mlimbila Tanzania Agricultural Research Institute (TARI), Dodoma, Tanzania

Abdul Razak Mohammed Consortium for Scientific and Industrial Research-Savanna Agricultural Research Institute (CSIR-SARI), Tamale, Ghana

S. G. Mohammed Centre for Dryland Agriculture, Bayero University, Kano, Nigeria

Emmanuel S. Monyo Alsem Company Limited, Arusha, Tanzania

Omari K. Mponda Tanzania Agricultural Research Institute (TARI), Dodoma, Tanzania

David Ndolelwa Tanzania Agricultural Research Institute (TARI), Dodoma, Tanzania

Joseph Nzunda Tanzania Agricultural Research Institute (TARI), Dodoma, Tanzania

Chris O. Ojiewo International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Nairobi, Kenya

Lucky O. Omoigui International Institute of Tropical Agriculture, Kano, Nigeria

Richard Oteng-Frimpong CSIR-Savanna Agricultural Research Institute (CSIR-SARI), Tamale, Ghana

Doris K. Puozaa CSIR-Savanna Agricultural Research Institute (CSIR-SARI), Tamale, Ghana

Masawudu Abdul Rasheed CSIR-Savanna Agricultural Research Institute (CSIR-SARI), Tamale, Ghana

Jean-Claude Rubyogo International Center for Tropical Agriculture (CIAT), Cali, Colombia

Uma Sah ICAR-Indian Institute of Pulses Research, Kanpur, India

Dramane Sako Institut d'Economie Rurale (IER), Kayes, Mali

Barry Silamana Institut de l'Environnement et de Recherche Agricole (INERA), Ouagadougou, Burkina Faso

N. P. Singh ICAR-Indian Institute of Pulses Research, Kanpur, India

Reuben Solomon International Institute of Tropical Agriculture (IITA), Ibadan, Nigeria

Oumar Togola Cinzana Agronomic Research Station, Ségou, Mali

Abdoulaye Traore Group of Research and Support to Seed Producers, Kathmandu, Nepal

Appolinaire S. Traoré Institut de l'Environnement et de Recherches Agricoles, Station de Kamboinsè (INERA), Ouagadougou, Burkina Faso

Mamary Traoré Institut d'Economie Rurale (IER), Kayes, Mali

Rajeev K. Varshney Research Program – Genetic Gains, International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Patancheru, India

Julius Yirzagla Consortium for Scientific and Industrial Research-Savannah Agricultural Research Institute (CSIR-SARI), Bawku, Ghana

Bertin M. Zagré Institut de l'Environnement et de Recherches Agricoles, Station de Kamboinsè (INERA), Ouagadougou, Burkina Faso

Apolinaire Zoungrana ONG FERT/Kaya, Kaya, Burkina Faso



General Context of Smallholder Farmers' Access to Seed of Improved Legume Varieties and Innovation Platform Perspectives

1

Essegbemon Akpo, Chris O. Ojiewo, Issoufou Kapran,
Lucky O. Omoigui, Agathe Diama, and Rajeev K. Varshney

Abstract

The high percentage of farmers (80–90%), including the pro-poor in remote areas, who have no access to recently released and high-yielding varieties proves the failure of various seed delivery models implemented so far. The ideal model to grow a crop commodity business to reach farmers in developing countries with seed of improved legume crop varieties has been a hard topic for development organizations. Past studies have shown that the full and balanced integration of multiple stakeholders' knowledge and contexts into the process of agricultural technology development increases the uptake and ownership among end users.

Keywords

Improved legume variety · Productivity of smallholder farming · Seed delivery model · Innovation platform · Sub-Saharan Africa and South Asia

E. Akpo (✉) · C. O. Ojiewo
International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Nairobi, Kenya
e-mail: e.akpo@cgiar.org

I. Kapran · A. Diama
RP-WCA, ICRISAT, Bamako, Mali

L. O. Omoigui
International Institute of Tropical Agriculture, Kano, Nigeria

R. K. Varshney
Research Program – Genetic Gains, International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Patancheru, India

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1.1 Introduction

Seed is the single most important input in crop production. The lack of quality seed limits smallholder farmers' production and productivity of developing countries in sub-Saharan Africa (SSA). Most precious asset of smallholder farmers passed on from generation to generation, the seed alone as input, is estimated to contribute up to 20% of total crop productivity. Despite this, only an average of about 20% of farmers in sub-Saharan Africa use seeds of improved varieties. The availability of seed of improved varieties supported by other inputs and services is important for increased crop yield and agricultural production and in most cases guarantees household food security. Good supply systems ensure farmers' or households sustained ability to sufficient quality of the desired types of seed at the right time (Kiwanka and Kintu 2004). The average legume crop yield attained by smallholder farmers in developing countries in SSA is still low (below 1000 kg/ha) compared to the potential yield under good management. For grain legumes, e.g. groundnut, cowpea and chickpea, the productivity is linked to limited access to seed of improved varieties for planting. The low productivity is also linked to harsh and unpredictable weather conditions as well as a complex of insect pests and disease problems that the old varieties can no longer withstand, knowing that many of these old ruling varieties are aged between 20 and 50 years and beyond when new pests and diseases are constantly evolving with time. The pressure of other biotic stresses makes the situation even worse as the parasitic weeds such as *Striga gesnerioides* (Wild.) Vatke and *Alectra vogelii* (Benth.) can potentially reduce the yield of legume crops by 50% (Mahmoud et al. 2013; Ayeni et al. 2017). Improved, climate-resilient, and high-yielding crop varieties offer a practical and sustainable way of adapting to the harsh environmental conditions that are characteristic of dryland regions. For example, while the national average for most legume crops is still below 1000 kg, the new improved varieties have been tested to produce two to threefold over the current yield farmers get with most old ruling varieties. In recent years, many new climate-resilient legume varieties specifically bred for increased tolerance to traits associated with a variable and changing climate, with high productivity output market-fit, and responsive to the farmer need have been developed and released by national agricultural research systems with support of the Consortium of International Agricultural Research Centers (CGIAR), e.g. ICRISAT, IITA, CIAT. Up to recently, many of these varieties were unknown to the vast majority of smallholder farmers in the dryland farming communities, indicative of a weak seed system. Improved varieties adoption has scored low in most developing countries of SSA (Garbero et al. 2018).

The high percentage of farmers (80–90%), including the pro-poor in remote areas, who have no access to recently released and high-yielding varieties proves the failure of various seed delivery models implemented so far. For decades, a variety of seed and other technology delivery models have been developed with intention to serve the highest number of smallholder farmers with improved technologies. The rate of replacement of old ruling varieties with new improved ones is still lower than development partners would like to see. The state-controlled model with extension

services distributing improved seed is no longer adequate to serve the ever-growing number of smallholder farmers widely spread in rural communities. The NGOs' community approach model has not reaped at scale either. The community seed production and distribution efforts usually end when projects come to an end. The private seed companies alone have not been very effective in targeting farmers in remote areas. The traditional location of private seed companies falls short to involve small farmers with inconsistent seed demand from one year to another. The fitness of old ruling varieties to farmer contexts and the output market was not good enough to attract large and consistent consumer demand. For open pollinated varieties, and self-pollinated food legume crops, farmers hardly renew seed and varieties annually and plant most of their plot to home-saved seed. All these challenges make it difficult for the commodity value chain to grow into large business opportunities for farmers and other actors to sustain their daily livelihood.

1.2 Role of Innovation Platform in Change Facilitation

Developing more innovative mechanisms building on the strengths of currently existing seed technology delivery models is critical. The ideal model to grow a commodity business to reach farmers in developing countries with improved seed of legume crop varieties has been a hard topic for development organizations. Past studies have shown that the full and balanced integration of multiple stakeholders' knowledge and contexts into the process of agricultural technology development increases the uptake and ownership among end users (Akpo et al. 2015). During the past decade, Innovation Platform (IP) has been put forward as a social space for information sharing and learning for innovation by various stakeholders who have interest in solving a value chain challenge, be it, a problem or an opportunity. Innovation platform gathers relevant stakeholders who meet physically or virtually to address issues of common interest. The outcomes of innovation platform interactions and participation bring benefits to every actor involved through three key principles: (1) the recognition of the complexities of the issues that affect sustainable productivity, production, processing, marketing and utilization of agricultural commodity; (2) the integration of research and development along the commodity value chain whereby productivity, market outlets, management of natural resources, policy ecosystems, product development, gender and youth are purposely balanced; (3) the use of innovation system approach as core intervention strategy where various actors contribute collectively to identify problems, understand the context, explore relevant solutions, implement, monitor and assess the solutions for adjustment to make a difference in the lives of stakeholders and communities involved (Adekunle et al. 2013). Innovation platform can operate at operational level or strategic level. The operational platforms are located at the grassroots' level, under the auspices of strategic platform set up at higher level to define strategic orientations, options and axes. The roles of the operational IP are joint diagnostic with the different ground actors, validation of technological options through demonstrations, validation of mechanisms to access different services, e.g. credit, information, market, support to

farmers' organizations, and facilitate interaction between farmers through cross-visit, exchange days, field days, facilitate interactions between ground actors for experience sharing and learning, build actors' capacity (farmers, processors, traders, etc.). The roles of the strategic platforms are to engage facilitators (researchers, extensionists, NGO professionals) to better support IP, facilitate experience sharing among facilitators to enforce mutual learning, create institutional support to the IP, negotiate better market access to IP members, facilitate mechanisms to access various services, i.e. credits, markets, technical supports. Most of the platforms reported in this book are operational platforms working closely with farming communities.

The use of innovation platform to enhance smallholder farmers' access to seed of improved varieties of legume crops through the Tropical Legumes phase III (TL III) project represents a major initiative. The outcomes of the Tropical Legumes project interventions deserved to be shared with practitioners and other professionals for learning and reflections to inform future technology delivery initiatives. The seed sector is a full value chain that requires collective actions among actors along the seed value chain to deliver the various seed classes, i.e. breeder or pre-basic seed, foundation or basic seed, certified and quality declared seeds. These different seed classes are handled by various actors whose interactions need proper coordination to these important planting materials in a sustainable manner. Specifically, for early generation seed of legume crops, timeliness of availability is a major challenge that only concerted efforts of various players can solve. This is the main reason the TL III project selected IP as the main mechanism to deliver its seed delivery component.

1.3 Aim of this Book

The aim of this book is to share with the wider research, development and scientific communities, the experiences of TL III in facilitating smallholder farmers' access to seed of improved legume varieties through innovation platforms in seven developing countries, i.e. six sub-Saharan African countries Burkina Faso, Ghana, Mali, Nigeria in West Africa, Ethiopia, Tanzania in East Africa and India for the past 12 years (Monyo and Varshney 2016). In this book, we used the concepts innovation platform, multi-stakeholder platform and platform concurrently meaning, a physical or virtual space for interactions, learning and innovation along the legume commodity value chains for different actors who have interest to have a challenge resolved.

1.4 Structure of the Book

This book is organized into 14 Chapters. Chapter 1 is an introductory general context of smallholder farmers' access to legume seed. Chapter 2 presents the groundnut seed production and distribution through the Southern Groundnut Platform (SGP) in Tanzania. The power of SGP to leverage different categories of

knowledge brokers for farming practices improvement is presented. The observed increase in groundnut production and business over years is highlighted. Chapter 3 shows the progress made in groundnut value chain in Burkina Faso thanks to seed of improved varieties. The quality declared seed and certified seeds produced and sold to the local communities at affordable price and in small packs are presented. Chapter 4 sheds light on the achievements made in groundnut production and marketing systems with male and female seed producers in Mali. Kolokani platform contributions to groundnut seed value chain and farmers' relief in seed acquisition have been synthesized and analyzed. Chapter 5 presents the added value gained in seed access through innovation platform using the case of groundnut business development in Ghana. The importance of various actors as sources of high-quality groundnut seed in their communities and beyond in the production and delivery of the new varieties has been presented. The seed farms where improved varieties were planted and managed using good agronomic practices (GAPS) yielding up to 70% higher than the old varieties and practices are illustrated. Chapter 6 presents one case of the multiple platform experiences for groundnut in Nigeria. The accrued additional and twofold income for innovation platform members during dry and wet seasons thanks to the TLIII interventions is reported. The increasing access by farmers to various services (e.g. improved seeds, extension, credit facilities, market, etc.) and enhanced productivity (farm size, pod and haulm yields) are highlighted. The high adoption rate of improved variety and other GAPs are presented. Chapter 7 shares the experiences of progress imparted on chickpea value chains and seed business through multi-stakeholder platform in Ethiopia. The way the platform strengthened the extension efforts and triggered dissemination of improved chickpea technologies to a large number of farmers is presented. The three to fourfold increased productivity of chickpea by model farmers and the doubling of the national productivity in the last decade in Ethiopia are highlighted. The platform experience on improving access to market for chickpea farmers is shared. Chapter 8 presents the boost to chickpea productivity observed in project areas thanks to seed of improved chickpea varieties in India. It highlights to what extent the seed societies formed in different districts contributed towards strengthening the formal seed system of chickpea by contributing in quality seed of recommended varieties, marketed to institutionalized seed chains. The thousands of partner farmers with direct access to improved seed through farmers seed societies and indirectly through social networks are presented. The way the efforts of the farmers' societies strengthened the informal seed system through farmer-to-farmer horizontal diffusion resulted in area enhancement under the introduced chickpea varieties in the project villages is further elaborated. In Chap. 9, the facilitation of cowpea seed access to remote farming communities in Nigeria is presented. The rapid adoption and use of newly released varieties by farmers as a result of increased awareness of improved varieties through multi-media and user-friendly communication strategies and tools are presented. The connection of community-based seed producers to seed companies and seed companies to research institutions to access early generation seed (EGS) is underlined. The increased production of basic seed, certified/QDS seed of improved cowpea varieties, and twofold yield increase on farmers' field are highlighted. The increase of

women and youth incomes as a result of seed entrepreneurship is also presented. Chapter 10 proves the effectiveness of innovation platform to build stakeholders capacity and grow cowpea seed business in Mali. It describes how bringing together farmers, distributors, transporters, financial and technical services, and NGOs ensured greater sharing of information and knowledge among the different actors involved in the cowpea seed value chain. It presents the significant results achieved regarding the number of varieties available for farmers, the amount of foundation seeds produced annually, the effectiveness of small seed packs to reach more farmers, the promotional activities and training sessions for farmers in different aspects of the value chain areas. Chapter 11 demonstrates how informal and formal sectors are driving the cowpea seed sector that works for the whole commodity value chain in Burkina Faso. The key role the platforms played in the dissemination of new cowpea varieties through demonstrations, field days, the mass media and social media is underlined. The increasing demand for foundation seeds in Burkina Faso and INERA's Seed Unit sub-contracting platform members to produce foundation seeds as out-growers is presented. Chapter 12 shares the experience of a seed revolving scheme set up for cowpea in Ghana. Each farmer group was supplied with improved variety seed that was paid back after harvesting. Having been trained to produce their own seed, members of the platform were self-reliant in acquiring improved seed and are actively engaged in various operations that sustain their gains after the phased out of projects. Chapter 13 presents the cross-case analysis of the 11 innovation platform experiences in seven countries. It compares the different approaches followed by different countries in the establishment and implementation of multi-stakeholder platforms for supply of improved legume seed to farmers. The reader is provided with insights into the level of success of innovation platforms in the different countries and implications for agricultural technology dissemination to smallholder farmers. Chapter 14 presents the concluding remarks highlighting the progress made through the multi-stakeholder platform in the different countries, the main lessons drawn from TL III experiences and how these can inform future initiatives to facilitate improved agricultural technologies delivery to farmers and other actors along commodity value chains in developing countries.

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Groundnut Seed Production and Distribution Through Multi-Stakeholder Platforms in Southern Region of Tanzania

2

Gerald Alex Lukurugu, Omari Kalanje Mponda, Essegbemon Akpo, Emmanuel S. Monyo, Joseph Nzunda, Happy Daudi, Athanas Joseph, Hamphrey George Mlimbila, David Ndolelwa, and Charles Mkandawile

Abstract

Southern Groundnut Platform (SGP) was established in 2016 to enhance seed access and adoption of improved groundnut varieties by farmers. The platform serves all districts in Lindi and Mtwara regions and Tunduru district in Ruvuma region. The platform has 53 members of which 22 are females and 31 are males. Since its establishment, there has been a marked increase in farm advisory services using government extension officers, community extension services and lead farmers. Groundnut seed production and distribution networks have increased to include more actors such as NGOs, seed companies, farmers groups and individual seed entrepreneurs. The increased seed access to farmers in the southern zone has contributed to 11% increase in area under cultivation resulting in 15% increase in groundnut production in Nanyumbu district between

G. A. Lukurugu (✉) · O. K. Mponda · J. Nzunda · H. Daudi · A. Joseph · H. G. Mlimbila · D. Ndolelwa · C. Mkandawile
Tanzania Agricultural Research Institute (TARI), Dodoma, Tanzania

E. Akpo
International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Nairobi, Kenya

E. S. Monyo
Alssem Company Limited, Arusha, Tanzania

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2012 and 2018. New market linkages formed helped improve farm gate prices by 80% (from Tshs. 1000 to 1800). The platform also introduced 29 new labour saving technologies reducing women drudgery and increasing farmer improved varieties choice from 3 to 11 new varieties released between 2009 and 2018.

Keywords

Improved groundnut varieties · Quality declared Seed · Smallholder farmers · Innovation platform

2.1 Introduction

Tanzanian seed sector has a wide variety of public, private sector and civil society actors. The breeding programme in the country is conducted by both public and private sectors. Public sector breeding programme is conducted through a network of seven zonal centres of Tanzania Agricultural Research Institutes (TARI) located throughout the country (ASARECA/KIT 2014). A number of private seed companies including SeedCo, Suba Agro, Kibo Seed Co. Ltd, Pioneer and Monsanto have also invested in seed breeding, predominantly in maize (Kalinda et al. 2014). The breeding materials used by the public sector are primarily sourced from the international agricultural research institutions such as International Maize and Wheat Improvement Center (CIMMYT) e.g. maize, the World Vegetable Center (AVRDC) e.g. tomato and leaf legumes, or International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) e.g. groundnut (Madulu et al. 2016). However, other breeding materials are also sourced within the public sector e.g. National Agricultural Systems (NARS).

In Tanzania, the groundnut breeding programme aims to develop and maintain improved varieties after it is released. At the production stage there are four classes of seeds produced including breeder or pre-basic seed, foundation or basic seed, certified seed and quality declared seed (QDS). Each category of seed is public registered class. Breeder seed of public varieties is produced by the TARI's centres (chiefly by TARI Naliendele, Mtwara), while basic, or foundation, seed is produced almost exclusively by the public seed company Agricultural Seed Agency (ASA). The production, processing and storage of certified seeds are done by private seed companies. The quality declared seed is produced and marketed by farmer groups, private seed entrepreneurs with the confinement of the ward geographical area. According to the seed unit of Ministry of Agriculture (MoA), there are 65 registered seed companies in Tanzania producing certified seeds.

Seed is primarily sold through agro-dealers, although some seed companies and the ASA also engage in direct sales to farmers. The MoA has a list of over 4000 registered agro-dealers; however, only half of them are estimated to be actively selling inputs (Chambers et al. 2013). The enabling environments that impact the entire seed value chain include government institutions (MoA, Tanzania official Seed

certification Institute (TOSCI) responsible for the variety release and registration, plant variety protection, seed certification, seed related enterprise registration and quality control in the seed market. Another component in the commodity value chain is seed market demand. This involves the end users of grain products.

In Tanzania, an estimated 75% of farmers continue to source their seeds through the informal seed system (Chambers et al. 2013). Access of seed through the formal systems is undermined by high seed prices, insufficient awareness of the benefits of certified seed, poor quality control of the formal seed market and a lack of output markets to absorb the increased production from improved seed technologies (ASARECA/KIT 2014). Most of the 65 registered seed companies in Tanzania are located in Arusha. The concentration of seed production in the North adds significant transportation costs to the price of seed in the market. Out of 65 registered companies, only seven seed companies have expressed interest of producing groundnut seeds (ASA, Temnar, Suba agro, Meru Agro, Alssem, Mbozi Highland Economic Group and Iffa seed co.). Most of these companies have started bulking groundnut seeds very recently say 2016–2017 after the intervention of TLIII project hoping that they will grow and become substantial contributors in production of groundnut seed through the Innovation Platforms like SGP. Therefore, groundnut certified seeds were hardly to be found before TLIII project. Only Quality Declared Seeds (QDS) were accessed by farmers through Farmer Research Groups, Non-Governmental Organizations and Individual seed entrepreneurs in the country. To increase groundnut seed access in the country, various multi-stakeholder platforms were established at national, zonal and district levels through TLIII project. The main objective of these platforms was to facilitate interactions, learning and innovation among different actors along the groundnut value chain to increase the productivity and production for different communities through improved and recently released varieties, and build capacity of smallholder groundnut farmers in the country. This paper highlights the key processes that made the multi-stakeholder platform, the key achievements and lessons learned in bringing improved legume seed to scale in Tanzania. In the next sections, we present the platform establishment, its composition, roles and responsibilities, and main activities.

2.2 Establishment of the Platform

In 2016 the Groundnut platform in the south eastern of Tanzania was established and called “*Southern Groundnut Platform*”. The main aim of this platform was to enhance seed access and adoption of improved groundnut varieties in the southern zone of the country. The zone serves Lindi and Mtwara regions and Tunduru district in Ruvuma region. Southern Groundnut Platform had 43 members when it was established in 2016. It has since grown to 53 members in 2018 of which 22 are females and 31 are males. It is worth noting that only six members out of 53 are youth (less than 35 years).

The establishment of *Southern Groundnut Platform* involved two meeting procedures. The first step was diagnostic. This step involved a team of two researchers

from TARI Naliendele, two groundnut traders and three District Agriculture Irrigation & Cooperative Officers (DAICO's) and one seed company representative. The team identified major challenges as well as opportunities in the groundnut value chain and relevant actors who could effectively resolve the identified challenges and/or opportunities. The major challenges identified included low adoption of improved groundnut varieties and marketing problems in the southern zone. The second meeting was conducted with all stakeholders to validate the identified challenges, to share information among actors and discuss how best to address the key challenges. Moreover, at this step the Southern Groundnut Platform was formally launched and all actors committed to address low adoption of improved groundnut varieties and marketing linkages to smallholder farmers. The major output was development of workplans to address the challenges and putting in place rules and regulations governing the operationalization of the Southern Groundnut Platform.

2.3 Composition, Roles and Responsibilities of the Platform Members

The Southern Groundnut Platform is composed of different actors having different roles and responsibilities as shown in the Table 2.1.

The platform has 53 members of different categories including Groundnut Researchers (5), extension unit (4), seed companies (3), Media people (6), Farmer Research Groups (6), Policy makers (2), Individual seed entrepreneurs (3), Grain Traders and Processors (5), financial institutions (2), Agro-dealers (1), NGOs (2), Local Government Authorities (4), Regulatory Authorities (6), Transporters (3) and Agricultural Marketing Cooperatives (AMCOS) (1).

2.3.1 Platform Governance Structure, Steering Committee and Arrangements in Place to Facilitate Smooth Implementation of Platform Activities

To ensure Southern Groundnut Platform better delivers outcomes to the members, a steering committee was formed to facilitate platform decision-making and implementation process. The steering committee composed of researchers, extension, NGOs and skilled representatives of primary beneficiaries. For the platform to solve emerging specific issues, working groups were formed involving different actors based on their interest in the groundnut value chain. Three working groups were formed: (1) Seed producers' group (Researchers, FRGs, Individual farmers and seed companies); (2) Seed marketing group involving seed companies, NGOs, Processors, LGAs and certification and (3) financing group (Banks, SACCOSS, VICOBA). For the platform activities to run smoothly every actor uses her own resources to gain her interest.

Table 2.1 Roles and responsibilities of members of The Southern Groundnut Platform

| Name of stakeholders | Sex | | Roles and responsibilities |
|--|------|--------|--|
| | Male | Female | |
| Tanzania Agriculture Research Institute Naliendele centre | 4 | 1 | Develop and maintain improved groundnut varieties and Production of breeder seeds |
| Tanzania Official Seed Certification Institute (TOSCI) and District Seed Inspectors in Nanyumbu, Masasi, Tunduru and Mtwara DC | 1 | 5 | Conduct field inspections, seed sampling and testing; accredit seed sampling and testing laboratories; train seed producers, inspectors and analysts; and carry out pre- and post-control tests. |
| Farmers and Farmer Research Groups (FRG's) representatives | 3 | 3 | Conduct PVS trials, demonstration plots, farmers field days and seed fairs; sensitize peer farmers |
| Public and private seed companies (ASA, Meru Agro & Temnar Ltd) | 3 | 0 | Produce and market certified seeds |
| Individual seed entrepreneurs | 3 | 2 | Produce and market QDS of groundnuts |
| Agro-Dealers (Tunduru Agro-dealers) | 1 | 0 | To distribute seeds by selling seeds to farmers |
| Regional Agriculture Advisor (RAA) | 2 | 0 | Facilitate agricultural sectoral policy and plan implementation at the level of Local Government |
| Local Government Authorities (LGAs)-Nanyumbu DC, Masasi DC and Tunduru DC and Mtwara DC | 3 | 1 | Bring to farmers good groundnut production practices, and promote improved new groundnut varieties within farming communities through sensitization |
| Agricultural Marketing Cooperatives (AMCOS) | 1 | 2 | Capacitate farmers' formation of association for collective production and marketing |
| Wafanya Biashara Soko Kuu (WABISOKO)-Mtwara means Association of Grain Business People in Mtwara main market | 0 | 2 | Groundnut grain purchase and sale in large quantity |
| Processors | 2 | 1 | Processing groundnut into butter, oil and other consumable products |

(continued)

Table 2.1 (continued)

| Name of stakeholders | Sex | | Roles and responsibilities |
|---|------|--------|---|
| | Male | Female | |
| Mikindani Women Processors | 0 | 2 | Groundnut Processing and value addition |
| NGO's—CARE International (T) – Kikundi Mwamvuli Masasi (KIMAS) | 2 | 1 | Facilitating multiplication and distribution of seeds (subsidies/trainings), Promotion of improved seeds. Link farmers with the community extension officer |
| Financial institution; banks (NMB, CRDB), SACCOS, VICOBA | 2 | 0 | Provision of loans (credits) to stakeholders; facilitation of groundnut transport to markets/clients |
| Media: Radio (Pride FM and Jamii FM) and Television (ITV, TBCI, AzamTV, Channel 10) | 4 | 2 | Broadcast crafted message on comparative advantage of new groundnut varieties against the old ones; cover demonstration and field days' events; produce documentaries in local language on groundnut business |
| Total | 31 | 22 | |

2.4 Platform Activities

2.4.1 Description of the Different Platform Activities

Southern Groundnut Platform (SGP) was set up to create awareness of groundnut improved varieties to farmers and other stakeholders, scale out adoption of groundnut seed, increase pre-basic, basic, certified and QDS seed production. Furthermore, the other key function is to increase groundnut Market linkages and networking.

2.5 Creating Awareness Through Popularization of Improved Groundnut Varieties

To achieve the above objective, platform members established demonstration plots, organized field days and seed fairs, conducted trainings to farmers, seed companies and individual seed entrepreneurs on improved seed production and marketing.

2.5.1 Establishment of Demonstration Plots

In the southern zone more than 100 demonstrations were established in Masasi, Nanyumbu, Tunduru and Mtwara districts to showcase improved released varieties. In these demonstrations the released and local varieties are compared side by side on a 0.25 acre plots for farmers to practically self-appreciate their performance and preferred traits. Traits observed included yield, pest and disease resistance, drought tolerance, maturity, pod filling and number of pods per plants. Varieties demonstrated included Mnanje 2009, Naliendele 2009, Mangaka 2009, Masasi 2009, Nachingwea 2009 and Nachi 2015. Furthermore, since 2015–2018, a total of 2942 farmers participated in these demonstrations of which 1339 are females and 1603 are males.

2.5.2 Farmer Field Days

Platform members organized farmer field days on the demonstration plots to showcase Good Agricultural Practices (GAP) and performance of improved groundnut varieties with implementing farmer groups or individual seed entrepreneurs. The events gave platform members a chance to showcase their achievements by using improved groundnut varieties and the general farming population an opportunity to know about the varieties. Members showed good practices for sustainable groundnut production to fellow farmers and other stakeholders. The field days were typically hosted by farmers themselves with some assistance from Extension officers, NGOs Staffs and TARI Naliendele researchers. The host farmers share information and farming practices with participants and engage in discussion to learn from each other. Participants in these field days included researchers from TARI Naliendele,

policy makers at ward level (ward councillors), seed companies, extension officers at district and village levels, farmers within and nearby villages, Religious Institutions, Media workers (radio and TV programmes), Agricultural students in primary and secondary schools and NGOs. The Southern Groundnut Platform organized a total of 24 field days in Mtwara, Masasi, Nanyumbu and Tunduru districts during 2015–2018. In these field days a total of 12,408 farmers participated of which 5782 are females and 6626 are males. Moreover, 4621 promotional materials including leaflets, factsheets and production guides were distributed to participants during field days. The number of female and male participants who received promotional materials distributed during field days was 2956 and 1665, respectively.

2.5.3 Agricultural Seed Fairs and Exhibition Shows

This was another method used by SGP members to popularize the improved groundnut varieties. Most of these events were done in the rural areas in the village settings where seed companies, Farmers groups, Agro-dealers, Researchers, media partners, Extension officers and farmers were invited as part of increasing farmers' awareness and access to improved groundnut varieties (Fig. 2.1). Not only groundnut varieties were promoted but also improved seeds of other crops were displayed. This gave a chance to agro-dealers, seed companies, farmer groups and other stakeholders to promote their work and sell their product to farmers.

The Southern Groundnut Platform (SGP) successfully organized and participated in four National Agricultural Exhibition shows and three rural seed fairs from 2015 to 2018. The national agricultural exhibition shows were conducted in Ngongo Lindi while the rural seed fairs were conducted in Nanyumbu, Masasi and Tunduru



Fig. 2.1 Participants at seed fairs in Mtwara

districts at Mnanje, Mpeta and Ligunga villages, respectively. Moreover, 7280 farmers and other stakeholders (3159 females, 4121 males) visited different technologies displayed.

2.5.4 Disseminating Electronic (TV and Radio) Programmes and Print Media

For the groundnut technologies to reach a wider audience, different TV and radio programmes were recorded and aired through different TV and radio stations. The locally available radio stations in the southern zone were used including Pride FM, Safari FM and Info radio. Moreover, Tanzania Broadcasting Corporation (TBC1), Channel 10, AzamTV and ITV Tanzania were among the TV stations used to popularize groundnut improved varieties. These media were used to promote different improved groundnut varieties to the farmers. Six groundnut varieties including Mangaka 2009, Mnanje 2009, Nachingwea 2009, Naliendele 2009, Masasi 2009 and Nachi 2015 were promoted widely through the above-mentioned stations. These have increased the demand of improved groundnut varieties not only to the southern zone but also to the whole country. People from different parts of the country are now demanding improved groundnut varieties. Since 2015 to 2018, the platform facilitated 69 TV and Radio programmes and printed information that have been recorded and broadcasted by TBC1, ITV Tanzania, Channel 10, AzamTV, Habari Leo, and Mwananchi newspapers.

2.5.5 Conducted Farmer Participatory Variety Selection (FPVS)

Farmer Participatory varietal selection (FPVS) involved farmers in selecting finished or near finished groundnut elite germplasm from plant breeding programmes to ensure that farmer input is included in the breeder decision-making process before releasing the varieties. The process exposed farmers to different groundnut planting materials that will be available to them even after the release of improved groundnut varieties. From 2015 to 2018, a total of 3506 farmers participated in FPVS of which 1440 are males and 2066 are females. The FPVS increased farmer access to improved planting materials and help them select groundnut cultivars that better suit their local growing conditions and market demand. Seven (7) groundnut cultivars including five pre-released varieties and two released groundnut cultivars were used in FPVS. The pre-released groundnut varieties used were ICGV-SM 08503, ICGV-SM 07599, ICGV-SM 01514, LOCAL and ICGV-SM 07509. While the released groundnut varieties used in FPVS were Mangaka 2009 and Nachi 2015.

2.6 Increase Production of Pre-Basic, Basic, Certified/QDS Seeds of Groundnut Varieties

Members of the SGP observed that, there was low production and access of improved groundnut varieties in their zone and proposed joint collaboration for increased production of pre-basic, basic, certified and QDS seed. Responsibility of producing pre-basic seeds was given to researchers while production of basic seeds was under the responsibility of Agricultural Seed Agency (ASA) which is a public seed company. Certified seeds in the southern zone were under a private seed company called TEMNAR co. Ltd. Responsibility of QDS production was given to Farmer Research Groups, NGOs through their farmers' network, Primary and secondary schools and Religious institutions (Churches and Mosques) and individual seed entrepreneurs within communities.

2.6.1 Pre-Basic Seed Production

To ensure enough seed is available to different stakeholders, TARI Naliendele improved its irrigation infrastructures under TLII project support by increasing production cycles within a season (Fig. 2.2). This has enabled TARI to produce more than 40.8 t of pre-basic seeds for the period from 2015 to 2018.

2.6.2 Basic Seed Production

Thanks to the platform initiative, the Agricultural Seed Agency has started producing groundnut basic seed of Mnanje 2009, Naliendele 2009 and Mangaka 2009 since 2016. From one seed production site in 2016, ASA has now increased to three to get basic seed much closer to groundnut farming communities. In 2018/2019 farming season ASA has cultivated 8 ha of groundnuts including 4 ha for Mnanje 2009 2 ha for Naliendele 2009 and Mangaka 2009 respectively. To complement ASA effort in basic seed production, TARI Naliendele used to sub-contract ten Farmer Research Groups and five individual seed entrepreneurs to produce groundnut basic seeds in the southern zone. The basic seed produced was sold back to TARI Naliendele. The basic seeds bought were distributed in the form of seed loan to other farmer groups, NGOs, Individual seed entrepreneurs to produce QDS seeds that are sold to other farmers in the zone. For decentralized basic seed production, TARI Naliendele has established linkages with other sister research stations i.e. TARI-Tumbi in Western zone, TARI-Uyole in the Southern Highlands, TARI-Ukiriguru in the Lake Zone and TARI-Makutupora in the central zone. The collaborative efforts with other sister research stations managed to produce 12 tons of basic seed from 2015 to 2018.



Fig. 2.2 Irrigation facilities for increasing breeding cycle and pre-basic seed production

2.6.3 Certified Seed Production

The platform through TLIII project has elicited both public (ASA) and private seed companies (TEMNAR, MERU AGRO, IFFA and SUBA AGRO) who have already started bulking certified seeds. In the southern zone, Temnar company Ltd. and Meru Agro and Tour Consult Ltd. are also producing groundnut certified seeds. IFFA seed company and Suba Agro are producing groundnut in Mbeya regions as well.

2.6.4 QDS Production

To increase improved seed access to farmers in remote communities, the platform in the southern zone has facilitated linkages with five NGOs including CARE international through WWF, AGAKHAN foundation, Anglican Church Diocese of Masasi, SWISS Aids and Nawaje Mosque in groundnut seed production through their Farmers' Networks. Moreover, the platform has established a base of 137 farmer research groups in Mtwara, Lindi and Tunduru district in Ruvuma region to produce QDS seeds. Furthermore, the programme is working with 107 individual seed entrepreneurs (63F, 44 M) in QDS production. From 2015 to 2018, the platform through its collaborative efforts with other partners produced 446 tons of QDS seeds in the southern zone.

2.7 Market Linkages and Networking

During the platform meetings distinguishing traits of the improved groundnut varieties were identified as a selling strategy of these varieties to consumers. These were compiled into leaflets, factsheets and other promotional materials and aired into different TV and radio programmes to create demand of improved groundnut varieties. Some of the distinguished traits of the promoted groundnut varieties are presented in Table 2.2.

Farmers in the southern zone were linked to RECODA, LGA and different traders who buy groundnut seed and sell to other stakeholders throughout the country.

The above-mentioned platform activities managed to address three main challenges including inadequate supply and access of improved groundnut seeds, poor

Table 2.2 Market-driven traits

| Variety name | Year of release | Market-driven traits |
|-----------------|-----------------|--|
| Mnanje 2009 | 2009 | <ul style="list-style-type: none"> – Highest oil content (51%) than other released varieties – Has highest Iron 65.4 mg/kg – Very sweat when cooked and in raw form |
| Mangaka 2009 | 2009 | <ul style="list-style-type: none"> – Highest zinc 94.5 mg/kg than other released varieties – Has 2–3 kernels per pod |
| Naliendele 2009 | 2009 | <ul style="list-style-type: none"> – Highest protein (34.5% w/w) than other released varieties – Maturity 90–100 days |
| Masasi 2009 | 2009 | <ul style="list-style-type: none"> – High oil content (46.9%, second to Mnanje) and resistant to rosette |
| Nachingwea 2009 | 2009 | <ul style="list-style-type: none"> – Maturity 110–120 days – Contain 77 mg/kg zinc |
| Nachi 2015 | 2015 | <ul style="list-style-type: none"> – Yield potential 2 t/ha – Has high protein (32.4 mg/kg) third to Naliendele – Bold seeds and resistant to rosette disease |

awareness and adoption of improved groundnut varieties and poor marketing linkages and poor networking.

2.7.1 Facilitation of Platform Activities, Including Meetings

The first meeting of Southern Groundnut Platform was organized by TARI Naliendele, where all cost related to the meeting were supported by TARI through TLIII project. However, other subsequent meetings were supported by members' organization and/or institute and TARI Naliendele only supported venue and meal (breakfast and lunch) for all participants. To enhance stakeholder participations, mainly farmer groups which by one reason or another had challenges in their specific seasons i.e. drought, pest and diseases, flood and affected groups income, TARI Naliendele had to support them attend annual meetings. All the meetings were called by TARI Naliendele. During the meetings participants vote for a chairman among the two proposed members, the timekeeper is also selected and a secretariat involving four members for capturing participants' inputs during the meeting is also selected among the meeting participants. During the meeting all members are given equal chance to contribute to the meeting agenda provided. Both oral and written contribution from meeting participants are noted by secretariats and presented at the end of the meeting. Then all participants pass through different issues presented by secretariat to reach agreements. The agreed issues will be shared as a meeting outcome to all members for implementation.

2.8 Achievements of the Platform

2.8.1 Increased Contacts with Extension and Farm Advisory Services

To ensure proper access to knowledge and farm advisory services to all stakeholders in groundnut value chain, the platform members used government extension services to reach farmers in the villages. Most of the villages and wards in southern zone have extension officers to serve farmers in their respective communities. In places where there is no government extension officer, the community extension service and lead farmers created by NGOs were used to reach their fellow farmers within the village. The approach of using community extension services is widely used by NGOs especially in places where there are limited government extension services.

Before membership to SGP majority of farmers in Mtwara, Masasi, Nanyumbu and Tunduru districts had limited knowledge of how to control pests and diseases, good agronomic practices (seed rate, spacing and good post-harvest management). After membership to SGP, farmers got more acquainted to extension officers within the districts who are fully mobilized to reach farmer groups. Community extension services, lead farmers, farmer group representatives and government extension

officers who were trained on good groundnut production and post-harvest practices got much closer to farmers, many of whom had never had previous contact with advisory services. Farmers were also trained on business management skills. For example, farmers in Mpeteta, Mnanje and Kidodoma villages in Masasi, Nanyumbu and Tunduru districts, respectively, were among the farmers who benefited from farming as business training intervention offered through TLIII. The other intervention was that conducted by Masasi High Quality Farmers Produce (MHQFP) Ltd., a farmer association responsible for increasing farmers' income. They trained 2103 farmers in 25 villages in Masasi district on good agricultural practices and importance of using improved varieties.

2.8.1.1 Achievements in the Areas of Access to Improved Seed and Other Inputs

Before membership to SGP groundnut farmers used old improved varieties released in the 1990s or before such as Pendo released in 1998, Johari released in 1985 and Nyota released in 1984. These old varieties were susceptible to rosette and other foliar diseases. Moreover, farmers also used their other local varieties such as Kanyomwa, Chimbuvila and Karanga njugu that are no longer adapted to current biotic and abiotic stresses and current market demand. It is worth noting that out of the old released varieties, Pendo 1998 was the most popular variety compared to others. Furthermore, before membership only farmers groups that had direct access to TARI Naliendele had access to improved seeds.

Membership to SGP brought much improvement in terms of seed access to farmers. SGP involved NGOs such as CARE international, Agakhan Foundation, Anglican Church Diocese of Masasi, Rural Oriented Sustainable Development Organization (ROSDO), Masasi High Quality and SWISSAID which have farmer networks in the regions. Improved seeds through these NGOs have widened the coverage areas and farmers throughout the zone. For example, through Masasi High Quality, 2103 farmers have accessed improved seed in 25 villages in Masasi district from 2014–2017. Moreover, ROSDO managed to distribute improved seed to 2700 farmers out of 5000 farmers in Mkapunda and Lisekese villages in Masasi district. In collaboration with NGOs farmers' network, a total of 1799.9 t of QDS seeds have been produced from 2016–2017 alone in the southern zone. Moreover, the number of improved varieties accessed by farmers increased from three old varieties to six new varieties. Farmers were able to replace the old varieties that were susceptible to foliar diseases to recently released improved groundnut varieties that are high yielding, drought tolerant and resistant to foliar diseases. The recent varieties stakeholders accessed after membership included Mnanje 2009, Naliendele 2009, Masasi 2009, Mangaka 2009, Nachingwea 2009 and Nachi 2015. Furthermore, not only platform members have benefited from the disseminated improved varieties. Through spill-over effects, other non-members have also gained from activities of the platform. For example, farmers in Mnanje village in Nanyumbu district who are members of SGP have shared improved seeds to more than 90% of groundnut farmers in their village. Beyond their communities, it was reported that they have sold improved seeds to other district councils e.g. Ruangwa, Lindi, Newala and

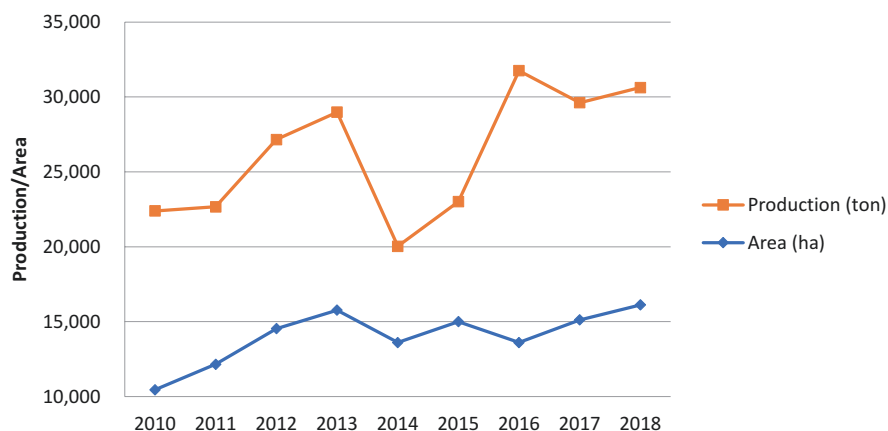


Fig. 2.3 Area and production of groundnut from Nanyumbu district from 2010 to 2018. Source: Nanyumbu District Council (2019)

Shinyanga. A total 11,250 farmers in 25 neighbouring villages have also benefited from improved seeds of groundnut produced in Mnanje village alone in Nanyumbu district.

The increased access of improved groundnut seed led to the increase in area and production of groundnut in the southern zone. In Nanyumbu district for example, the area and production of groundnut in the district have increased by 11% and 15%, respectively. Groundnut area in the district has increased from 14,540 ha in 2012 before membership to 16,125 ha in 2018 after membership. Groundnut production in the district has increased from 12,613 ton from 2012 before membership to 14,497 t in 2018 after membership (Fig. 2.3). The increase of area and production of groundnut in the district is attributed to the increased access to improved seed which are high yielding, resistant to pests and disease, drought resistant and with farmer and market preferred traits.

2.8.1.2 Achievements in the Areas of Improved Varieties Released from 2009 to 2019

In collaboration with partners within and outside the country, TARI Naliendele has managed to release 11 improved varieties resistant to biotic and abiotic stresses. These varieties are listed below in Table 2.3.

Out of 11 varieties released, six varieties were released during the TLIII project and the other five varieties were released during TLII project. Tropical Legume project has contributed significantly to the release of improved groundnut varieties by TARI Naliendele from 2007 to 2018. TARI Naliendele has released 11 improved varieties compared to six varieties released by the Institute since 1961 to 2006.

2.8.1.3 Achievements in the Areas of Access to New Markets, Finance and Other Services

Platform members in the southern zone have benefited from new market outlets from different parts of the country. Some of the groups in Masasi and Nanyumbu

Table 2.3 Improved varieties released by TARI Naliendele from 2009 to 2017

| Variety name | ICRISAT Name | Year of release |
|-----------------|---------------|-----------------|
| Naliendele 2009 | ICGV-SM 99555 | 2009 |
| Mnanje 2009 | ICGV-SM 83708 | 2009 |
| Mangaka 2009 | ICGV-SM 99557 | 2009 |
| Nachingwea 2009 | ICGV-SM 01711 | 2009 |
| Masasi 2009 | ICGV-SM 01721 | 2009 |
| Narinuts 2015 | ICGV SM 01731 | 2015 |
| Kuchele 2015 | ICGV 8326 | 2015 |
| Nachi 2015 | ICGV SM 90704 | 2015 |
| Mtwaranut 2016 | ICGV-SM 07599 | 2018 |
| Naliendele 2016 | ICGV-SM 08503 | 2018 |
| Tanzanut 2016 | ICGV-SM 01514 | 2018 |

districts are contract farmers producing groundnut pre-basic seed on behalf of TARI Naliendele. These groups are provided with seeds and all the production processes are supervised by TARI Naliendele and sell the final output to TARI Naliendele at the market price plus an incentive. Other farmers in the southern zone who produces groundnut seeds have been linked to their district council which buy seeds and distribute to other villages within their district. Moreover, Non-Governmental Organization i.e. RECODA and World vision bought groundnut seeds for their farmers' networks in Singida, Tabora and Dodoma regions. Moreover, marketing of groundnut grain was done by local traders who pass door to door during harvest season to buy groundnut from famers. Other traders established temporally groundnut aggregation and collection points through cooperative societies where groundnut grain is bought from farmers. Later on, the collected groundnuts are transported to Kariakoo market in Dar es Salaam and other town market.

Traditionally, the market prices of shelled groundnut in the southern zone at farmers' level increased from TZS 1000–1200/kg during the harvest season (May–August) to TZS 1800–2200/kg during planting season (December–February). Nowadays, the groundnut prices have increased thanks to the market-fit varieties farmers produce. The shelled groundnut price has increased from TZS 1000–1200/kg in 2014, to TZS 1500–1800/kg in 2018 during the harvest season. In the planting season (December–February) prices have increased from the usual TZS 1800–2200/kg to TZS 2400–4000/kg. The increased price has been attributed to the use of improved varieties that fit current market demand. The improved seeds were preferred by both farmers and traders because of softness of the pod, high yielding compared to local varieties, early maturity, large-sized kernels, (confectionary type) and high oil content.

2.8.1.4 Achievements in the Areas of Social Assets Including Affiliation to Associations and New Social Services

Umoja group at Mnanje village in Nanyumbu district was the only group in the village producing groundnut before membership to SGP. But after membership, Umoja facilitated the formation of ten new groups in the nearby villages as part of platform

activities to ensure that improved groundnut seeds are made accessible to as many farmers as possible. Income obtained from groundnut sales is used to purchase inputs (pesticides and fungicides) for cashew production in Mnanje village (the other important cash crop in the village). Shabila Musa is a female farmer (45 years old) in Masasi district. She started groundnut farming in 1999 using Pendo and Sawia released in 1998 and Johari released in 1985. Through income from groundnut farming as a member of the platform, she has been able to expand her original farm from 1 acre to 3 acres, bought another 19 acre farm, constructed two family houses and managed to take her children to school and handle the management cost for her cashew farm. Mapambano is another group in Mpeta village of Masasi district. This was the first groundnut research and production group created by TARI Naliendele and also a member of SGP. According to Andrew James, the village chairman of Mpeta, this group assisted the village with construction of two classrooms and a village dispensary using proceeds from groundnut production sales. SGP platform members have therefore gained recognition as important members of their community.

2.8.1.5 Achievements in the Areas of Gender Equality and Youth

Groundnut production in the country is cultivated by both males and females, however, women are the main providers of labour (Buchekeyi et al. 2010). The crop has been regarded as women crop because they are more involved in producing as compared to men for meeting the household food demands and income (Katundu et al. 2014). Despite, being major provider of labour for groundnut production, the major challenges faced by women in groundnut production were low yields, poor access to improved varieties, more time spent in planting and shelling groundnuts (Battista et al. 2014). To address the above-mentioned challenges, the SGP equally targeted both men and women in sensitization meetings on comparative advantages of the improved groundnut varieties. TARI Naliendele through TLIII project has procured 29 labour saving technologies, i.e. 4 ox-ploughs, 14 planters, eight threshers and three oil expellers which are being tested at different project sites including southern Tanzania. The use of these technologies will reduce drudgery in both women and men farmers in the country. Moreover, TARI Naliendele together with its partners such as NGOs, District councils and farmer groups have distributed six improved groundnut varieties that are high yielding, resistant to pests and diseases and drought tolerant. This has widened the choice and uses of varieties to farmers—for example Mangaka 2009 for high zinc (94.5 mg/kg), Mnanje 2009 for high iron (65 mg/kg) and oil (51%) and Naliendele 2009 for high protein content (34.5% w/w). Zinc and iron are important mineral nutrients to both men, women and children health in the society as they correct mineral malnutrition. The platform has built the capacity of both men and women in groundnut production and post-harvest technologies through business and entrepreneurship trainings, aflatoxin mitigation strategies and good agronomic practices. All these have attracted the attention of youths in the southern zone and are now producing groundnut seeds as cash crop.

2.8.1.6 Perceptions of Platform Performance

According to platform members, the SGP has opened doors for the many social and economic opportunities as a result of improved access to the new higher yielding varieties. For them, more efforts must be done to improve market access to groundnut produced in the regions. Platform members reported that TARI Naliendele has promoted too many varieties at once in the process confusing farmers regarding which varieties to take. It was suggested by platform members to focus on at least four with key market and farmer preference attributes for specific period of time so that the few available resources for promotion are used more efficiently. The district council proposed allocation of resources for fuel to distribute and supervise groundnut production activities in their respective districts including demonstrations, seed multiplication and PVS. Moreover, some platform members particularly farmer groups proposed exchange visits with other groundnut groups doing similar activities outside their regions to share experience, enhance learning and improve efficiency in doing their business.

2.8.1.7 Sustainability of Multi-Stakeholder Platforms

The proposal the district council puts forward to allocate some resources to support groundnut production activities i.e. demonstrations, seed multiplication and PVS in their respective districts is a good indication of ownership and subsequent sustainability of the platform interventions. In addition to the local government actions, several steps have been taken by TARI Naliendele to enhance sustainability of platform activities. These include:

- Involvement of more private sector operators who have resources to facilitate seed production and marketing activities.
- To ensure that every platform member has ownership. This means they should be financed by their institutions and/or organizations to participate in the SGP meetings.
- To incorporate more stakeholders particularly traders who will buy the grain produced by farmers.
- Link groundnut producing groups with financial institution i.e. NMB Foundation for Agricultural Developments (NFAD) which has shown interest of financing these groups to support commercial groundnut production and marketing.

2.9 Reflections on the Process

The collaboration between Research and private sector in demand creation activities has enabled TARI Naliendele to reach more farmers throughout the country. The operating cost of facilitating the innovation process is lowered as multiple partners brought on board allocate their own resources to perform some of the activities e.g. seed production, field days and monitoring activities. Even though some platform members still think that TARI Naliendele should take a lead in financing platform activities through project fund, we believe this is not sustainable. Projects such as

TLIII should only catalyse the bringing together of stakeholders to pursue their common interest. This is a major step forward compared to many past and recent platform experiences where everything collapses at the end of the initiating project.

2.9.1 The Significance of Observed Achievements for the Livelihood of Different Stakeholder Involved

The improved groundnut seed accessibility to farmers in the southern zone has led to the increased area, yield and income to all players in the groundnut value chain. Moreover, the increased private sector participation in seed industry development through seed production and distribution has changed livelihood of many farmers and groundnut stakeholders in the region by increased income and contacts to agricultural extension services. The introduction of labour-saving technologies will contribute to reduction in drudgery and save time that can be allocated to other income generating activities. Use of labour-saving technologies at scale will benefit other players in the groundnut value chain like processors and manufacturers of farm implements who will fabricate the required equipment.

2.9.2 The Significance of Observed Achievements for the Communities at Whole

The increased income by groundnut farmers in the southern zone have benefited villagers by building schools, dispensary and healthy centre in Mpetta and Mnanje villages in Masasi and Nanyumbu district councils. Moreover, the distribution and accessibility of high iron, zinc and protein varieties (Mangaka 2009, zinc (94.5 mg/kg), Mnanje 2009, iron (65 mg/kg), and Naliendele 2009, protein (34.5% w/w)) to the farming communities have significantly contributed to the upliftment of nutritional status of pregnant women, children, and the communities at large. Significantly important, training of groundnut post-harvest technologies has helped the communities to apply aflatoxin mitigating strategies and reduce danger from aflatoxin contamination common in groundnut farming communities.

2.10 Areas to Focus on in the Future

Membership Fee for Running Platform Activities Platform activities and/or assignments are run by members themselves using their own resource including meetings. Membership fees could help the SGP to run administrative issues and employ some staffs to monitor the overall implementation of platform activities.

Having a Permanent Chairman and Secretariat for Specific Period of Time The chairman of the meetings and secretariats are selected by members during the meet-

ing and can act on their position during the meeting period only. Having these posts for a certain period of time enable some important decision to be made before the annual meetings.

Establish a Platform Steering Committee The committee will monitor the implementation of the Platform's activities, resolve potential issues, and provide strategic guidance. In addition, the steering committee will assess the progress achieved by all platform members against the different action points adopted during annual meetings. The steering committee will be composed by representatives from all its member networks as agreed by members in the annual meeting.

Promoting New Improved Groundnut Varieties Released in 2018 TARI Naliendele has just released new groundnut varieties in January 2018 with good market attribute and well adapted to biotic and abiotic stresses. These varieties have not yet been exposed to farmers and other stakeholders along the groundnut value chain. Therefore, promoting these varieties now will help farmer to have alternatives in the future when replacing the old varieties that will have climate change issues.

Replicating Success of SGP Throughout the Country Key lessons learned from SGP will be replicated in lake, western, central and southern highlands zones. These lessons will enhance a well-structured groundnut market in the country and bridge information asymmetry between groundnut value chain partners.

Training on Good Agronomic Practices More farmers within and outside the SGP will be trained on good agronomic practices to increase groundnut productivity. Farmers will be able to use the recommend seed rate, appropriate spacing and other groundnut management practices.

Grain processors and/or traders creating demand for specific varieties Establish linkages between groundnut traders and/or processors with farmer groups that will have demonstrations plots to specific groundnut varieties desired by traders in different location. This will stimulate grain demand of improved groundnut and thereby creating demand for groundnut seeds produced by different partners.

2.11 Lessons Learned

- The wide choice of improved groundnut varieties to farmers from three old improved varieties released in 1980s and 1990s to five new improved varieties released in 2009 opens up new market opportunities for various actors.

- The increased contact of farm advisory services using government extension officers, community extension services and lead farmers has made a big difference in reaching farmers with improved technologies and knowledge even those located in remote areas.
- The increased groundnut seed production and distribution networks by NGOs, seed companies, farmers groups and individual seed entrepreneurs have facilitated seed availability and accessibility to farmers.
- The increased area and production of groundnut in the southern zone from 14,540 ha in 2012 to 16,125 ha in 2018 and from 12,613 ton in 2012 to 14,497 ton in 2018, respectively, have proved that innovation platforms are effective and led to increased business opportunities for stakeholders along the groundnut value chain.
- The dissemination of market-fit varieties led to increased market prices of shelled groundnut in the southern zone at farmers' level from TZS 1000–1500/kg in 2014 to TZS 1800–4000/kg in 2018.
- The sustainability of platform interventions requires efforts by all players within the groundnut value chain and not the sole commitment of few development organizations.
- Working in partnership with other stakeholders creates bigger impact and reduces operating cost (monitoring and supervision costs).

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An Analysis of Groundnut Innovation Platform Achievements in Brokering Improved Varieties to Communities in TL III Project in Burkina Faso

Amos Miningou, Appolinaire S. Traoré, Essegbemon Akpo, Issoufou Kapran, Bertin M. Zagré, Gabriel A. Diasso, Yamba Kienthéga, and Apolinaire Zoungrana

Abstract

Access to seeds of improved groundnut varieties is the most critical problem of farmers in Burkina Faso. Firstly, majority do not know the existence of improved varieties and secondly the price is not affordable to them. Based on the above, the INERA groundnut breeders' team established four innovation platforms on groundnut in the Region of Centre-East, Region of Centre-North, Region of Centre-West and Region de la Boucle of Mouhoun. Through these platforms, Quality Declared Seeds (QDS) were produced for the first time in Burkina Faso in 2016 with support from the Tropical Legumes phase III (TL III) project. Since then, QDS and certified seeds are produced and sold to the local communities at affordable small packs in order to make improved seeds accessible to the poor farmers. So far about 10,000 persons have been reached with small packs.

A. Miningou (✉) · A. S. Traoré · B. M. Zagré · G. A. Diasso
Institut de l'Environnement et de Recherches Agricoles, Station de Kamboinsè,
Ouagadougou, Burkina Faso

E. Akpo
International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Nairobi, Kenya

I. Kapran
RP-WCA, ICRISAT, Bamako, Mali

Y. Kienthéga
Direction Provinciale de l'Agriculture et des Aménagements Hydrauliques de la Sissili,
Sissili, Burkina Faso

A. Zoungrana
ONG FERT/Kaya, Kaya, Burkina Faso

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Farmers, agricultural extension and NGO staff have been trained in groundnut seed production, demonstrations, field days and Farmer Participatory Variety Selection (FPVS) to promote the improved varieties and the best agronomic practices. Farmers' yields increased from 500–700 kg/ha to 1200–1500 kg/ha increasing women and youth incomes from 200 USD to 800 USD/year only for those who grow groundnut during the rainy season. Those who grow during rainy and off-seasons their incomes can reach 1200–1500 USD. Links with financial institutions have facilitated access to credit for these farmers. In the future, the Platform sustainability will be assured through members' annual financial contributions and strong production contracts among traders, processors and farmers.

Keywords

MSPs · Seed dissemination · Demonstrations · Field days

3.1 Introduction

Until 1990, groundnut was the number one cash crop in Burkina Faso before cotton (Dyemkouma 2009). From 1990 to 2000, there was no project nor policy /program from Government towards groundnut production/promotion (FAO 2015). Few farmers' groups were interested in groundnut production, for example "Heresso" and "Mogoya" in the Western part of Burkina Faso.

The first problem facing groundnut stakeholders in Burkina Faso is the fact that the organization of farmers' groups is under the responsibility of the Ministry of Agriculture only but the task is huge because farmers are in small groups scattered in villages and districts and do not have official registration from administrative authorities to produce certified seeds. For crops like sesame, maize, cashew... value chains are relatively well structured. The first platform in Burkina Faso was around maize at Léo in the province of Sissili. But this is not the case for the small groups of farmers' organizations around groundnut. On one hand, some groundnut farmers are part of the national seeds producers' organization which is well structured with regional and district representations. On the other hand, groundnut processors and traders are not well organized as national or regional organizations although some localized groups exist. Thus, the concept of groundnut value chain does not exist, and groups are scattered.

The second problem facing groundnut stakeholders is farmers' lack of access to seeds of improved varieties. The mechanism of sharing information and knowledge is often not well functioning (Fayam 2018; Sanaka 2017) so improved varieties are not well promoted. Sometimes, the lack of seeds of improved varieties also parallels the lack of knowledge of improved varieties. This explains the low rate of adoption of improved varieties of about 10% (Fayam 2018; Masa 2013). Finally, only the seed producers who are members of the national seed producers' organization buy

the basic seeds from INERA (the national agricultural research institute) and produce certified seeds under the control of the national seed service, while other farmers can only produce groundnut for consumption.

Another problem is the cost of basic seeds in Burkina Faso which is 2100 in CFA franc (used in former French Colonies in West and Central Africa), the equivalent of approximately four United States Dollars (USD), which is not always affordable for smallholder farmers' groups. A certified seed producer is required by regulation to grow at least 3 ha of groundnut certified seeds which requires an investment of USD 320–400 in basic seeds at a rate of 80–100 kg/ha of unshell groundnut. This is why improved varieties were not well known by farmers and particularly by women who continue to grow their low yielding local varieties in traditional cropping systems. These women are disadvantaged for access to land and to improved varieties because they do not always have the money to buy the seeds of improved varieties and land belongs to men (Masa 2013).

Innovation platforms (also known as Multi-Stakeholders Platforms in our case) are ways to bring together different stakeholders to identify solutions to common problems or to achieve common goals. They ensure that different interests are considered, and various groups contribute to finding solutions (Anonymous 2013). An innovation platform is a dynamic structure including many stakeholders and it allows them to implement the principles of Integrated Agriculture Research for Development (IAR4D). In such a platform, the stakeholders use various methods and approaches to define in a participative way the problems and opportunities in the context of value chains.

The innovation platforms have as fundamental principle to bring together farmers, processors, inputs sellers, certified seed producers, traders, microfinance institutions and decisions makers. They are the place where the stakeholders of the same crop value chain are linked and can meet to discuss about opportunities and problems and make decisions. They are also good channels of seed dissemination in order to reach farmers through their groups or organizations. In these platforms, the entry points are farmers and the exits are processors and traders.

In order to contribute to the organization of groundnut farmers' groups, the groundnut breeders' team of INERA established four Multi-Stakeholders Platforms (MSPs) which are Innovative Platforms, in four administrative regions Region of Centre-East, Region of Centre-North, Region of Centre-West and Region de la Boucle of Mouhoun while two other platforms (Pouni and Gourcy) were jointly established with the cowpea breeders' team. The first one (Region of Centre-East) dates from September 2014. Through these platforms, farmers are continuously trained on groundnut production guidelines, groundnut post-harvest management, and in-field and post-harvest management of aflatoxins. High yielding improved varieties are introduced to farmers and the selection of new varieties is operated through farmer participatory variety selection (FPVS) during the field days organized each year for the duration of TL III project. QDS are an innovation in Burkina Faso through the TL III project. These seeds are produced using basic seeds provided by INERA groundnut breeders' team but instead of the conventional system the seeds are distributed only in local communities in a local seed business system;

the seeds are produced by the farmers of the MSPs, principally by women to reduce the gap between men and women for seeds production, under the control of INERA groundnut breeders' team. Thus, instead of official certification by the national seed service, the groundnut breeders' team guarantees the quality of the QDS.

3.2 Establishment of the Platforms

3.2.1 Year of the Establishment of the Main MSPs

Four (4) MSPs were established from September 2014 to May 2018 in the main zones of groundnut production in Burkina Faso (Table 3.1).

3.2.2 Number of Members at the Establishment

At the time of each platform establishment, 60 persons were invited comprising farmers, processors, traders, agricultural extension staff, political authorities like governors, media, financial institutions and researchers. The leaders of each category were chosen among the 60 persons (Table 3.2).

3.2.3 Current Number of Members

By this time, the members have increased to 200 persons in the Region of Centre-East and Region of Centre-North, 180 in the Region of Centre-West (Table 3.3). The platform of Region de la Boucle of Mouhoun was established in 2018 so the membership has not increased for the moment.

3.2.4 Number of Women

In each platform, women are the majority members: 70% (140/200) in the Region of Centre-East, 72.5% (145/200) in the Region of Centre-North, 66% in the Region of Centre-West (120/180) and in the Region de la Boucle of Mouhoun (40/60) (Table 3.4).

Table 3.1 Year of the establishment of the MSPs

| Platform | Year of establishment |
|--------------------------------|-----------------------|
| Region of Centre-East | 29–30 September 2014 |
| Region of Centre-North | 2–3 February 2016 |
| Region of Centre-West | 2–3 May 2016 |
| Region de la Boucle of Mouhoun | 17–18 May 2018 |

Table 3.2 Number of members at the establishment

| Platform | Number of members at the establishment |
|--------------------------------|--|
| Region of Centre-East | 60 |
| Region of Centre-North | 60 |
| Region of Centre-West | 60 |
| Region de la Boucle of Mouhoun | 60 |

Table 3.3 Current number of members in each MSP

| Platform | Current number of members |
|--------------------------------|---------------------------|
| Region of Centre-East | 200 |
| Region of Centre-North | 200 |
| Region of Centre-West | 180 |
| Region de la Boucle of Mouhoun | 60 |

3.2.5 Number of Youth (Under 35)

The youth in the platforms are mainly young women who are producing the groundnut. In the Region of Centre-East, they represent 10%, 12.5% in the Region of Centre-North, and 16.7% in both Centre-West and Boucle of Mouhoun regions. The representation of young people in platforms is presented in Table 3.5.

3.2.6 Overall Process of the Platform Establishment

The platforms were established in the major zones of groundnut production in Burkina Faso based on the national statistics of groundnut production for 5 years. In this paper, we will focus on the description of the establishment of three (3) MSPs (Region of Centre-East, Region of Centre-North and Region of Centre-West).

Two (2) MSPs (Region of Centre-East and Region of Centre-North) are under the authority of the governors of these regions and the MSP of the Region of Centre-West is under the authority of the high commissioner of the province of Sissili. They represent state authority. The establishment of the MSPs took place during a three (3) days meeting. The first day for the trainings, the second day for group formation and reflections on problems and opportunities and the third day for establishing the governing structure of the MSP. At the establishment the MSPs were composed of farmers, certified seeds producers, input sellers, traders, processors, local media, financial institutions like banks (Ecobank) and microfinance (UNCPB: National Union of Saving Bank of Burkina Faso), research institutes (INERA and IRSAT: Applied Sciences and Technologies Research Institute), the Ministry of Agriculture and NGO representatives. All these categories constitute the core of our platforms. At the end, a statement was read by the governor/high commissioner to mark the

Table 3.4 Number of women in each MSP

| Platform | Number of women |
|--------------------------------|-----------------|
| Region of Centre-East | 140 |
| Region of Centre-North | 145 |
| Region of Centre-West | 120 |
| Region de la Boucle of Mouhoun | 40 |

Table 3.5 Number of youths in each MSP

| Platform | Number of youths |
|--------------------------------|------------------|
| Region of Centre-East | 20 |
| Region of Centre-North | 25 |
| Region of Centre-West | 30 |
| Region de la Boucle of Mouhoun | 10 |

official setup of the platform and another statement is read by a representative of all the categories to commit themselves to work for the best functioning of the platform.

3.3 Composition, Roles and Responsibilities of the Platform Members

3.3.1 Different Categories of Stakeholder Members of the Platform

The Table 3.6 presents the various categories of platform members. During the establishment of the platform, the stakeholders were trained on the importance of a MSP, how a MSP functions, the importance of groundnut production, groundnut production guidelines, post-harvest management, groundnut disease management and in-field and post-harvest aflatoxin management. A training on farmers' group management was also provided to the participants.

After that, twenty (20) women per MSP were identified specifically for community seed production. These seeds are produced for local use in a local seed business under the quality control of the INERA groundnut breeders' team and the staff of the agricultural services as supervisors. Three (3) other farmers were identified to produce certified seeds under the control of the national seed service for the platform. In order to help the stakeholders to produce or to buy the groundnut, the financial institutions were required to facilitate access to credit at low interest rates because as pointed out by Ouoba et al. (2003) there were issues with the relatively high interest rates and the duration of the processing of the credit, which do not always make it possible for small scale farmers to use credit effectively.

Table 3.6 Number of members per category in each MSP

| Categories of members | Number of representatives at the establishment |
|-------------------------|--|
| Governor or prefect | 1 |
| Farmers | 20 |
| Traders | 15 |
| Processors | 15 |
| Local media | 2 |
| Financial institutions | 2 |
| Research institutes | 2 |
| Ministry of Agriculture | 2 |
| NGOs | 2 |

Table 3.7 Composition, roles and responsibilities of the platform members

| Categories of members | Roles and responsibilities |
|--------------------------|--|
| Governor or prefect | State authority, supervises the activities of the MSP |
| Certified seed producers | Produce certified seeds for the MSP, sometimes produce basic seeds for INERA |
| QDS producers | Produce QDS for the MSP to make seeds accessible for their communities |
| Traders | Buy and sell the groundnut of the MSP, look for markets |
| Processors | Buy and process the groundnut of the MSP, look for markets |
| Local media | Provide information about the activities of the MSP |
| Financial institutions | Help and facilitate access to credit for the members of the MSP |
| Research institutes | Lead the research activities, seed production, tests, field days and overall technical support |
| Ministry of Agriculture | Provision of farmer advisory services and policy directives |
| NGOs | Follow farmers' activities, advise them and promote groundnut varieties |

3.3.2 Composition, Roles and Responsibilities of the Platform Members

The roles and responsibilities of different platform members are shown in Table 3.7. The governor or the high commissioner is the moral authority and supervises the meetings of the platform. He also supervises activities of the platform and facilitates linkage of the MSP with other organizations under his authority.

The QDS are community seeds produced using basic seeds provided by the INERA groundnut breeders' team and under their quality control. The agricultural extension staff follow the QDS producers to make sure that the groundnut production guidelines have been well followed by farmers from land preparation to the storage steps. These seeds are used in the local communities but not at the national level. This is a local seed business. It permits farmers to get seeds of improved varieties at low prices in small packs. The producers of these seeds have been trained by INERA groundnut breeders' team on groundnut production technical guidelines,

diseases management, in-field and post-harvest management. The QDS production process started in June 2016. To begin with, twenty (20) women were identified per MSP, to produce the seeds and they were provided with 20 kg of unshelled groundnut and 25 kg of NPK fertilizer by the project. After harvest, the TL III project bought 40 kg from each woman, and gave the produce with fertilizer to two other women for QDS production. So, the numbers of QDS producers tripled, from 20 to 60 producers with 40 being new producers. And the following year, 40 kg were bought by the project from each of the 60 to give to 120 new producers making it a total of 180 producers. That is how the process went on for QDS production. From each producer, 5000 FCFA were collected for the account of the MSPs. The QDS production is done by farmers' organizations like UPPA (Provincial union of groundnut producers), AgroTechDev (Agro Technologie pour le Developpement)... at Léo and by other farmers' organizations under the responsibility of the French NGO FERT at Kaya.

On the other hand, certified seeds are produced by farmers who have the required registration to produce certified seeds with basic seeds under quality control of the national seed service. At the beginning three (3) certified seed producers were chosen in each MSP. This number is increasing because the project trained more than sixty (60) and is still training new certified seed producers. Each producer cultivated at least 3 ha of groundnut. The project also gives them basic seeds and fertilizer. At the end of the season, they reimburse the platform account for seeds and fertilizer received. These certified seeds are bought by the project to distribute to other members of the MSP for QDS production because INERA cannot meet the increasing demand of seeds needed for QDS production.

The processors were linked to seeds producers. They express in advance the quantities they need to process, and the farmers have to produce that for them. This permitted some farmers to boost their production capacity. For example, at Kaya, twenty women coming from different groups of processors expressed a demand of 396 tons of grain for 1 year. In the near future, strong contracts will be established between the two groups.

The NGOs, local seed enterprises and the extension service staff helped with the supervision of seed production by farmers. They are trained together with farmers on groundnut production, groundnut diseases management, post-harvest and aflatoxins management. They control fields, give advice, collect and weigh the harvest of each farmer. They help also with the identification of the new QDS producers in their areas.

The traders buy groundnut from farmers at agreed price and sell it. Some are prospecting regional and international markets. In the near future, strong contracts will be established between the two groups.

The financial institutions were required to facilitate the access to credit for the members of the MSP. They help farmers to gather the qualifying documents needed for credit and advise them on how to organize themselves to get easier access to credit.

The media (mainly local radios) were tasked to inform the local population on all the activities of the MSP. They communicate on the field days, FPVS implemented in the villages, the varieties preferred by farmers and their characteristics. They

inform also the population on the availability of QDS, the amount and the places where they can buy these seeds. They interview farmers, researchers and political authorities about the different activities and broadcast them.

3.3.3 Evolution of the Number of Members per Category

The Table 3.8 presents the evolution of the number of platform number per category of stakeholders.

3.4 Roles and Responsibilities of Different Stakeholders Participating in the Platform Activities

The Table 3.9 presents the roles and responsibilities of each category of platform member.

3.4.1 Platform Governance Structure

The platform is under the authority of the governor or the prefect. Then representatives from farmers, traders, processors, financial institutions, local media, research institutes, extension service staff and NGOs participate in the platform meetings and decision-making. Apart from these meetings, TL III project organized at least two meetings with farmers per year: the first (in January) to evaluate previous season groundnut production by farmers and the second (March or April) to plan the activities of the next rainy season and giving trainings to the new producers.

3.5 Platform Activities

3.5.1 Trainings of the Platform Members

Each year, the farmers were trained on the technical guidelines of groundnut production, groundnut diseases management, post-harvest management, pre and post-harvest aflatoxins managements during dry season to prepare them for the rainy

Table 3.8 Evolution of the number of members per category

| Stakeholders | Evolution per platform per year | | |
|--------------------------|---------------------------------|------|------|
| | 2016 | 2017 | 2018 |
| Certified seed producers | 20 | 40 | 60 |
| QDS producers | 60 | 180 | 540 |
| Extension services staff | 20 | 40 | 85 |
| NGO | 1 | 1 | 1 |
| Total of the 3 MSPs | 300 | 783 | 2058 |

Table 3.9 Roles and responsibilities of the steering committee

| Stakeholders | Roles and responsibilities |
|---------------------------|---|
| Governor or prefect | State authority who oversees the activities of the platform |
| QDS producers | Produce QDS to be given to other producers |
| Certified seeds producers | Produce certified seeds for the platform |
| Traders | Buy grains from producers and sell them to other persons |
| Processors | Buy grain from traders and farmers to process into paste, oil, “coura-coura”... |
| Financial institutions | Facilitate access to credits |
| Local media | Provide information about the platform |
| Research institutes | Support MSPs by providing basic seeds, fertilizer, training, field supervisions, seed quality, groundnut processing steps, quality steps— General technical backstopping |
| Extension services staff | Support farmers with on site timely crop management advise, seed selection, supervision of field activities and data collection. |
| NGOs | Organize farmers’ groups, supervise them to get good quality seeds |
| Local seeds enterprises | Support seed producers under their responsibility |

season. Then the new farmers receive 20 kg of unshelled groundnut and 25 kg of NPK fertilizer.

3.5.2 Basic Seed Production Contract with INERA Research Stations

INERA under the TL III project contracted seed producers and gave them breeder seeds to produce basic seeds. The basic seeds they produced were split in two sets, one to produce certified seed and the other to produce QDS for the benefit of the platform. The quality control of the certified seeds is done by the national seed services and for the QDS, by the INERA groundnut breeders’ team and the agricultural extension staff who follow the farmers. For certified seed producers the production cost was supported by the farmers and when the seeds were sold, the money was split between each farmer (70%) and INERA (30%). For QDS, the production cost was supported by the farmer and the money belongs entirely to the farmer. The amount of basic seed thus increased from 187 tons in 2015 to 395 tons in 2017 to 1056 tons in 2018.

3.5.3 QDS Production

At the beginning, we selected 20 women per platform to produce QDS by providing 20 kg of unshelled groundnut as basic seed and 25 kg of NPK fertilizer to each

woman. As agreed, each of these producers provided 40 kg of seeds to two new producers the second year (2017) so the total was 60 producers including 40 new ones per platform. By the third year (2018) there was 180 QDS producers per platform and an overall 540 QDS producers with 140 tons of QDS produced in 2018. The quantity of QDS produced from 2016 to 2019 is 215 tons.

3.5.4 Certified Seeds Production

In each MSP, this activity started with three certified seed producers who produced certified seeds for the MSP. These seeds help to produce R1 and R2 seeds as allowed for self-pollinated crops. The amount of certified seeds increased from 2360 tons in 2015 to 2934 tons in 2017 with now a total amount of 11,404 tons in 2018 from 70 individual producers, 20 farmers' organizations and 1 NGO involved.

3.5.5 Tests of Demonstration with Improved Varieties and Improved Technologies

Since 2015 in the first platforms, demonstration tests were set up in farmers' fields in order to compare improved varieties to farmers' local varieties. Field days were organized for farmers to appreciate and choose the best varieties at vegetative phase and at harvesting time. From these activities conducted in all MSPs during the three (3) years, improved varieties were always preferred by farmers. The varieties chosen by farmers were tested during 2 years at four locations under Nation Performance Trials and were described for Distinction Uniformity Stability. The yields of these varieties are superior to the previously released variety SH 470P. This permitted to register seven new varieties in the national catalogue of varieties (ICGV 91328, ICGV 93305 for aflatoxins tolerance, ICGV 01276 for foliar diseases resistance and ICGV-IS 13806, ICGV-IS 13830, ICGV-IS 13912 and KIEMA for drought tolerance).

A second activity relating to the transfer of improved technologies to farmers was sowing on ridges. It demonstrated to farmers the best way to sow in rows, to apply fertilizer, to weed and to harvest. The production increased to 30% compared to the sowing on flat land.

There were also tests of optimum planting dates which showed that sowing after 20 July risks loss of production due to the likelihood of lack of rains at the maturation time. Planting should therefore be done at the onset of planting rains but before 20th July. A total of 229 demonstrations were implemented (60 in 2016, 94 in 2017 and 75 in 2018) to come up with this recommendation.

3.5.6 Field Days

A total of 191 field days with ten varieties each year were organized by the TL III project including those conducted by INERA groundnut breeders' team (27 field days) and more organized by farmers with extension service staff (164 field days) because the breeding team did not have enough time to cover all the field days. The field days gathered women (80–90%) and men (10–20%) and allowed farmers to familiarize themselves with the new varieties. The local media were invited to cover these activities in the presence of the political authorities. This was one of the best ways to promote improved varieties.

3.5.7 FPVS

During the 191 FPVS events done during the TL III project implementation (3 in 2015, 21 in 2016, 92 in 2017 and 75 in 2018), farmers indicated their choice of best varieties for pod production, haulm production and other criteria like the colour of the seeds or the oil content. This activity took into account the gender aspects because men and women made their choice separately depending on their own criteria. This permitted to the breeding team to know the strengths and weaknesses of the different varieties used in the FPVS and to use this information for future varietal improvements. The local media were invited to cover these activities in the presence of the political authorities of the regions concerned.

3.6 Facilitation of Platform Activities Including Meetings

Mainly, research scientists in collaboration with extension service staff and the local media helped in the organization of the different activities of the platform. Annual activities were planned then discussed with the steering committee during the committee meeting and adopted. For example, the research team proposed the demonstration tests, field days, FPVS and the varieties to be used in these activities and the extension service staff proposed which farmers can implement these tests on the basis of the facilities they have (lands, level of education, appropriate materials for land preparation, the capacity to gather people for activities, the ability to explain the activity to other persons...), their localities and the calendar of supervisions.

Each year, as described above, the research team organized at least two meetings with the farmers, the first to know the amount of seeds produced during the previous season and the second to plan the activities of the next season.

The steering committee holds a meeting with the representatives of all the different categories to evaluate the activities conducted: what was good, not so good and bad, what and how to improve in the future.

Everyone is free to speak, and solutions and decisions are collectively made. In case of a particular problem, the committee or any category of the platform can hold a meeting to discuss the problem and solve it.

3.7 Achievements of the Platform

3.7.1 Access to Knowledge and Advisory Services

In Burkina Faso, the process of technology dissemination by the Ministry of Agriculture has shown serious limitations so an important agricultural constraint is that many farmers were not informed of the existence of improved varieties, and as a consequence the variety adoption level is still very low across the country. This situation is largely due to the fact that INERA is not part of this Ministry. For example, INERA has to contract the extension service staff (in the Ministry of Agriculture) to implement “farmers’ field schools”, demonstrations... Also, before the TL III project, no NGO was involved in groundnut promotion or production. They were working with maize, cowpea, rice. With this background the groundnut breeders’ team took the opportunity of the TL III project to contract the agricultural service staff, some NGOs like FERT as part of the MSPs to help in this field. They were not trained on groundnut apart from the basic courses taken at the agricultural school but now they learned about groundnut production and improved varieties (maturity duration and major traits). The results are interesting because through this, the agricultural service staff, and the NGOs promoted the improved varieties, helped farmers to measure the size of their production fields, and also helped monitor their activities and gave various advices. This permitted farmers to more than double their yields from 500–700 kg/ha to 1200–1500 kg/ha.

3.7.2 Access to Improved Seeds

In Burkina Faso, before the TL III project access to seeds of improved groundnut varieties was a challenge for farmers because these varieties were not well known by farmers and the price of basic seeds (2100 FCFA, about 4 USD) was not affordable to most farmers to enhance the production of certified seeds. Farmers continue to grow their very low yielding local varieties (500–700 kg/ha) on small areas varying from 0.25 ha to 1 ha (Masa 2013). INERA, through the TL III project, started and emphasized the QDS production to enhance access to seeds of improved varieties by farmers particularly women farmers. QDS made seeds of improved varieties more available for farmers at low price in comparison to certified seeds which are more expensive. It permitted to sell seeds in small packs which was an innovation in Burkina Faso. To increase seed access in remote areas, the TL III project at the beginning (June 2016) chose 20 women from different villages/MSP in the 3 MSPs and gave them seeds and fertilizers to grow QDS after they were trained on groundnut production. From the production of each of these women 40 kg were taken and new producers in other villages were identified and were also given seeds and fertilizers by the project to go on producing QDS after training. So, the seeds became accessible in remote areas. The project targeted to reach farmers with improved varieties seeds at low price (1 USD/kg). This was achieved because when the yields doubled at farmers’ level (from 500–700 kg/ha to 1200–1500 kg/ha), they increased

their profits and they were able to reduce the sale price to 1 USD/kg. On a ¼ ha some women producers got 300 USD. Each year, the number of QDS producers tripled in each MSP in an effort to cover the MSPs areas. The target is to cover all the zones of groundnut production with seeds of improved varieties.

Also, in each MSP, three farmers were selected to produce certified seeds for the MSP. These seeds were also used to reach more farmers through seed events. So far about 10,000 farmers were reached with small packs of groundnut seed, as a new idea and new concept for seeds of improved varieties to reach smallholder farmers. This has boosted groundnut production beyond the MSPs and throughout the country. In the past, farmers were growing groundnut on small areas, especially women farmers. Indeed, after SOFIVAR company closed (Society of Funding and Popularization of Groundnut), groundnut production levels fell, and farmers were not very interested in groundnut beyond their own consumption. SOFIVAR (created in 1985 and closed in 1997) was a public institution dedicated to financing groundnut production (gave seeds, fertilizers, mechanization tools, credits to farmers) and marketing (bought the production of the farmers and gave it to factories to process groundnut into pastes and oil) in Burkina Faso. Since the establishment of MSPs, with the training provided and the collaboration with agricultural extension staff, farmers including women and men are now very interested in groundnut production as seen in their request for seeds of improved varieties with QDS producers (more than 500 women in each MSP requested for seeds from current producers). The areas of production are increasing year after year and by now have reached more than 10,000 ha planted with seeds of improved varieties.

3.7.3 Access to Credit

The processors, traders and farmers were linked with the financial institutions to facilitate the market issues. Now the processors and traders know that groundnut grains are available from farmers and they can express their needs. In the three MSPs, 20 women processors expressed a demand for more than 300 tons per year during a meeting attended by financial institutions (Ecobank, microfinances institutions). This represented USD 300,000. This made a good impression on the financial institutions, so they decided to facilitate access to credit for the seed producers and general farmers, traders and processors and help them with advice. Processors took the initiative to deposit their own transactional funds in an account in order to facilitate access to credit from the bank. The interest rate on loans given to different stakeholders (4%) is below the current market rate because the financial institutions are also part of the MSPs. For now, the groundnut MSPs are serving the national market because the demand is very high for groundnut paste, oil and other processed products. Some are prospecting regional markets.

3.7.4 Access to Social Networking

The MSPs have contributed to create links between different categories of actors or groups that never met before, e.g., farmers, traders, processors, financial institutions and political authorities. This permitted to create farmers' associations, groups and organizations with the official administrative documents showing that their groups have come to existence in order to get credit facilities.

3.7.5 Filling the Gender Gap

The adoption of improved varieties helped with the reinforcement of family mutual assistance. Before they started using improved varieties, women were growing their local low yielding varieties on small farms of size from 0.25 ha to 1 ha maximum. With yield ranging from 500 kg/ha to 700 kg/ha, they could not get a profit from their harvest, so it was essentially used for family consumption. Today, women farmers have been trained in groundnut production and they use the seeds of improved varieties, and their yields have increased to 1200–1500 kg/ha. Through the higher productivity, they have increased their incomes from the sale of groundnut. They are making profit of USD200 to USD800 for rainy season and USD1200–1500 for rainy and off-seasons production and can now cover some of their expense needs on their own. The fact that some women manage to pay for some of their family expenses has improved the relationship between them and their husbands. Women believe that since the adoption of improved varieties, their income levels have increased and their contribution to family spending has increased. This has led to harmony within households. Some women participate in decision-making in the family. Adoption of improved varieties increased women's income and made them more financially independent, less vulnerable and more self-reliant. The introduction of improved varieties has impacts on the main economic activities in all the MSPs areas. Because of this, there is a relatively better endowment of households in agricultural equipment, the use of fertilizers, etc.

The MSPs are more efficient tools than separate production and distribution channels, because of their ability to bring together the stakeholders of many groups. MSP members had their own interests but also worked for the group to be successful. The farmers have been producing because there was a market from traders and processors; in turn those two market players have been assured to access credit facilities from financial institutions, which they could use to buy and store enough groundnut worth the demand over a year. Farmers have been better advised by agricultural service staff because they have been well trained by INERA breeders on groundnut production and were closer to MSPs farmers than to other farmers. In each MSP, there were two kinds of seeds production: firstly, the QDS produced for the local communities in a local seed business; these seeds are sold at low prices at the community level, and secondly the certified seeds produced for a wider market at national level.

3.8 Perceptions of Stakeholders

For the farmers, access to seeds of improved varieties at low price through the small packs of QDS was a major innovation. They were trained in groundnut production and supported by agricultural service staff and their yields doubled. The field days helped farmers to know improved varieties that are more productive than their local varieties which are being progressively replaced.

For producers of certified seeds, the fact that they participated in seed fairs made them more visible as source of improved varieties. This permitted to sell a lot of small seeds packs to non-members of MSPs.

For the women, the production gap was closed thanks to the training and the use of improved varieties and fertilizer to produce QDS. Now, they have the same yield as men (1200–1500 kg/ha) and in some areas they even get better yield than men (1700–1800 kg/ha) as seen in the Region of Centre-North and Region of Centre-West. Women have increased their farm size from $\frac{1}{4}$ ha to $\frac{1}{2}$ ha and in some cases to 1 ha. They bought themselves fertilizer NPK and applied it in their fields. Consequently, their productivity has increased as well as their incomes to make them more financially independent, less vulnerable and more self-reliant. The annual best farmer awards were all given to women.

The QDS and grains productions are implemented in villages in the MSP zones and information about where to get seeds/grain and price is given by local media (radios members of the MSPs) to farmers. This also reduced travel for the traders and the processors who no longer have to go from markets to markets to get groundnut. In addition, with the access to credit, they can buy at fixed price and store the desired quantities of groundnut and realize profit margins.

For researchers, the benefits included training of farmers in groundnut production, the introduction of QDS and its enhancement with more than 90% of women farmers, the promotion of improved groundnut varieties through field days and seed fairs. Also, with the demonstrations tests, new practices were promoted and used. INERA developed strong collaboration with partners including agricultural service staff, NGOs like FERT, farmers' organizations and certified seed producers.

For the agricultural extension staff, this permitted them to be trained in groundnut production, to better know the improved varieties of INERA and to work closely with farmer organizations. A frank collaboration is now established with INERA for the promotion and dissemination of improved varieties.

To make the platform more sustainable, the focus has been on production and processing. With members' contributions, bank accounts were opened for each category of stakeholders. We think that the processing can pull the production and thus we are moving towards contracts between farmers, traders and processors. Access to credit will help in this field.

3.8.1 Reflections on the Process

By now, improved groundnut varieties are better known not only in the platform areas but also across the country through seed fairs, and small packs sold. Farmer interest in groundnut and farmer productivity have significantly increased. Farmers' yields have gone from very low levels (500–700 kg/ha) to double (1200–1500 kg/ha) thanks to training farmer groups. This was possible because during trainings we emphasized the sowing dates and sowing mode and the use of seeds of improved varieties and fertilizers. Before, farmers sowed groundnut in scattered pattern without fertilizer. One key factor was the training of agricultural extension staff in groundnut production which allowed them to better monitor the QDS producers and this increased their yields. The collaboration with agricultural extension staff and NGOs and their implication in the activities have been fruitful for INERA and the project.

The QDS production was a good way to reach farmers in their communities with improved varieties. This helped women to increase their income, and to fill the productivity gap between men and women. Some women used their money to buy bicycles, to pay their children school fees, to buy cattle and feed them with the haulm of groundnut produced. This increased also the adoption rate of improved varieties as the sale of small packs of seeds helped reach about 10,000 persons with improved varieties whereas previously in the same area no more than 200 farmers had access to quality seeds.

The producers of certified seeds, members of the MSPs participated in the seed fairs and were able to promote the improved varieties that they sold in small packs. Some from Kaya obtained rewards like carts, fertilizers from the authorities. Another one bought a tractor with his income from groundnut and sorghum without contracting any credit from a bank.

The demonstrations served as sites for field training to compare the farmers' practices with improved techniques of groundnut production. Sowing on ridges has the advantages to keep water in the soil longer than sowing on flat soil and it improves also the quantity harvested by minimizing pod loss. Farmers who previously did not apply fertilizer on groundnut are now adopting the application of NPK and realizing a 30% yield increase. The field days and FPVS permitted to promote not only improved varieties but also to know the preference of farmers. This was useful for us breeders. During field days, 3500 flyers on groundnut production and post-harvest management were distributed to farmers, agricultural and NGO staff.

The link established with financial institutions allowed farmers to access credit with very low interest rates. Some processors opened a bank account and deposited their own funds to support their group activities. Based on this they can get credit to buy groundnut at the harvest time and store it for their activities.

3.8.2 Areas to Focus on in the Future

We will continue to reinforce the link between financial institutions and processors, traders and processors. The focus will be the financial contribution of each member to the platform after selling their produce. This way they will be able to support their meetings without external financial support. Once the traders and processors get strong contracts with farmers and they reach regional or international markets, groundnut production will be pulled upward. Additional and newer varieties released will be introduced in the QDS production channel to replace the old ones. So little by little, we will cover all the platform zones and surely the country with improved varieties. The accessibility of seeds of improved varieties by farmers at low price is our target through the platforms as well as to increase the income of women who are the largest group among groundnut farmers.

3.8.3 Lessons Learned

The QDS production increased the supply of seeds of improved varieties beyond what used to be available only from the certified seeds producers or farmer saved seeds in Burkina Faso. Improved seed access for smallholder farmers has also increased as of now, smallholder farmers are able to buy seeds in small packs. The small seed packs are the best way to promote improved varieties. With these packs, about 10,000 persons were reached with improved varieties in the MSP regions. With these packs poor smallholder farmers bought seeds of improved varieties for their own production to replace their local varieties.

A strong collaboration between agricultural extension staff, farmers' organizations and NGOs has been established. Their capacity has been reinforced in groundnut production using the improved groundnut varieties of INERA. They were trained in an approach of training of trainers so they can advise farmers and organize field days without INERA assistance.

The QDS permitted to fill the gender yield gap and increase the income of women involved in this production. Women's contribution to family spending capacity has increased. This has led to harmony within households. Some women participate in decision-making in the family. Adoption of improved varieties increased women's income and made them more financially independent, less vulnerable and more self-reliant.

To increase farmers' productivity, they have to be trained. Trained women doubled their yields by following the technical guidelines of groundnut production and applying fertilizer. One of the certified seed producers indicated his yield went from 500–700 kg/ha to 1200–1500 kg/ha after receiving and following the training given. During the training, we focus on the sowing dates and the sowing modes which permit farmers to know the best sowing dates instead of their old habits of sowing in the last decade of July.

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Kolokani Groundnut Innovation Platform Activities and Achievements Through TL III Project in Mali

Dramane Sako, Mamary Traoré, Folocoum Doumbia, Fodé Diallo, Moussa Fané, and Issoufou Kapran

Abstract

Groundnut productions have been declining in Mali in spite of several new improved varieties being released, the key problem being inadequacy of the seed supply system. To solve this problem, Kolokani MSP was established in 2012 and reorganized with support from TL III in 2015 to include more stakeholders in the groundnut value chain—farmers particularly women, farmer associations, cooperative societies, seed producers, agro-dealers, grain traders, processors, research and extension. Four new varieties Fleur11, ICGV 86124, ICGV 86015, and ICGV 86024 were supplied to the platform for FPVS and among them two, Fleur 11 and ICGV 86124 were preferred for their high yields and large grain size under farmer conditions. Through training of trainers, the different members of the platform reached 1246 farmers among them 928 women with improved groundnut seed production, aflatoxin management, seed business plans, and small-scale mechanization. A total 47 FPVS, 50 Demonstrations, and three multi-locational variety trials were conducted annually from 2016 to 2018. Kolokani platform have played an important role in groundnut value chain by producing and marketing 85 tons groundnut certified seed of these varieties annually for farmers. This is expected to stop the national productivity decline while improving platform members' livelihoods and nutrition status.

Keywords

Multi-stakeholder platform · FPVS · New improved varieties · Seed production · Actors' training · Seed marketing

D. Sako (✉) · M. Traoré · F. Doumbia · F. Diallo · M. Fané
Institut d'Economie Rurale (IER), Kayes, Mali

I. Kapran
RP-WCA, ICRISAT, Bamako, Mali

4.1 Introduction

Groundnut, *Arachis hypogaea L.* is grown in all agro-ecological zones of Mali. According to FAO the National yields were 1.4 t/ha and area was 351,977 ha with a production of 509,363 tons. Since then the production has declined significantly to 301,207 tons and average yields dropped to 0.78 t/ha and though area increased to 386,993 ha (FAOSTAT 2017). Groundnut plays an important role in the country's agricultural system including crop rotation and soil health through nitrogen fixation. Currently, this crop offers opportunities for cropping systems diversification in the country. Lately, groundnut area in the country has been progressively increased but productivity has been declining. Indeed, there is a clear increase in areas in the north-west considered as groundnut belt which includes Kayes and Koulikoro regions and the center of the country (Segou, Mopti). Production of improved varieties is increasing in all regions with the contribution of TL III. Groundnut is widely used both as human food and animal feed. Because of its high protein and oils content, it helps to correct the deficiencies in proteins and vitamins B1 and B2 of the cereals which constitute the staple food of the Malians. The use of high-quality groundnut seeds is one of the most effective ways for the African farmer to improve his crop productivity. Thus, a better organization of quality seed production and dissemination to all users is important for the realization of any groundnut development plan and seed is often a prerequisite for the introduction of other productivity enhancing inputs (Mayeux et al. 2003). The following are considered as key requirements for a farmer who wishes to register in the national seed multiplication program. He/she must accept quality control including field inspection, seed sampling for analysis, and certification of his/her production. Farming practices and techniques must be optimized so that the plant can express its full potential and ensure quality seed production. It is important that plants develop under adequate fertility and optimum climatic conditions or under supplementary irrigation to ensure good pod filling and seed maturity and ultimately good yield (Ntare and Traoré 2004). Pod and seed size are important parameters in the value of a seed lot (Rapport Annuel 2004). The objective of the Kolokani innovation platform is to produce and market groundnut seeds to improve its members' productivity and livelihoods. The groundnut seed value chain from breeder seeds and foundation seeds to certified seed production and marketing by the platform has indeed improved farmers' incomes and welfare.

4.2 Establishment of the Platform

Kolokani platform was established in 2012 with 25 members including eight women (Table 4.1). By 2015 with the reorganization of TL III project partners many other farmer associations and cooperatives joined the platform including five youths who were interested in improved groundnut seed production and one youth interested in input selling. The process of the platform establishment was initiated to solve the declining productivity of groundnut despite the use of improved seeds. The

Table 4.1 List of the initial platform members

| Affiliation and role | Role | sex |
|--|-------------------------------|-----|
| Sababugnouma cooperative | Seed producer | M |
| Sababugnouma cooperative | Seed producer | F |
| Sababugnouma cooperative | Seed producer | M |
| Improved seeds user | Seed producer | F |
| Improved seeds user | Seed producer | F |
| Tièssiri cooperative | Seed producer | M |
| Senèyiriwaton cooperative | Seed producer | M |
| Gadiabaniton (CORAF) | Seed producer | M |
| Gadiabaniton (CORAF) | Seed producer | F |
| Extension service (two representatives) | Facilitation and advice | M |
| Input supply | Trader | M |
| ONG ASIC (two representatives) | Facilitation and advice | M |
| Daba Tayé Tienyé | Producer | M |
| Kondo Jigima savings Bank | Financial support | M |
| World vision NGO/ | Facilitation and advice | F |
| Town hall | Facilitation and advice | F |
| Agricultural council | Facilitation and advice | M |
| IER | Research and technical advice | M |
| ICRISAT | Research and technical advice | M |
| RMCR | Facilitation and advice | M |
| Processors | Processing | F |
| Famolo Coulibaly cooperative (1 male and 1 female) | Producer | M |

foundation meeting on 5–6 July 2012 in Kolokani had the following agenda: lower agricultural yields in general particularly for groundnut; non-organization of farmers in the different value chains except cotton; insufficient and difficult access to good quality seeds and the creation of a multifunctional platform.

4.3 Composition, Roles, and Responsibilities of the Platform Members

Kolokani platform is composed of several categories of stakeholders as follows:

- Producers of improved seeds composed mainly of five cooperatives such as Sababugnouma cooperative, Tièssiri cooperative, yiriwaton cooperative, Famolo and CORAF seed producers. Lately, many individual seed producers joined.
- Traders composed of three groups including Dabatayétienyé, Sabougouma group, and the Tièssiri group.
- Processors composed of four cooperatives including Benkadi Misola cooperative, Senèyiriwaton, Sababugnouma Cooperative, and Kolokani groundnut producers' association.

- Local Authorities: Representatives of City Hall and of Traditional Chiefs of Kolokani.
- Financial institutions: Kondo Jigima, RMCR fund, BNDA agricultural bank, and EPC /CAEB micro-credit fund.
- Agribusinesses composed of MPC, Stork, Toguna SA and Keita and Son Company.
- Advisory group: research institutions such as IER, ICRISAT, and LaboSEM.
- Extension support including the Extension Service and the Chamber of Agriculture.
- NGOs like World Vision and ASIC.

4.3.1 Roles and Responsibilities of Different Stakeholders Participating in the Platform Activities

The Table 4.2 summarizes the roles and responsibilities of various stakeholders involved in the Kolokani innovation platform.

There were a number of platform governance tools used that involved steering committee and arrangements in place to facilitate smooth implementation of platform activities. Facilitators were from Extension Service (first facilitator), from the West and Central African Council for Agricultural Research and Development (CORAF/WECARD) (second facilitator), from lead farmers, and farmer organizations. Their contacts can be sourced from “Institut d’Economie Rurale” (IER) office.

4.4 Platform Activities

A number of activities are conducted by Kolokani platform such as:

- Seed production. Each year the platform produces at least 85 tons of the following improved varieties: ICGV 86124, ICGV 86015, and Fleur11 while relying on

Table 4.2 Roles and responsibilities of stakeholders

| Stakeholders | Roles and responsibilities |
|-------------------------|---|
| Improved seed producers | Produce improved groundnut seeds, certify them, and supply to the platform |
| Traders | Supply inputs to farmers and buy groundnut harvests from the platform |
| Processors | Buy groundnut harvests to manufacture processed products for the market |
| Local authorities | Play important role at institutional and political level |
| Financial institutions | Support in term of credit toward the implementation of different activities |
| Agribusinesses | Supply inputs and buy groundnut harvests from the platform |
| Advisory group | Technical support, access to improved seeds, and training |

its research actors to supply foundation seeds. This target is achieved by the platform by utilizing common fields of producers per cooperatives.

- Training and information exchange.
 - On the guidelines for pre and post-harvest technologies for optimum quality assurance through radio broadcast. The objective is to build the capacities of the actors on the recommendations for improved groundnut, post-harvest, storage, and good practices for the management of aflatoxin. Also, to provide useful information on groundnut field isolation to keep varietal purity, phytosanitary control, and product certification.
 - In packaging technology and seed marketing. The platform in agreement with the technical actors trained 25 farmers including five women and 20 men on how seed must be well conditioned to attract customers and well presented in small packs accessible to all and with all the necessary information.
 - In quality seed production techniques. With the technical support of research scientists 120 farmers including 30 women and 90 men were trained in seed production techniques, business plan management, seed legislation, and many other helpful information.
 - In negotiation techniques especially in aggregating the harvest of different cooperatives in one place and looking for a potential buyer with whom an ad hoc committee starts negotiations of a single price benefiting all. The trainees included 50 farmers, ten women and 40 men.
- The organization of field days which are held once per cropping season; it brings together a very important number of representatives of all the actors to see each other's achievements and acquire new experiences, draw lessons of successes and failures from each other, provide advice as needed, appreciate achievements.
- The seed purchase by an appointed team of 20 people, including seven women and 13 men, to purchase seeds from the seed producers and retail to platform members for profit.
- The initiation of partnership between seed producers and research on better access to foundation seeds. Once a year the platform organizes a brainstorming session with IER, and farmer organizations involved in seed production to discuss availability and price affordability of foundation seeds.
- The infrastructure for seed storage. The platform benefitted from two warehouses of 100 tons capacity each on request of the Sababugnouma cooperative to WAAP with co-funding from the cooperative. Also, the Sababugnouma cooperative and WAAP equipped the two warehouses with 100 pallets, two scales, two tables, and four chairs.
- Periodic meetings are held each quarter, for the platform members to get updates on activities and special meetings are held as needed.
- The sensitization of farmers on the use of organic manure: at each meeting of the platform emphasis was on the importance of organic fertilizer on seed quality. The dose per hectare was given at 30 t/ha. The awareness raising through the media done once a week, the use of quality seeds of improved varieties is discussed on local radio stations with the support of technical partners. The key

messages are about the achievements of the cooperatives on use of quality seeds with verifiable testimonials.

4.5 The Main Problems Identified and Solved By the Platform

A number of challenges have been identified and solved through the platform:

the consensus among all the actors on the importance of the use of quality seeds; the importance of increasing adoption of improved varieties and mastery of good seed production practices; the use of organic fertilizer to ensure good pod filling and seed quality (DRPC-Koulikoro 2013); the management of groundnut against contamination by aflatoxin through mastering post and pre-harvest techniques; good management of grain and seed stocks; insuring that seeds of improved varieties are accessible everywhere to all small-scale farmers in Kolokani.

The platform enabled the various actors to initiate good collaboration among research, public institutions (political, customary) and the farmers, and the platform helped women improve access to land for all agricultural activities and the improvement of the living standards of all concerned communities.

4.5.1 Types of Issues Addressed By the Platform

Four key area issues were addressed by Kolokani platform:

Technical issues with regard to aflatoxin management and capacity building of platform members;

Policy issues in relation to gender mainstreaming, close collaboration with research institutions and rural municipalities (City Halls, customary chiefs);

Organizational issues to transform simple organizations into cooperatives with an office, decision-making bodies and regulations, great mobilization capacity of the platform, organization and massive participation in seed fairs, field days, and farmers exchange visits;

Managerial issues with a committee on negotiation and marketing to guarantee the interests of members in price fixing at purchasing and selling.

4.6 Facilitation of Platform Activities, Including Meetings

4.6.1 Description of the Process Followed to Help Platform Members Implement Their Activities

The platform carries out a certain number of activities as per a well-defined chronogram. The realization of these activities requires the involvement of all without exclusion.

For organization of field days all actors are invited at a precise venue through the radio and at least a week in advance. There is an organizing committee which selects the fields to be visited. The expense of the organizing committee and visitors' transportation to the field is supported by the platform or other supporting partners such as IER through TL III project.

Improved seed is the most important input in agricultural production and its integrity and quality cannot be compromised. Good storage can guarantee all its intrinsic qualities (germination and seedling vigor). For this purpose, the appropriate measures were taken by the construction of two large warehouses and their equipment (pallets, hygiene standards, use of non-toxic products and new containers).

In collaboration with the technical services committee (comprised of IER, ICRISAT, and NGO), the modules on good agricultural practices are taught to actors and relayed by local media in the local language to reach the maximum number of farmers. NGOs help the platform train members in negotiation skills. There is an ad hoc committee of the platform made up of 20 people who are well trained to negotiate.

A revolving fund established from the net profit of the platform activities and members' contribution is used to support platform expenses. Sometimes this fund is used by the seed purchase appointed team to buy improved seeds for the members of the platform who will reimburse in kind.

For the purpose of facilitating platform meetings participation, telephone and local radio stations as well as village announcements are used. Awareness and use of quality seeds are promoted through testimonials during radio broadcasts and routine field visits. The production of quality seeds is subject to legislation which is accompanied by a phytosanitary control certificate. The acquisition of this document is facilitated by grouping of field visits by the agents and a partial support by the technical groups.

Most of the platform actors live in rural areas where they also produce seeds of dryland cereals in rotation with groundnuts with the help of research. In a customary way farmers exchange seed among themselves. This method also helps with the distribution of improved seeds among farmers. The platform installed a selling point for improved groundnut seeds at the office of the Chamber of Agriculture where the seed is accessible in all seasons. The seeds are presented in small packages of 1 kg, 2 kg, 10 kg, 20 kg, 25 kg, and 50 kg. The cooperative Dabatayétiényé, an actor of the platform is in agribusiness, and they sell the seeds in small packages (1 kg, 2 kg, 10 kg, 20 kg, 25 kg, and 50 kg) or wholesale to the local communities and also for export. In addition, the platform collaborates with seed companies like Faso kaba, farmer's organizations such as AOPP to sell or to get seeds of new varieties.

4.6.2 Mechanisms to Enhance Stakeholder Participation

The following tools ensure good governance and increase the participation of key actors:

- The membership is free without distinction of activity,
- The major decisions are taken in general assembly,
- The interests of the actors are guaranteed by transparency of management of the prices obtained through negotiation, and
- Free training obtained and information on good agricultural practices learned without distinction of gender or activity.
- Equal access to quality seeds for all platform members.

4.6.3 Platform Decision-Making Process

To make decision the platform meets once a month for activities planning, evaluation of activities that have been done. The process of decision-making is participatory, and all the decisions involved all the cooperatives and members.

4.7 Achievements of the Platform

From its creation to today the Kolokani platform has registered rich and long experience in running activities.

Achievements in Access to Improved Seed IER supplied improved groundnut seeds of Fleur11 and ICGV 86015 varieties to the platform. To illustrate the impact, farmer Daba Kané in Falakan village produced those two varieties on 1.5 ha in 2016. The farmer kept his production and he was able to grow 8 ha in 2017 and 12 ha in 2018 (Fig. 4.1). He was able to improve his livelihood with the income generated from his production over the 3 years. In another example R1 certified seed production of the fleur11 variety was conducted by the Falakan cooperative

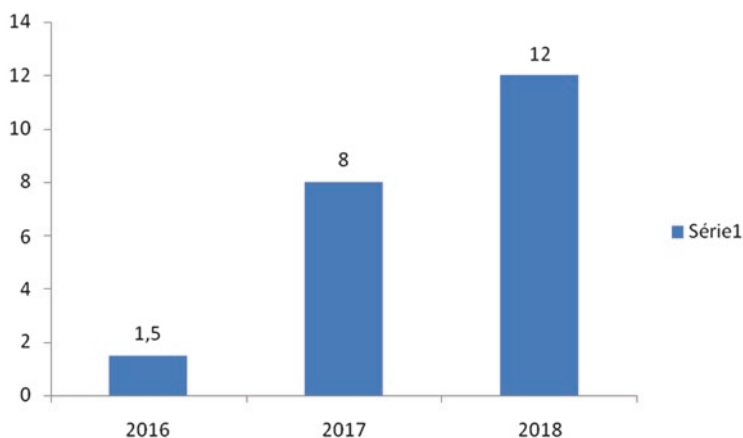


Fig. 4.1 Increase in area under improved groundnut with Daba Kané farmer in Falakan village

(4 ha) with a production of 5847 kg. The platform produced at least 85 T of certified seed of Fleur11, ICGV 86015, and ICGV 86124 every year.

Access to Improved Varieties Before and After Formation of the Platform Before the platform farmers relied on the process of local seed exchange between actors with limited support from research and extension. Before having the platform farmers in Kolokani used to produce only two varieties namely JL24 and 47–10. With the platform, close collaboration was established with extension services, research, and NGO. This benefitted platform members in terms of group purchase of seeds and associated inputs at affordable price. Grouping of farmer seed producers greatly reduced the cost of certification; stronger research and platform collaboration facilitated ease of access to basic seed; and the search for a common market made it easier to bargain the price of platform products without selling off.

With the platform, more diverse varieties are accessed by farmers including Fleur11, ICGV 86124, ICGV 86015, and ICGV 86024 (Fig. 4.2). There have been remarkable improvements in access to improved seeds and other inputs. The platform has seen a recurring increase in the demand for seeds, and an increase in the areas cultivated. The number of non-platform members having access to quality seeds through the platform is estimated from 1000 to 1500 farmers. The areas sown to groundnut before the platform did not exceed 10 ha for both local and improved groundnut. Over the last 3 years, the platform has seen an exponential increase in improved groundnut area cultivated that is estimated to 40 ha for the Yiriwaton cooperative and 90 ha for the other platform producers including individuals' producers.

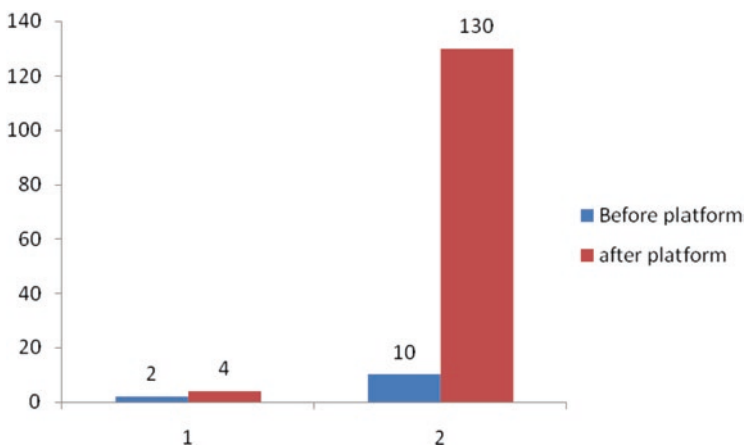


Fig. 4.2 Number of improved varieties and area before and after the platform.

Achievements in the Areas of Access to Knowledge and Farm Advisory Services Organization of open fields days with extension service and IER to do hands on training for platform members on seed conservation techniques, production, marketing, advocacy, negotiation, group purchase or group sales. An open field day was organized on mother/baby trials in Ntiobougou-Bolibana for 40 participants including five women and 35 men; Open field days were organized around Groundnut tests (demonstration of varieties and aflatoxin management) in Zirablenkoro. As part of the activities of the platform under extension service and IER support and advice, a number of trials were visited by the platform actors including plots of groundnut trials, seed production fields, multi-location trials, and demonstrations to provide advice while monitoring platform activities. Two actors (Thiory Kané and Paul Kamaté) participated in the training workshop on conservation, packaging, marketing, seed production, negotiation techniques, advocacy, isolations, basic seed purchases, access to credit, partnerships, use of improved varieties, possibility of subsidizing inputs by the state, use of organic manure.

Planning planting of trials, demonstrations, and delivery of seeds included trials for drought tolerance and cercosporiose, in Tongoye under the responsibility of extension services (agent Fakoro Cissé and a farmer named Kinta Traoré), Early maturing variety trial in Koumi village, Farmer Participatory Variety Selection with seven varieties in the villages of Kolokani, Sido and Tao Zirakorobougou, demonstrations trials on 0.5 ha with Fleur11, ICGV 86124 and ICGV 86015 in the villages of Zirablenkoro, Tiéneguébougou, NTiobougou, Falakan and Fakolombougou; Demonstrations tests on cultural practices comparing Fleur11, ICGV 86124 to a

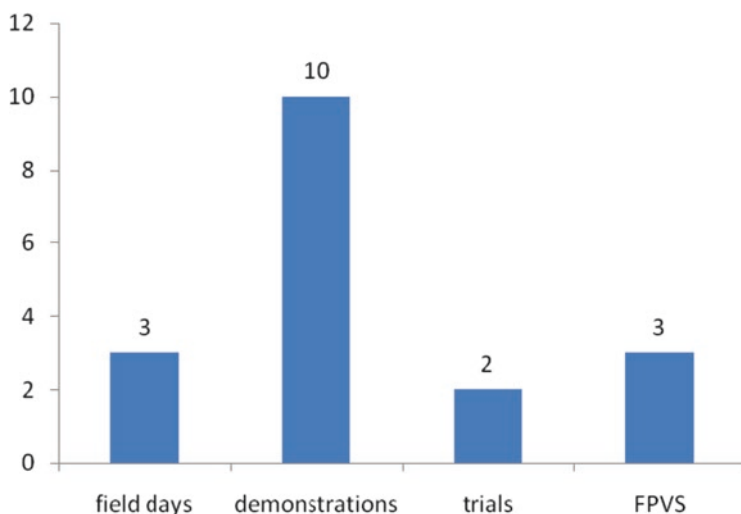


Fig. 4.3 Number of field days, demonstration, trials, and FPVS conducted by Kolokani platform from 2016 to 2018

local variety in the villages of Tongoye, Koumi, NTiobougou, Tiénéguébougou and Tao Marifara (Fig. 4.3).

Achievements in the Areas of Access to New Markets and Financial Services As a result of the collective marketing power of the platform, members gained access to new markets such as Dabatayétienyé, Agro dealers, Faso Kaba, AOPP agribusinesses to make group sales after negotiations for better prices. The platform gained access to agricultural loans with RMCR and BNDA financial institutions. The members with poor credit rating are guaranteed by the platform which controls farmer produce in the warehouse until they are sold at the most opportune time. The platform in collaboration with the local authorities facilitates registration for all member cooperatives which is a guarantor of access to credit.

Achievements in the Areas of Social Assets Members of the platform clearly indicate that their livelihood has changed because they are better able to meet their daily needs. Some have purchased agricultural equipment (plows, tractors, threshing machines, oxen). Others have managed to open savings accounts. Farmers use the social network SENEKELA of Orange mobile telecom Mali to have weather reports, and early warning systems. The cooperatives within the platform exchange information with each other on the social networks to find a buyer for their surplus. Kolokani is an affiliate member of platform associations whose head office is in Sikasso where they meet regularly.

Achievements in the Areas of Gender Equality and Youth Women are fully involved in the major decisions of the platform. Through the platform women got access to land rights which they did not have before. The involvement of youth in the training in new innovative farming techniques has helped retain young girls and boys in farming to help fight against poverty and the birth of a new hope for youth.

Perceptions of Platform Performance Gains include the good spirit of collaboration, the enthusiasm created by seed production with its economic, social, and technical advantages, the raising of the living standards of the actors directly and of the community indirectly, the revitalization of groundnut culture in the Kolokani sector, and today the Kolokani platform is a pride for the whole community and cited as a model of success everywhere in Mali.

Sustainability of Multi-Stakeholder Platforms The following steps have been taken to enhance sustainability of platforms activities and achievements after TL III: the integration of crop and animal production activities to benefit from the complementarity of actions, the capacity building and external collaboration of platforms, the integration of entrepreneurship spirit among young actors, the creation of vast

networks with an open market, the youth settlement and support for youth projects, the prioritization of gender in communities for social equity and the value chain approach to farming and increased mechanization of agrarian systems to reduce production cost estimated to more than 600,000 F CFA per hectare (CORAF 2015).

4.8 Reflections on the Process

Improved seed production has had its ups and downs. Today we cannot say that the end of the tunnel is reached because many problems remain unresolved like the insufficiency and the difficult access to good quality seeds of improved varieties, their high price; difficult access to agricultural credits and the low level of mechanization of agrarian systems. Groundnut productivity in Mali continues its downward trend which must be arrested and reversed. Certainly, much effort was made by the platform and its partners in this direction (TLI, TLII, GSP, and TLIII). Insufficiency, access, and price of certified seeds can be solved by expanding the production to farmer organizations (POs) and private organizations in partnership with research organizations. Mostly, groundnut price in the market is regulated by the evolution of the supply and demand. Seed production is a business that deserves to be supported if all the actors are organized within groups offering a certain legal credibility. Financial institutions can support farming by equipping it with capital and equipment while being part of a safe, logical, and sustainable process. The state as the guarantor of the interest of all can play a decisive role by subsidizing inputs (basic seed, fertilizer, gypsum, aflatoxin test kit) to better support the system in terms of production, productivity, and health. As in perspective, the Kolokani platform adheres to the idea of creating a national platform that will bring together all the platforms to solve common issues. Because the groundnut industry is poorly organized, the platform plans to erect the industry to the level of inter profession including processing agro-industry to have more visibility. Vegetable production activities will be introduced to fill the gap in the off-season to produce food of marketable quality and also make cash gains. Thanks to the platform all the groundnut producing cooperatives of Kolokani are now producing safely with the required standards. The members make important profits that give them a better purchasing power. The community of Kolokani has moved from traditional groundnut production to more business-based groundnut production. Women and young people across the platform have their customary rights broadly improved. The well-structured Kolokani platform is boosting groundnut culture while winning the fight against poverty among the peasant masses and improving under-nutrition/malnutrition with its processors by incorporating groundnut into children's food (Misola exported to the sub-region).

Kolokani platform contributed in certified seed production at national level with 85 tons per year that will cover 80,000 ha in 5 years. Mali needs to set in place have 20 platforms such as Kolokani platform to cover 20% of the cultivated area in the next coming 5 years.

Areas to Focus on in the Future The Kolokani platform should focus on increasing the production of improved groundnut basic seeds to meet at least 50% of early generation seed (EGS) requirements of the country. The production currently at 85 tons per year is insignificant. There is need to incorporate more partners, multiply the number of selling points, and get more loans to increase capacity.

4.9 Lessons Learned

Many lessons have been learned. It is noted the benefits of teamwork because the dynamism of the actors helped the platform to acquire two large warehouses equipped with scales, pallets, tables, and chairs.

Capacity building has a strong impact on groundnut productivity and income of platform members. With the good collaboration of research organizations (IER and ICRISAT) the actors were trained in the cultural techniques, conservation, storage, isolation, marketing, business plan management, and the seed legislation and certification. These trainings improved groundnut production systems and increased production and productivity but on small scale. The incomes of members have been increased and the skill of marketing improved. The management of groundnut aflatoxin contamination and its effects on the health of humans and animals have also been improved. In this way, aflatoxin contamination in groundnut with all its misdeeds on human and animal health is a danger to the crop and groundnut consumers but this was very poorly known by the actors. Today thanks to the multiple training received, it is very well controlled by the actors. Improving and adapting communication to provide key technical information on improved seeds production, marketing, and business plan management greatly facilitated the activities of the platform. Broadcasting in local and national radio in local languages to reach a great number of farmers at the same time, and the use of mobile phones to convey messages (weather report, early warning system, meetings, and training) are good examples of innovations in communicating with platform members.

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Enhancing Access to Quality Seed of Improved Groundnut Varieties Through Multi-Stakeholder Platforms in Northern Ghana

Doris K. Puozaa, Alhassan Nuhu Jinbaani,
Desmond S. Adogoba, Douglas Busagri,
Masawudu Abdul Rasheed, Abdul Rashid Issah,
and Richard Oteng-Frimpong

Abstract

One of the main constraints to groundnut production has been the use of low yielding varieties, susceptible to biotic and abiotic stresses. Multi-stakeholder platforms (MSPs) have been used by agricultural research organizations to help make their research more relevant and to facilitate the adaptation and dissemination of findings. In the implementation of TLIII project in Ghana, eight MSPs were set up with the objective to improve groundnut productivity among actors through improved access to varieties and related technologies. Through trainings, demonstrations and field days, the platform members totalling 347 (55% being female) were exposed to two existing improved groundnut varieties and several candidate varieties which were yet to be released. The actors have become important sources of high-quality groundnut seed in their communities and beyond with the production of 5 tons of seed of the new varieties. The seed farms where improved varieties were planted and managed using good agronomic practices (GAPS) yielded up to 1.6 tons/ha, 70% higher than the use of their old varieties and practices on their personal farms which gave less than 0.5 tons/ha. This form of experiential learning was observed to be very useful in the willingness of platform members to uptake technology. As unintended benefits, through the use of funds raised by the associations, the sanitation and health of some members and their households were improved, and many engaged in non-farm businesses. Going forward, good conflict resolution skills and access to funds for

D. K. Puozaa (✉) · A. N. Jinbaani · D. S. Adogoba · D. Busagri · M. A. Rasheed · A. R. Issah · R. Oteng-Frimpong
CSIR-Savanna Agricultural Research Institute, Tamale, Ghana

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supporting platform activities and members' individual interests would be very important in the sustainability of these platforms.

Keywords

Quality seed · Community seed systems · Groundnut · Improved varieties · Multi-stakeholder platforms

Introduction

Ghana is mainly an agrarian country with over 50% of the population employed in the agricultural sector. Agriculture continues to contribute about 30% to GDP (Ibrahim and Florkowski 2015). Although the country has experienced rapid economic growth in recent years, nearly two million Ghanaians remain vulnerable to food insecurity. Like in many developing countries, most of the farm holdings are less than 1.2 ha per farm household and majority of the poorest, food insecure and malnourished people are predominantly rural dwellers. This phenomenon is particularly widespread in the north of the country, which is characterized by low rainfall with intermittent drought conditions, depleted soils and limited access to markets, making it difficult for households to raise agricultural productivity and earn adequate incomes.

Groundnut is the most important legume in Ghana both in production and consumption. It is of high economic value to most rural households in the country. In Ghana, as in the rest of West Africa, groundnut is termed as a woman's crop due to the major role women play in its production, marketing and processing. Women function as farmers, traders and in some cases as labourers in planting, harvesting and shelling. Groundnut is a very significant component of the diets of many Ghanaians contributing equal (or even higher in poorer homes) levels of energy, fat and protein compared to animal sources. It is reported to contribute 3% of total energy availability, 16% of total fat and 6.5% of total protein availability per capita (FAO 2013). Not only is groundnut a food crop for humans, the haulms are widely used as fodder for livestock especially during the dry season.

Groundnut cultivation is concentrated in the Northern, Upper East and Upper West regions which account for up to 94% of the national production of 437,770 tons and an area of 320,310 ha (DAI 2014; MOFA 2017). It is common to find up to 90% of household cultivating groundnut in a typical farming community in these regions (Tsigbey et al. 2003). Also, groundnut is usually the most likely commodity to be marketed among all the other crops produced. Hence it offers an important opportunity to improve household incomes and nutrition in these parts of the country.

There have been many interventions to improve groundnut production and ultimately the groundnut value chain. For instance, in 2009 the Millennium Development Authority (MiDA) as part of its strategies developed a programme to assist up to 4000 farmers to expand their groundnut farms. Support was also given in the form

of credit inputs, warehousing, cleaning processing as well as marketing. Cultivation and production of the crop increased by 47% and 67%, respectively, between 1999 and 2010 but yields remain lower (less than 1.2 t/ha) than the world average of 1.7 t/ha (FAOSTAT 2017). This was evidenced by the country's ranking dropping from fourth producer of groundnut in Africa in 2013 to 11th in 2015. Like most crops, groundnut yield in Ghana on farmers' fields is sometimes only 25% of the potential for the crop.

One of the main constraints to groundnut production has been the use of low yielding varieties which are susceptible to stresses. Increased investment in new crop varieties has been recognized by many workers as one of the most important tools for increasing groundnut production (Angelucci and Bazzucchi 2013). This has resulted in the development of many varieties including Nkatievari, Kpanieli, Oboshie, Yenyawoso and Obolo and in 2018, Sarinut 1 and Sarinut 2. However, these investments over time are not commensurate with the gains made in improving production and productivity. In growing groundnuts, farmers use very little good quality seed of improved varieties, fertilizers and other external inputs. Less than 5% of the crop is cultivated with certified seed purchased from the formal seed system, while the rest is sourced from farmers' saved seeds, gifts from family and friends and the grain market, often of questionable quality. Farmers' failure to use new varieties has been attributed to the unavailability, inaccessibility (located far from farming communities) and highly priced nature of seed in the formal system. Poor access to information about the existence of the varieties and their characteristics thereof have also been an impediment to the widespread use of new varieties. Most seed outlets are located in district capitals and cities, while farmers are predominantly in the rural areas hence creating a challenge of access because they need to travel long distances to buy seed.

Meanwhile, multi-stakeholder platforms (MSPs) are used by agricultural research organizations to help make their research more relevant and to facilitate the adaptation and dissemination of findings (Homann-Kee Tui et al. 2013). They have been used in various initiatives and were recognized under Tropical Legumes III (TLIII) project as a tool that could be used to accelerate variety dissemination and access to improved seed among others. The MSP concept was to be used to facilitate the dissemination of quality seed of improved groundnut varieties through community seed production as a start, quality declared seed production entities and grow them into full-fledged seed cooperatives.

5.1 Objective of the Platform

The objective of establishing these MSPs within the TLIII project was to improve groundnut productivity among actors through improved access to technologies.

5.2 Establishment of the MSPs

Prior to the establishment of these platforms, a multi-stage consultative approach was adopted in the form of meetings to map out actors of these platforms. First, meetings were held at the district level with District Directors of the Department of Agriculture of the Ministry of Food and Agriculture (MoFA), their technical staff, staff of the District Coordinating Councils and District Directors of the Department of Cooperatives. The consultations led to the identification of communities where these platforms were to be established. At the community level, actors were identified within the groundnut value chain. These actors were also drawn from neighbouring communities, taking into account distance in order not to overburden actors with transportation costs.

In 2015, five MSPs were formed and three additional ones in 2017. Each platform elected an executive committee responsible for the day-to-day running of the platform. The committee comprised of the Chairperson, Treasurer, Organizer, Secretary and Women Organizer. The MSP members agreed to hold monthly meetings to discuss the activities of the group, while quarterly meetings would have facilitators from the research team and other government institutions in attendance.

The platforms begun with a membership of 173 in the 2015 cropping season with an average membership of 35 each. Out of this number 70 were male representing 40.46%, 48 were female over 35 years of age representing 27.74% and 55 were youth (under 35) representing 31.79% of total participation. Due to the benefits derived from group members, membership of these MSPs has increased from 173 in 2015 to a current number of 347. With the current number of participants, 155 are males, representing 44.67%, 93 are female over 35 years of age, representing 26.80%, while youth under 35 years of age are 99, representing 28.53%.

5.3 Composition, Roles and Responsibilities of the Platform Members

Each MSP was made up of farmers (over 70%), agro-input dealers (1 per group), processors, traders and tractor service providers (usually 1 per MSP). Each group was assisted by an Agricultural Extension Agent (AEA). The representation of financial institutions on these platforms was completely absent. This short fall was addressed through the introduction of the Village Savings and Loans Association (VSLA) scheme, with technical assistance from the objective one component of the project. This was the main reason for formation of the three additional MSPs in 2017. The savings scheme helped members to mobilize financial resources through weekly savings, where funds realized were loaned to group members. The roles and responsibilities of each actor are captured in Table 5.1.

Members of the platforms have been able to establish market linkages to facilitate the value chain of commodity from producers to end users. Groundnut producers on the platform use modern and improved ways of groundnut production as well as switched from their traditional low yielding varieties to improved groundnut

Table 5.1 Roles and responsibilities of different stakeholders participating initially in the platform activities

| Stakeholders | Roles and responsibilities |
|--|---|
| Farmers | Groundnut farmers. They produce the groundnut |
| Processors | They process groundnut into pastries. They are small scale operating with simple tools. Women are mostly involved in this business |
| Traders (aggregators) | Buy the produce from farmers at the local level and sell in bigger markets or urban centres |
| Agro-input dealers | Sell agro-inputs (fertilizer, herbicides, insecticides, etc.) to farmers. The IP enabled farmers to get such input on credit from the input dealers |
| Agricultural Extension Agents | Provide technical backstopping on production related issues |
| Research, Ministry of Food and Agriculture (DoA, DoC) and District Council | These groups facilitate the whole process (Research, the department of agriculture, the Department of Cooperatives and a representative of District Coordinating Council) |

varieties introduced by the project. This has been achieved through the involvement of group members in field trials and demonstrations by the project. Another remarkable development has been the introduction of Village Savings and Loans Association (VSLAs) concept into some of the MSPs, which is a self-help initiative aimed at mobilizing funds through group savings to enhance the financial fortunes of actors.

5.4 Platform Governance Structure

To facilitate a smooth implementation of platform activities, each platform has an elected executive steering committee tasked with the responsibility of managing affairs of the platform. The committee is made up of the Chairman who is the overall head of the group responsible for chairing meetings and also serves as the main link of the group to the implementing partners and community opinion leaders. There is a Treasurer in each platform responsible for the management of group finances and properties as well as an Organizer who is tasked with the organization of meetings and coordinating activities within the group. The Secretary is tasked with the responsibility of documenting activities of the group, while the Women Organizer is tasked to handle women affairs in the group. She also coordinates and links activities of predominantly women traders and processors in the group.

5.5 Platform Activities Addressing Main Challenges Associated with Poor Access to and Use of Improved Varieties

Apart from regular meetings held by these MSPs, actors participated in a number of activities organized for them following the recommendations of a SWOT (strengths, weaknesses, opportunities and threats) analysis undertaken during the formation

process. Activities were designed to take advantage of opportunities and mitigate threats. The need to create awareness about groundnut varieties and related technologies was recognized as a major contributor to increased productivity. To address other challenges such as poor access to affordable capital, a savings scheme was instituted. Furthermore, a number of technical trainings were conducted for members to build their capacities in group dynamics and governance, good agronomic practices, financial management and entrepreneurship as well as groundnut seed production and delivery among others.

An important management issue addressed by MSP activities was conflict resolution. During the implementation of platform activities, poor consultation among MSP members and lack of clear-cut procedures on resolving conflicts were identified as major problems that needed to be addressed, because some members made up their minds not to actively participate at meetings or to leave the group all together. These conflicts resulted from the fact that actors were drawn from different sectors of the groundnut value chain and as such had diverse views and sometimes conflicting interests. To address this challenge, a training on group dynamics was organized for members. The training was geared towards enabling actors to be more tolerant and positive towards diversity in order to promote a peaceful coexistence to ensure successful implementation of activities. To further strengthen the platforms, a second round of trainings was on understanding the underlying principles governing Innovation Platforms. In order to improve their businesses platform actors were also taken through agribusiness training. A total of 93 people benefitted from the training; 55 males and 38 females as indicated in Table 5.2.

Another set of challenges identified were low productivity resulting from use of poor varieties and production practices. The most popular varieties within most of these communities were “Bulga” and “Chinese” which among others are very low yielding and susceptible to leaf spot diseases, respectively. To encourage experiential learning MSPs hosted groundnut demonstrations during the 2016, 2017 and 2018 cropping seasons with support from the AEAs of their area. The purpose of the demonstrations was to expose the actors to improved groundnut varieties as well as good agronomic practices (GAPs). The varieties promoted under the

Table 5.2 Beneficiaries for training on agribusiness planning

| Region | District | Community | Male | Male under 35 years | Female | Female under 35 years | Total |
|-----------------|---------------|------------|------|---------------------|--------|-----------------------|-------|
| Northern Region | Mion | Salankpang | 15 | 9 | 11 | 2 | 26 |
| Northern Region | Yendi | Kulkpanga | 14 | 8 | 9 | 4 | 23 |
| Northern Region | West Mamprusi | Gbeduri | 13 | 5 | 9 | 3 | 22 |
| Upper West | Nadowli | Tibani | 13 | 7 | 9 | 2 | 22 |
| <i>Total</i> | | | 55 | 29 | 38 | 11 | 93 |

demonstrations were high yielding, drought tolerant and leaf spot resistant. As an added benefit, apart from the knowledge gained through the field days organized, about 1 ton of seed (not certified) was realized each year. The seed realized from the demonstration plots was sold by the platform to interested farmers on the MSP and funds raised added to the savings of the group. The seed purchased was then used on individual groundnut fields for production. One hundred and eighteen members (70 male, 48 females with 55 being youth) accessed this seed from the demonstrations annually (Table 5.3). Farmers on the MSPs were also introduced to good agronomic practices in groundnut production through the field demonstrations. Members admitted that they could vividly see the difference between their own farms and the demonstration fields. It is acknowledged that this approach to seed production is a stop gap measure because groundnut seed production still remains unattractive to commercial seed producers due to the high cost of production, low seed multiplication ratio, quick loss of seed viability, the self-pollinating nature of the crop, low demand especially by large farm enterprises and handling challenges as a result of bulkiness among others. To ensure the continued availability and accessibility of high-quality seed within communities through the MSPs, they were taken through principles of groundnut seed production and seed business trainings. During the training the platform actors were introduced to the various steps to take in becoming a certified seed producer. For the first year, the MSPs were assisted to produce seed. They would register as growers or become out-growers for seed companies through support from their AEA's.

Review meetings were also organized to bring together leaders of the MSPs, seed companies, traders and other stakeholders. The objective was to foster linkage and establish bonds for sustained performance after the end of the TLIII project. These meetings also offered the members of the MSPs to learn from shared experiences and learn from each other.

In a study conducted at the formation stages of the MSPs, members indicated that it was difficult getting money to plough their fields and buy the needed inputs such as seed and herbicides. Although there are rural banks and savings and loans institutions in many areas, high cost of borrowing and demand for collateral is a disincentive to many farmers. More so, these institutions are of the view that farming is a very risky business resulting in one of the highest interest rates applied (about 40% p.a) when lending to actors in agriculture. To address this challenge of

Table 5.3 Beneficiaries of seed produced from demonstrations

| Region | District | Community | Male | Male <35 yrs | Female | Female <35 yrs | Total |
|-----------------|---------------|------------|-----------|--------------|-----------|----------------|------------|
| Northern Region | Mion | Salankpang | 15 | 9 | 11 | 2 | 26 |
| | Yendi | Kulkpanga | 14 | 8 | 9 | 4 | 23 |
| | West Mamprusi | Gbeduri | 13 | 5 | 9 | 3 | 22 |
| Upper East | Bawku | Tampizua | 15 | 11 | 10 | 4 | 25 |
| Upper West | Nadowli | Tibani | 13 | 7 | 9 | 2 | 22 |
| <i>Total</i> | | | <i>70</i> | <i>40</i> | <i>48</i> | <i>15</i> | <i>118</i> |

funding, the platforms were introduced to and adopted the Village Savings and Loans Association (VSLA) concept. This self-help microfinance initiative was rolled out to help group members put monies together through weekly savings for a given period of 9 months amounting to an average savings of GHS 203.00 (USD39, April 2019 exchange rate) per member over the period. Members were also able to buy shares at GHS 1.00 (USD0.19) per share and each member could buy a maximum of five shares per week. With this initiative, members could borrow monies from these savings for their farming and other income generating activities and repay with an agreed interest rate of up to 10% per annum. This is very low compared to the industry of 25–40% per annum interest rate. This strategy has since relieved members of financial burdens associated with high interest rates from banks and other institutions.

5.6 Facilitation of Platform Activities and Decision Making

Facilitation of these platforms was done through the adoption of broad approaches to reach the wider audience in the platforms. Meetings were convened by the Chairman of the platforms, who also directed affairs during the meetings and other activities. In general, the use of participatory and collective action tools was employed. Decisions were arrived at, after a cast of votes by raising hands. Some sessions were also facilitated by dividing the members into smaller groups to come up with a consensus that represents that small group and then share with the larger platforms membership for decision making. Through this approach, a systematic joint analysis, documentation, and experiential learning and information sharing among platform members were always employed. This helped the executive committee members with assistance from the TLIII project team to develop strategies to improve and effectively run activities within the platform.

5.7 Achievements of the Platforms in Terms Access to Technologies, Social Assets and Improved Livelihoods

The MSPs were able to access seed of improved varieties in the form of small seed packs (10 kg of unshelled groundnuts to 112 farmers per year). Some of the varieties which were near release were given to them to put in demonstrations and apply the trainings they had received in agronomic practices and seed production. In 2018, a total of 25 acres of seed fields was cultivated to produce about 5 tons of high-quality seed. The noted low production per unit calls for increasing farmer sensitization and training on the GAP, but also investing in labour alleviating devices such as small planters and groundnut strippers especially for women farmers who often resort to broadcasting to save on labour cost and time. The quantity of seed required by the platform members for their personal use was taken and the rest sold to community members as seed.

The MSPs have become ambassadors of new groundnut varieties in their communities and neighbouring villages. In order to accelerate the access of these groundnut producing communities to information on new varieties, the platforms, after receiving the trainings on seed production were given seed of three candidate groundnut varieties for multiplication. This was to allow them to appreciate the potential of the new varieties, to speed up variety adoption and also serve as seed increase. Each group received 20 kg of unshelled groundnut seed of each line for planting half an acre, resulting in a total of 1.5 acres per platform. At the end of the season, the actors had the opportunity to observe the performance of the varieties and could easily identify them. Most of them had already chosen their favourite. This exercise resulted in close to 2 tons of seed which SARI paid for upon delivery. Two candidate varieties out of the three received were officially released in the last quarter of 2018 and have since been given the denominations, Sarinut 1 and Sarinut 2.

It is generally believed that the activities carried out within these MSPs and other components of the TLIII project were key contributors to the increased groundnut seed production (Fig. 5.1) and productivity (Fig. 5.2) together with a resultant estimated US\$ 340.00 change in gross margin on farmer's fields within the three Northern regions where project activities were implemented.

Furthermore, access to good land for women farmers was increased slightly by the advocacy by platform leaders to community opinion leaders. Land for women especially was a challenge in some communities. But after discussions with the families and some opinion leaders, some of the women making up about 20% were given good pieces of land for cultivation. Unfortunately, promises by some community leaders to release large parcels of land to MSPs were not honoured.

The sanitation and health of some platform members and their communities were improved through construction of hygiene facilities. Some MSP established collaboration with an NGO, IDE Ghana, promoting health through the abolishing of open defecation. This NGO used a cost sharing approach where interested community members contributed part of the money required to build a toilet within the

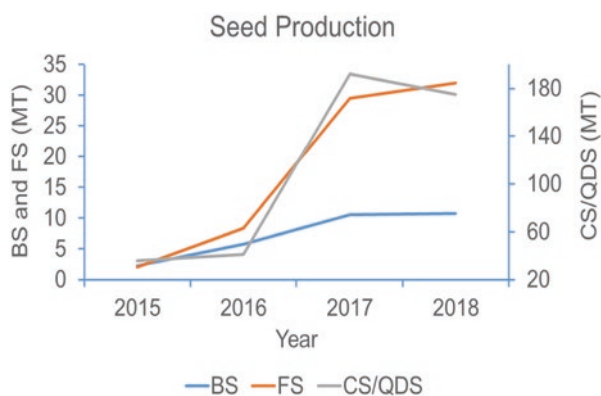


Fig. 5.1 Trends in groundnut seed production in the lifespan of TLIII

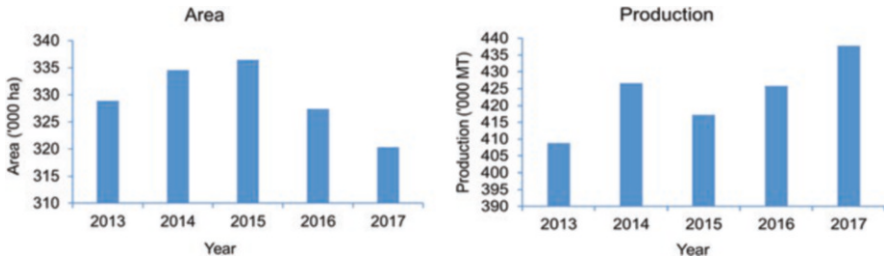


Fig. 5.2 Area and production levels of groundnut in Ghana

household. Through the loan facility available to platform members using their savings, the actors of one of the MSPs in Walewale borrowed money to undertake the construction of these toilets, nicknamed “Sama sama”. This in turn has helped promote good sanitation and hygiene among the people in the community. Also, this initiative (Sama Sama) is said to prevent certain diseases caused by many of the lower quality pit latrines available in the community.

Most members of the MSPs borrowed funds from the savings to renew health insurance (National Health Insurance, NHIS) and those of their households. Some of these members said their renewal in the past could be 2 years over-due because of other competing needs for money they generated through farming and petty trading. This has helped to reduce the burden of paying a lot of the bills (cash and carry) for medical care which people without NHIS have to bear.

A major partner of the TLIII project, Social Enterprise Development foundation (SEND) Ghana, educated the MSP members on conflict resolution at home and within the community to earn the support of other members of the households. Through the family gender model, conflict resolution and inclusive decision-making capacity within the household have improved. More importantly, creating an environment where women have the opportunity to express their opinion in the household in order to create a harmonious environment in the family has been highly appreciated by members.

The introduction of the savings system and the village savings and loans concept was viewed as very useful. Members, especially women on whom most of the day-to-day management of the home relied on, said they walk with their heads held high. According to them, their social status has increased since they joined the MSPs. They have stopped borrowing funds from lenders whose high interest rates were difficult to accommodate coupled with the harassment from these lenders in the community. Hence, they have gained respect among their peers.

5.8 Achievement in the Areas of Gender Equality and Youth

Joining the MSPs has boosted the women’s confidence and earned them the respect of family and friends. Regarding gender equality, one major challenge women faced in the community was asking for money from their husbands for the upkeep of the

home. Almost all (over 80%) of the women were able to establish or maintain non-farm businesses such as petty trading and selling of food with money borrowed from the platforms' funds. This way, they earned money and were able to contribute more, financially to support the household needs. Moreover, women are now better involved in decision making in the community and household since they are able to support in the provision of household needs such as payment of school fees, health insurance and even help support farm size expansion (support in ploughing larger areas) with money they make. The power to contribute financially has also led to reduced household conflicts between the husbands and wives. The wives say they do not need to request for money from their husbands as much as they used to do which was one of the major causes of disagreements.

In most parts of the three regions in the North, groundnut though widely known as a women's crop is one of the crops with the highest commercial value. According to the youth in the MSPs, unlike maize, sorghum and millet which most families rely on for subsistence and hence are considered to be family owned, groundnut does not fall within that category. While a young man or woman would need permission from the head of the family to dispose of the cereals and other crops, they are at liberty to sell their groundnut without any authorization from the family. The youth in the MSPs, with support from the group in light of the trainings and funds at their disposal for borrowing, are now able to own groundnut farms. These young people are more responsible towards other members of the household and contribute to the family's growth. All this is through the groundnut production since it is not considered as a family commodity, hence they solely own the output from the production. Through the access to good seed and credit from the platform, they can decide to even increase their farm sizes.

5.9 Members' Perception of Platform Performance

To most members of the platforms, baring conflicts that arise in any human society, the platforms have been a great source of relief. Some say they have acquired a second source of income through the off-farm businesses they started with funds from the platform, have gained knowledge to improve their crop production, marketing and peace in their homes.

They perceive the platform as an avenue for training and skills development. Any entity or institution they approach is willing to listen to them and help them if possible since they belong to an organization. The habit of saving inculcated in them would be very useful too in the future.

Also, members in the platform see it as a source of power to take control of their access to quality seeds of superior groundnut varieties. They are now able to produce quality seed and with the seed of the new varieties obtained they have the seed at their communities. The platforms are also able to set the prices of the improved groundnut seed since the production of the seeds is done by themselves. Also, because members are now linked to the research institute and they believe that they could always contact the institute for any information regarding varieties.

The members also see these platforms as a form of strong social network. They are able to support each other during funerals, baby christening and other social events. Apart from them attending to support such programs of members, they also help in kind and in cash. The women would usually help with cooking the large pots of food required to feed guests during such occasions. The group's social fund which was instituted to support such things is also offered to help relieve part of the financial burden on members during such occasions.

Furthermore, the being part of a group has given them a stronger bargaining power, market linkages, access to tractor services and access to agro-inputs. For instance, members are accessing tractor services more readily than before. Since most tractor operators are more attracted to large acreages of land compared to the one acre or so most of them have. One merit of this platform is that accessing improved technologies is easier since agencies like working with groups rather than individuals.

5.10 Sustainability of the Groundnut MSPs

It is envisioned that training of the platforms on group dynamics and conflict resolution in the home would help maintain the MSPs even after the end of the TLIII project. There is mutual respect for diverse opinions and democratic decision-making processes. This is a key factor for the members in the sustainability of any group.

The members of the MSPs were equipped with knowledge and skills in production and how to become registered seed producers. They have the opportunity to go into seed business as seed producers or seed cooperatives. They could register as producers of quality declared seed (QDS) and produce seed to serve their communities and neighbours. Also, the platform has created a linkage between the groundnut producers and seed companies through meetings. Through the trainings received in seed production these platforms can now act as out-growers to seed companies when enough seed has been supplied to members and the communities.

Another opportunity for sustainability and for that matter the most important one is the financial support these actors derive from being members of the MSPs. The access to funds in the form of affordable loans would serve as a great incentive for actors to remain members of the MSPs. Some platform members also serve as ready market for businesses (farm produce, seed, petty trading, agro-input, etc.) of other members of the platform. For instance, agro-input dealers and farmers on the platform can go into negotiation to supply the farmers with agro-inputs on flexible payment terms. Such synergies would be motivations for both the farmer and the input dealer to stay in the group.

5.11 Reflection on the Process

At the onset of setting up an MSP, things were quite rough. At the beginning, the platform was bedevilled with many arguments which led to meetings not usually ending with common consensus. Others even left the meetings in anger in the middle. Because, actors were drawn from different backgrounds and social standing, integration to forge a common goal was a challenge. They were slow in having a common understanding on issues and taking decisions as a group.

Patience and emotional intelligence are key attributes a facilitator need to have when setting up such platforms. One must work hard to win the trust of prospective platform members. For instance, it took a lot of effort to convince some members about one of the objectives of the project, to improve farmer access to high-quality seed. Some narrated the bad experiences they had with seed they purchased from seed dealers. They reported that the resultant crop was very poor and hence they had lost trust in seed from the formal sector. The use of experiential learning through trainings followed by demonstrations was very efficient tools in convincing the farmers to take up the new groundnut varieties and related technologies.

The various milestones chalked by the MSP benefitted all actors in different spheres of their lives. Producers were exposed to superior groundnut varieties. The varieties multiplied by the platforms yielded about 70% more than their old ones. They have acquired seed for their next planting at a very affordable price. The producers have also gained knowledge in post-harvest handling of their produce to reduce post-harvest losses and improve the quality of the grain especially with respect to lowering the levels of aflatoxin contamination. Secondly, there is an organized market system without middlemen which would help traders to realize good profits after sales of their produce. To the groundnut processor, the platform experience serves as a ready source of raw material for their businesses. The agribusiness and entrepreneurship training they received by the traders and processors would be useful in improving their businesses and livelihoods.

To the communities in which these MSPs are located, there is now a reliable, easily accessible and affordable source of quality seeds of improved groundnut varieties to farmers. Community members and those from neighbouring villages also participated in demonstrations which is hoped to translate into better farms and higher yields. It is hoped that they will experience the 70% yield advantage portrayed by the improved varieties and good agronomic practices. Members on the platform are helping their friends who are not members to also adopt these improved technologies.

One of the great advantages is that it has also created a harmonious living in the community. Many homes of the platform members are sharing their success story with others. Homes are now happier and there is more understanding and cordiality. Sanitation and general well-being in some areas within the communities would have improved.

5.12 Future Perspectives and the Way Forward

It would be very useful to include recipe development, value addition and related trainings in future activities of groundnut MSPs. This would diversify groundnut uses in the communities while enhancing nutrition and incomes.

Creating linkages with financial institutions would be essential in improving financial management of the MSPs as well as security of their savings. This will increase the safety of their money since the little boxes used in keeping members' savings as practiced by the platforms would be eliminated. Financial institutions prefer lending to groups because they feel this practice minimizes their risk of non-recovery of loans. Building a relationship with financial institutions will be a useful addition. The presence of the financial institutions would help increase group members' access to bigger loan facilities which may be beyond the amounts the platforms can afford from their savings. The platform actors would need minimum or no collateral to qualify for such facilities.

With the right form of management and commitment, these MSPs could become a great source of seed in their communities. With the training gained in various subjects, they could gradually grow into full-fledged contract growers for seed companies or form a company themselves. They may formally register as quality declared seed producers to improve their income earned through seed production and serve as a sustainable source of high-quality groundnut seed to their communities.

Land tenure is also a major challenge faced especially by women in the communities. More work need to be done in convincing husbands and the Chiefs to free fertile lands for women to undertake farming activities.

The progress of the groundnut MSPs would need to be followed over an extended period of time to be able to adequately measure change. Unfortunately, the current MSPs are relatively too young to be fairly appraised.

5.13 Lessons Learned Through the Implementation of the Groundnut MSPs

- MSPs are effective in variety promotion and valuable seed sources for low value and high-volume crop seeds such as groundnut.
- Getting the buy-in of community and family members is important for the success of MSPs. The MSPs activities if carried out in a participatory manner are capable of improving women's involvement in decision making in the household.
- The MSPs have the power to improve livelihoods and social status of people. They could be a good mechanism for reducing rural-urban migration if the youth can reap adequate benefits from their membership. For instance, members were able to make about 40% on their savings which is capital they can use for developing themselves and curb the need to migrate for menial jobs in the cities.

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Impact Assessment of Developing Sustainable and Impact-Oriented Groundnut Seed System Under the Tropical Legumes (III) Project in Northern Nigeria

S. G. Mohammed, M. Halliru, J. M. Jibrin, I. Kapran, and H. A. Ajeigbe

Abstract

Tropical Legumes III project as a development intervention focused on enhancing smallholder farmers' access to seeds of improved groundnut varieties using multi-stakeholder platforms. Open Data Kit was used to collect information from the platform members using structured questionnaires and focus group discussions (FGDs). Descriptive statistics and adoption score were used to analyze the data. Selection of appropriate project location, reliable beneficiaries, timely supply of seeds, and training on good agronomic practices (GAPs) and effective supervision on production were the major thrusts of the TL III project. The results indicated that the IP members accrued additional income ranging from \$214 to \$453 per hectare for wet season. The same increase in beneficiaries' income was reported per hectare for dry season from \$193 to \$823, respectively; all due to the TL III intervention. The results further indicated increasing access by farmers to services (e.g., improved seeds, extension, credit facilities, market, etc.) and enhanced productivity (farm size, pod and haulm yields). Findings further revealed an average increased market price of 21.5% and 18% for dry and

S. G. Mohammed (✉) · J. M. Jibrin
Centre for Dryland Agriculture, Bayero University, Kano, Nigeria
e-mail: sanusi.gaya@buk.edu.ng

M. Halliru
Department of Agricultural Economics and Extension, Bayero University, Kano, Nigeria

I. Kapran
International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Bamako, Mali

H. A. Ajeigbe
International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Kano, Nigeria

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wet season groundnut production, respectively. There was high adoption score (78%) of improved seeds and other GAPs. The study recommends the need to replicate similar interventions in other areas. Continued capacity building on GAPs and improved business management skills to Extension Agents and farmer groups will sustain the successes achieved by the TL III project.

Keywords

TL III project · Improved seed · Innovation platform · Groundnut productivity · Impacts · Nigeria

6.1 Introduction

Groundnut (*Arachis hypogaea*) is a major oilseed crop grown in the savanna zone of Nigeria. It is mainly grown for its nut, oil, and its haulms. Recently, the use of groundnut meal is becoming more recognized not only as a dietary supplement for children on protein poor cereals-based diets but also as effective treatment for protein related malnutrition in children. It is the 13th most important food crop of the world and the fourth most important source of edible oil. Its seeds contain high quality edible oil (50%), easily digestible protein (25%), and carbohydrates (20%) (APS 2014).

Inconsistencies in government policies as regards production, transportation, and marketing of groundnut in Nigeria, which the government was actively involved before the disappearance of the groundnut pyramids of the North, have been identified as the major setback for the decline in groundnut production. The high rate of population growth in Nigeria calls for the need for more groundnut to meet the population need of the crop. Groundnut production in Nigeria is constrained by many factors notably biotic and abiotic factors. Principal among these factors are diseases especially rosette and leaf spots; drought; lack of quality planting materials; and inefficient market. Concerted efforts have been made by various initiatives such as the Tropical Legumes (TL) III project to alleviate these constraints to improve farmers' income and household food security as well as make Nigeria regain its lost glory in groundnut production.

The TL III project led by the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) is a major international initiative supported by Bill & Melinda Gates Foundation (BMGF) and jointly implemented with International Center for Tropical Agriculture (CIAT), International Institute of Tropical Agriculture (IITA), and National Agricultural Research Systems (NARS) partners from sub-Saharan Africa and South East Asia. The project launched in 2015 has seven broad objectives and aims to develop improved cultivars of common bean, cowpea, chickpea, and groundnut and deliver their seed at scale to small holders in the BMGF focus geographies.

In Nigeria the project focused on enhancing smallholder farmers' access to seed of improved varieties of groundnut and cowpeas through formation of multi-stakeholder innovation platforms (IPs) in selected states of the country. The project implementation is led by the Institute for Agricultural Research (IAR), Samaru while the Centre for Dryland Agriculture (CDA) of Bayero University, Kano specifically leads objective 6; the Seed Systems for Groundnut. The CDA worked with ADPs of six states—Bauchi, Jigawa, Kano, Kebbi, Zamfara, and Sokoto—to implement the project activities. The project ended in 2019 and seeks to assess the impact of the intervention to provide scientific documentation of the IP activities and achievements in the target states. The documentation considered the TL III intervention areas specifically the project beneficiaries. The Open Data Kit (ODK) was used to collect information from the platform members using structured questionnaires and Focus Group Discussions. Descriptive statistics and adoption score were used to analyze the data.

6.2 Objectives of the Impact Study

The study was undertaken to achieve the following objectives:

- To establish the significance of the innovation platforms and its effects in enhancing smallholder groundnut productivity
- To determine the additional income accruable to SHFs who benefited from the innovation platform activities
- To assess rate adoption of the improved groundnut varieties and associated technologies among SHFs
- Identify existing potential differences of productivity drivers (farm size, income, yield and access to market, etc.) before and after the project among SHFs
- Identify the major constraints militating against the innovation platform of the TL III project

6.3 Establishment of the Innovation Platforms

Seven IPs were established at the start of the project in 2015. However, for the purpose of this study only two of the IPs prominent in two Local Government Areas (LGA) of Bauchi (Ningi Groundnut Alkhairi Farmers' Association - NGAFA) and Kebbi (Bela Groundnut Cooperative Farmers - BGCF) States were considered. At the onset, the IPs started with 12 members each, which currently increased to 24 and 25 members for the NGAFA and the BGCF, respectively. Platform governance structure for each of the group involved steering committee at the beginning that facilitate membership election for smooth implementation of platform activities.

The composition of the two groups is made up of 32 (65.3%) males and 17 (34.7%) females, including 18 youths (36.7%); those under the age of 35 years. One of the most important activity records for the groups was establishment of IPs,

whose purpose was to create a forum for sharing knowledge on good agronomic practices and other services that will facilitate effectiveness especially members' groundnut productivity approaches. The strategy for establishing the IPs started by identification of appropriate location that can favor the production of groundnut seed for both wet and dry seasons. Emphasis was given to Fadama areas or those with potential sources of water particularly for the dry season groundnut seed production activities. The next aspect involved sensitization, identification, and registration of stakeholders with interest and concerns in groundnut seed production value chain. Selected farmers were provided initially with foundation seeds of four released varieties of groundnut and superphosphate fertilizer enough to commence production of 5 ha by each group. The varieties produced were Samnut 24 for all farmers in Bauchi State and Samnut 24, Samnut 25, and Samnut 26 for their counterparts in Kebbi State. The farmers were continuously monitored and trained by EAs who provided regular trainings in the application of GAPs for groundnut seed production.

6.4 Composition, Roles, and Responsibilities of the IP Members

The composition of the IP and other stakeholders such as seed companies, processors, agro-input dealers, community leaders, extension agents, and buyers/market-ers from nearby communities within the study area is depicted in Table 6.1. The innovation platform serves as an umbrella where members meet on monthly basis to discuss matters associated with groundnut seed production in the presence of the EAs responsible for the communities. The major responsibility of the IP members was to produce quality seeds of improved groundnut varieties for supply to interested members of their communities and beyond. This turned out to be a significant effort to facilitate efficient development of the groundnut seed system and quality of groundnut grain production.

6.5 Facilitation of Innovation Platform Activities

The IP programs are facilitated by the EAs and the major activities undertaken include creation of awareness among community members, pre-season training on Good Agronomic Practices (GAPs) for groundnut seed production, and periodic supervision of members' activities during pre-production, production, and post-production periods. Prior to the commencement of production activities, annual pre-season trainings are provided to the members of the IPs. Areas of pre-season training covered GAPs ranging from site selection, land preparation, sowing, field sanitation, fertilizer application, and harvest and postharvest operations. The EAs in the project areas ensure maximum adherence to the GAPs among the selected farmers' fields.

Table 6.1 Roles and responsibilities of various stakeholders

| Categories of members | Roles and responsibilities |
|-----------------------|--|
| Farmer seed producers | Seed multiplication at community levels is the sole responsibility of farmers. Select few farmers were trained to produce foundation seeds. The partner Agricultural Development Projects distributed the foundation seeds and fertilizers to other seed growers who produced certified seeds following recommended production and certification practices. The certified seeds produced were further distributed to many farmers in different communities to produce grain for consumption and other market needs. Production fields were certified by the National Agricultural Seeds Council of Nigeria. Quality seeds recovered from the producers were kept and distributed to other farmers in same and neighboring communities for grain production |
| Seed company | Organized demonstration plots in communities to popularize new varieties. Device out-growers scheme to produce foundation and certified seeds, which they buy back. Sale of seeds in small seed packs to facilitate access to improved groundnut varieties by farmers |
| ADP staff | Select and organize farmers into groups, provide extension services, training, supervision, and coordination of all activities for effective delivery of the TL III project |
| Community leaders | Important pillars of communities; provide leadership roles and ensure cooperation of farmers in IPs and sustainability of interventions |
| Extension agents | Field agents that provide technical support at field level especially on GAPs and other postharvest operations. The EAs also play important roles in guidance, trainings, input sourcing, coordination of demonstration plots and field days among others |
| Traders | Responsible for input and output purchases. They are important pillars in IPs |
| Processors | These are important stakeholders in groundnut value chains. The role of the processors is value addition to groundnut grains produced in communities |
| Local media | Solely responsible for the extension delivery to communities. All the state ADPs have functional media units with designated weekly programs on radio and TV with wide coverage that extend improved agricultural practices to communities |
| Research | Develop varieties and associated production technologies. They facilitate innovations that encourage groundnut producers to properly engage in seed production |

6.6 Achievements of the Platform

6.6.1 Access to Knowledge and Farm Advisory Services

Achievements in the areas of access to knowledge and farm advisory services are required to be documented in any development project. Findings from this study indicated significant increase (98%) in extension advisory services of the IP members following the TL III project compared to the low advisory level (38%) before the intervention. This increase was attributed to the TL III IP support in training and frequent supervision by EAs in the project areas.

6.6.2 Training on Improved Groundnut Seed Production

The documentation further made enquiry in the areas of training on improved groundnut seed production. The training areas covered include both pre-production, production, harvest, and postharvest as well as business management skills. Basically, the IP members were trained on best practices for the production of improved seeds with particular reference to planting method (to maximize plant population), planting depth (for assured germinability), fertilizer requirements (for enhanced nutrition), and pest control strategies (for efficient health and wellbeing of plants) among others. IP members that received such trainings recorded higher yields than non-members in the same communities. Such trained farmers are most likely to practice the skills acquired compared to those who have not and in areas with limited access to good development intervention (APS 2014) (Fig. 6.1).

6.6.3 Access to Improved Seeds and Their Types

It was confirmed that, prior to the TL III project, groundnut producers mostly used local seeds because they have no access to seeds of improved varieties. Most of the local groundnut planting materials available to farmers for planting in the study area have low genetic potentials for pod yields, resistance to major pests and diseases as well as poor tolerance to drought. These constraints and many others result in low productivity of groundnut in Nigeria. The TL III intervention has increased farmers' access to improved groundnut seeds with spill-over effects to even beyond the IP member communities. The overall results showed that 88.7% of the beneficiaries now have access to quality improved seeds due to the TL III intervention compared to the previous access level of 26.3% before project. Majority (86.9%) of the beneficiaries have adopted Samnut 24, one of the improved early varieties for production (Fig. 6.2).

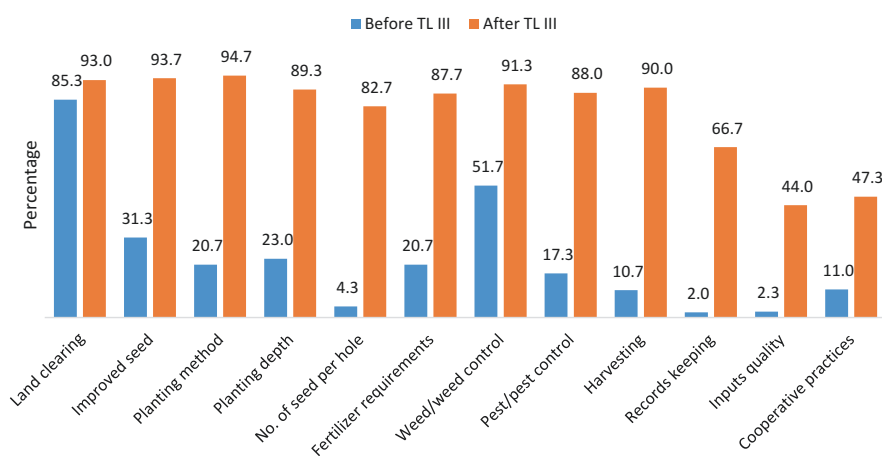


Fig. 6.1 Training on improved groundnut seed production

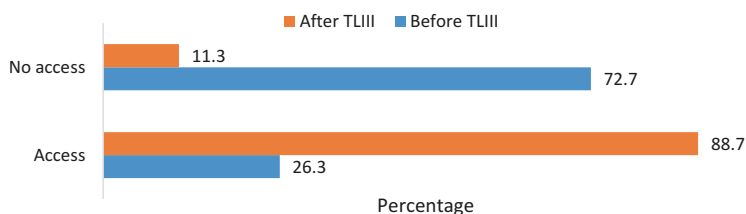


Fig. 6.2 Access to improved seeds

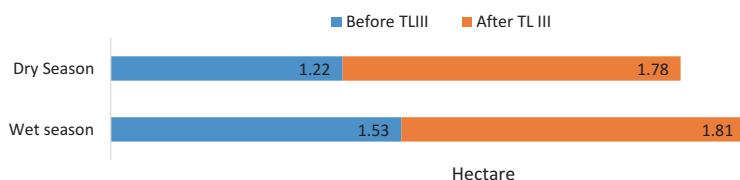


Fig. 6.3 Average farm size assessment

6.7 Average Farm Size and Yield Assessment among Members

Farm size and average yield are two primary parameters that determine farm productivity. This assessment indicated increase in farm size devoted for groundnut production during both wet and dry seasons. The average farm size for the dry season production was 1.22 ha and 1.78 ha before and after the project intervention, respectively. For the wet season, the average farm size increased from 1.53 to 1.81 ha. This impliedly showed expansion in farm area devoted for groundnut production among the IP members both wet and dry season productions, with greater increase in dry season than wet season (Fig. 6.3).

Similarly, the documentation exercise further computed the statistics of average pod yield (kg/ha) obtained from the groundnut production activities. Findings indicated increased average yield for both wet and dry seasons. The average yield increased from 939 to 1217 kg/ha, recording about 29.6% increase for the wet season production. Similarly, the study revealed that the average yield for the dry season production increased almost ninefolds from 155 to 1352 kg/ha per hectare (Fig. 6.4).

6.8 Income Assessment of Groundnut Seed Producers

The statistics for the groundnut farmers income assessment revealed positive improvement for both wet and dry season productions. The results indicated that the IP members accrued additional income ranging from \$214 to \$453 for wet season. The same increase in beneficiaries' income was reported for dry season groundnut

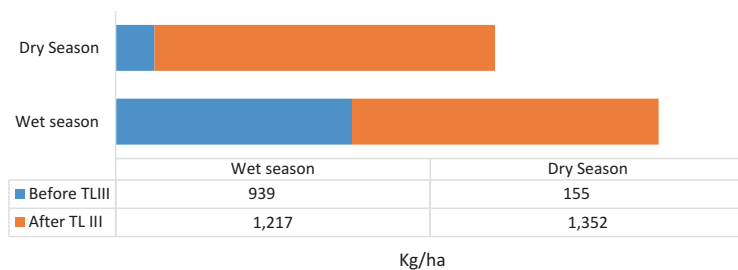


Fig. 6.4 Average yield assessment

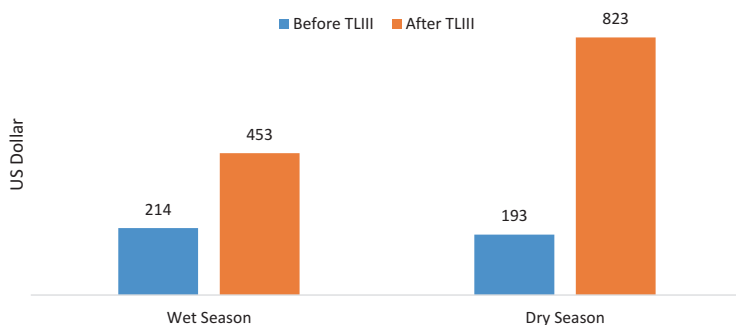


Fig. 6.5 Income assessment of groundnut seed producers

seed production from \$193 to \$823, after the TL III intervention. This implies positive contribution of the innovation platforms activities among the IP members. Diversification of income sources is a vital instrument for the development of farming activities, household living standard, and overall rural economic activities (Fadipe et al. 2014). It was observed that all income stream increased after the presence of the IP. The additional income obtained after TL III project can be used to improve other investment activities such as livestock production and off-farm enterprises among others (Fig. 6.5).

6.9 Access to Markets, Financial, and Other Services

Access to market among smallholder farmers in developing countries has been a serious challenge hindering increased agricultural activities in rural areas. The results from this study indicated increased access to market after TL III intervention as reported by 91.8% beneficiaries. Farmers were trained to produce quality outputs using quality inputs and other GAPs, which attracts market demand. Findings from the FGDs indicated that presence of off-takers, local processors, demand from other communities, and seed recovery by TL III are important in improving access to market.

6.10 Improvement in Market Price

The prices at which farmers dispose agricultural commodities determine to some extent the level of profit to be generated per unit time. The higher the price of farm output, the higher will be the revenue obtained by smallholder farming households (Olukosi et al. 2008). The IP member responses revealed information about farmers' opinion on market price improvement of groundnut seeds before and after the TL III intervention. These findings revealed appreciable increase in the market prices of groundnut seeds as reported by 90.8% of the beneficiaries after executing the TL III activities in the project areas. Poor prices were reported before the TL III intervention as claimed by 71.2% of the IP members. Findings further revealed an average increased market price of 21.5% and 18% for dry and wet season groundnut as reported during the Focus Group Discussions, respectively. These increased prices of groundnut were reported as the major element of investment attraction in both wet and dry seasons.

6.11 Access to Credit among IP Members

Access to credit among smallholder farmers has been considered as major constraints affecting agricultural and other investment opportunities in developing countries. Within the IPs, it was reported that 40.7% of the beneficiaries had access to credit following the TL III intervention. Even though some improvements were recorded for access to credit from 1.7% before the TL III project, the current scenario is not enough for the farmers as reported during the FGDs. Similar findings on access to credit were reported by Mamman et al. (2016) who worked on socio-economic factors and income diversification affecting food security status of farming households in Jigawa state, Nigeria. The increasing access to credit can be attributed to the training and farmer sensitization to seek for more income to expand their agricultural production activities. The program of Anchor Borrower Scheme of the Federal Government of Nigeria is believed to have contributed to the increased access to credit.

6.12 Cooperative Membership among Beneficiaries

The study further provides information on cooperative membership among project beneficiaries. From the group statistics, majority (89.3%) of the members belong to one cooperative group or another. There was increased participation in farmer organizations, as proved by members of the Ningi Groundnut Alkhairi Farmers' Association and Bela Groundnut Cooperative Farmers. Farmer cooperative organizations might be crop specific in rare cases and in most cases, they tend to be multi-purpose, comprising many crop ventures. In any case, farmer associations are expected to render some essential benefits such as collective purchase of inputs, output marketing, social interaction, and learning of technology dissemination among its members (Ahmed et al. 2013) (Fig. 6.6).

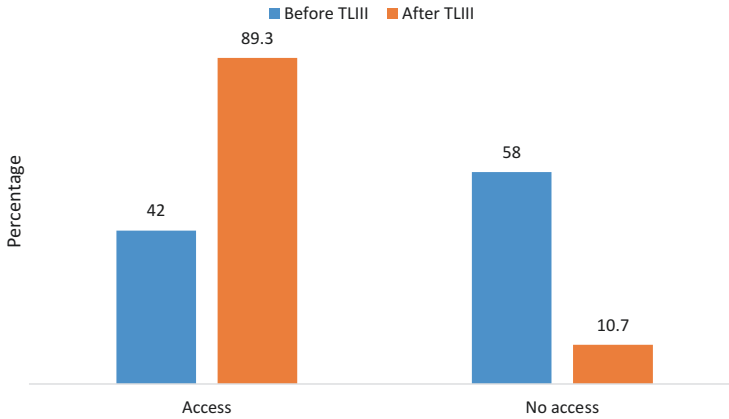


Fig. 6.6 Cooperative membership among beneficiaries

6.13 Achievements in Areas of Social Assets

Findings from this study revealed increasing participation in community social activities from 63.2% to 84.8% before and after the intervention, respectively. Participation in community social activities such as meetings and community development activities bring farmers together to interact, share knowledge and skills that might help them in improving production activities. The study further revealed that 17% of the IP members claimed improvement in their social assets, owing to their involvement in social participation.

The use of mobile phone in agricultural and other household economic activities has become a matter of importance and in most cases a serious concern to Government and other development agencies. Farmers are encouraged to accept the technology of modern communication systems. The response of the FGD indicated increased access to mobile phones from 61.4% to 82.7% for before and after the TL III project intervention. Farmers with improved access to mobile phone are likely better in receiving and sharing information on new technologies, input and output market prices, availability of improved seeds, and other GAPs techniques among others.

6.14 Assessment of Innovation Platform Achievements

6.14.1 Members Perception on IP Performance

The IPs have provided ground for supplying quality improved groundnut seeds, fertilizers, trainings, and access to market members and others in their communities. The study revealed that 89% of the beneficiaries assessed the IP performance as good while 11% reported moderated performance for the IPs.

6.14.2 Technology Adoption of Groundnut Seed Production under TL III Project

The intervention provided to the IP a package of inputs and training supports on GAPs. This study therefore assessed the adoption of various component technologies with reference to conventional adoption stages. The component technologies assessed include improved seeds supply, choice of appropriate sowing date, sowing method (spacing inclusive), sowing depth, number of seeds per hole, fertilizer application, weed control as well as harvest and postharvest operations. Findings across technology components showed that farmers put into consideration the adoption stages (i.e., awareness, interest, trial, evaluation, and adoption). The statistics of the various component technologies revealed high adoption score of 0.79 with a grand adoption score mean of 0.76 (Table 6.2).

6.15 Overall Benefits of the Innovation Platforms/Seed Support System

Youth engagement in groundnut seed production was the most interesting emerging issue in most of the rural communities as reported by the Ningi Groundnut Alkhairi Farmers' Association and Bela Groundnut Cooperative Farmers. Findings from FGDs revealed that many young adults who traveled to distant places in search of jobs, now stay in their respective communities and put efforts to produce and sale groundnut seeds. This implied that the intervention has practically reduced rural-urban migration, which affects rural labor force engagement especially for agriculture. The IP supported improved groundnut grain production (73.3%) by supplying the bulk improved seeds requirement to members of their communities. The supply of improved groundnut seed has greatly helped farmers who were earlier using seeds of local varieties before the TL III intervention. Other benefits reported among project beneficiaries include emergence of dry season seed production, which hitherto is not practiced in these communities. Similarly, women engagement in post-harvest operations for them to generate income, training on improved groundnut seed production practices, cooperative participation among the farmers and improved access to extension services are important key benefits derived from the TL III intervention in the study area (Table 6.3).

6.15.1 Comparison of Some Selected Key Variables by Gender

6.15.1.1 Assessment of Average Farm Size (ha) by Gender

The statistics for farm size indicated that male devoted more farm size compared to female for both wet and dry season groundnut seed production. This can be attributed to the nature of farm ownership, access and control of households and individual resources in developing countries. The statistics of average yield obtained also follow similar trend, where male farmers obtained higher yields compared to their female counterparts, showing clear evidence of increasing productivity for

Table 6.2 Technology adoption of groundnut seed production under TLIII project

| Adoption Stages | Improved seed | Planting method | Planting date | Planting depth | No. of seed per hole | Fertilizer requirements | Weed control | Harvesting |
|---------------------------------|---------------|-----------------|---------------|----------------|----------------------|-------------------------|--------------|------------|
| Awareness | 264(88.0) | 265(88.3) | 272(90.7) | 271(90.3) | 274(91.3) | 277(92.7) | 273(91.0) | 278(92.7) |
| Interest | 233(77.7) | 232(77.3) | 223(74.3) | 215(71.7) | 233(77.7) | 227(75.7) | 233(77.7) | 227(75.7) |
| Trial | 207(69.0) | 202(67.3) | 206(68.7) | 191(63.7) | 209(69.7) | 209(69.7) | 212(70.7) | 215(71.7) |
| Evaluation | 206(68.7) | 210(70.0) | 211(70.3) | 195(65.0) | 213(71.0) | 212(70.7) | 213(71.0) | 212(70.7) |
| Adoption | 223(74.3) | 222(74.0) | 223(74.3) | 210(70.0) | 235(78.3) | 237(79.0) | 233(77.7) | 228(76.0) |
| Total | 1133 | 1131 | 1135 | 1082 | 1164 | 1162 | 1164 | 1160 |
| Adoption score | 0.76 | 0.75 | 0.77 | 0.72 | 0.78 | 0.79 | 0.79 | 0.77 |
| Grand mean adoption score: 0.76 | | | | | | | | |

Table 6.3 Overall benefits of innovation platforms/seed support system

| Benefits | Percentage | Ranking |
|--|------------|---------|
| Commercialization of groundnut seed production | 79 | 2nd |
| Improved access to extension services | 65 | 7th |
| Support improved groundnut grain production | 78.3 | 3rd |
| Access to improved groundnut seed at community | 73.3 | 4th |
| Acceptance of improved production technologies | 69.3 | 5th |
| Women engagement in postharvest operations | 59.3 | 6th |
| Emergence of dry season groundnut seed production | 52.7 | 9th |
| Emergence of dry season grain production | 50.3 | 10th |
| Knowledge/understanding on cooperative participation | 53 | 8th |
| Youth engagement in groundnut production (dry and wet) | 83 | 1st |

Table 6.4 Average farm size (ha) by gender

| Seasons/gender | Before TLIII | | After TLIII | |
|----------------|--------------|------|-------------|------|
| | Female | Male | Female | Male |
| Wet season | 1.06 | 2.02 | 1.1 | 2.08 |
| Dry season | 1.29 | 1.5 | 1.03 | 1.78 |

both land and groundnut yield among the IP members. There was increasing participation of women in groundnut production as shown by the member composition of the farmer associations (Table 6.4) (Figs. 6.7 and 6.8).

6.16 Constraints to Groundnut Seed Production

The IPs ranked inadequate capital and credit facilities as the major constraints to groundnut seed production. This implied that, resource poor farmers could not purchase quality production inputs, pay for labor and efficient postharvest operations. Similar discoveries were made during the FGDs where farmers identified availability of capital, credit facilities, and transport as most important challenges to groundnut production in general. Other constraints include inadequate farm tools and equipment, pests and diseases problems as well as means to reduce drudgery, especially for women (Table 6.5).

6.17 Reflections, Focus, and Lesson Learnt

The IP system is believed to be ideal process to promote technologies to intensify agricultural production in local communities. The TL III as a development intervention has focused on enhancing smallholder farmers' access to improved seeds of

Assessment of Average Yield (kg/ha) by Gender

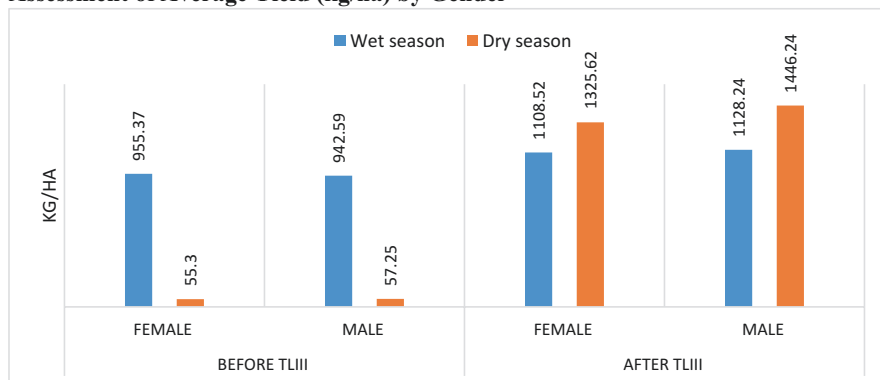


Fig. 6.7 Average yield (kg/ha) by gender

Access to Seed, Market and Group membership by Gender

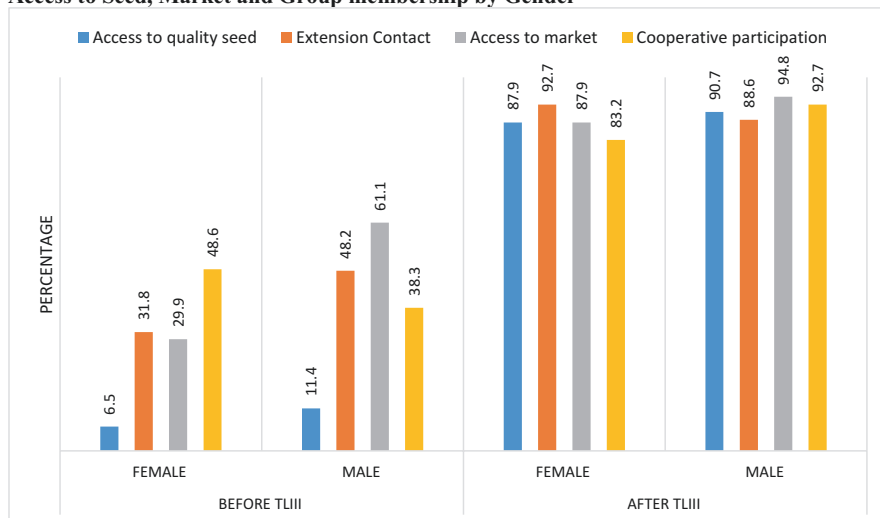


Fig. 6.8 Comparison of selected variables by gender

groundnut varieties through formation of multi-stakeholder platforms. Implementation evidence has shown that selection of appropriate project location, reliable beneficiaries, training and re-training on GAPs, and effective supervision on production activities are the major pillars of success of the TL III intervention in Nigeria.

6.18 Areas of Focus in the Future

Based on the reflections stated above, the following areas of focus are recommended for future interventions:

Table 6.5 Challenges affecting groundnut production

| Constraints | Percentage | Ranking |
|-------------------------------------|------------|---------|
| Inadequate farm tools and equipment | 81 | 3rd |
| Inadequate capital | 85.7 | 1st |
| Shortage of credit facilities | 82.3 | 2nd |
| Cultural beliefs | 29.7 | 10th |
| Pest and diseases | 68.3 | 4th |
| Problem of ready market | 43.0 | 7th |
| High cost of transportation | 49.3 | 5th |
| Weak extension services | 37.3 | 9th |
| Low selling price of groundnut | 43.3 | 6th |
| Unfavorable climatic conditions | 24.7 | 11th |
| Inadequate improved seed | 41.7 | 8th |

- The need for replicating the intervention in other focal areas especially those with potentials for dry season groundnut production.
- The need to strengthen capacity building on GAPs to EAs and farmer group leaders who could train their members to build on the successes so far achieved.
- The need to create more awareness on the potentials of the Samnut varieties particularly for dry season production as a panacea to reducing unemployment in rural areas and rural-urban migration of youth and able-bodied persons.
- There is need to develop the capacity of the SHFs in business plan and management to enable them to decide on when, where and which groundnut variety to produce based on market demand.
- Attention should be given on gender balance in the subsequent and similar interventions to increase the proportion of participation of women in such development activities.
- There is need to evaluate the likely spill-over effects of the IP system and diffusion of the improved groundnut varieties to non-project LGAs and other neighboring states.

6.19 Lessons Learnt

This assessment has documented some lessons worthy of learning from the beneficiaries of the TL III intervention. These include:

- Timely provision of inputs, delivering appropriate pre-season training and follow-up supervisions by EAs are key to the success of innovation platforms.
- Women and youth have keen interest and are willing to engage in dry season groundnut production in areas with available sources of irrigation. This will reduce unemployment and involvement in social crimes among youth.
- Introduction of modern technologies requires multi-stakeholder approach and involvement of SHFs in cooperative groups or associations to share knowledge

and skills. This will help in ensuring sustainability of the innovations for enhanced productivity.

- IPs have high potentials for spill-over effects as farmers in non-project communities are eager to access improved seeds and other GAPs from the beneficiaries.
- Market information is vital and strong for both input and output markets. This will enable smallholder farmers generate premium from sales of improved seeds.
- Availability of the IPs has attracted investors to express interest to engage SHFs into contract cultivation of improved groundnut varieties thereby confirming assured market.

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Enhancing Chickpea Production and Productivity Through Stakeholders' Innovation Platform Approach in Ethiopia

7

Mekasha Chichaybelu, Nigusie Girma, Asnake Fikre, Bekele Gemechu, Tiruaynet Mekuriaw, Tesfaye Geleta, Wubishet Chiche, Jean-Claude Rubyogo, Essegbemon Akpo, and Chris O. Ojiewo

Abstract

Chickpea (*Cicer arietinum* L.) is the third important food legume both in area and production after common beans and faba beans in Ethiopia. However, the productivity of the crop was very low compared to the potential as a result of non-use of improved varieties and technologies generated by the research system. To enhance the use of the improved and associated research technologies a National Chickpea Stakeholders Innovation Platform was established in 2013 with the objective of bringing together various stakeholders acting on the value chain in order to identify major challenges and find solutions that would be implemented through synergistic efforts. The platform identified seed shortage as a major bottleneck in the sector. This issue has been addressed through establishing farmers' seed producer

M. Chichaybelu (✉) · N. Girma · B. Gemechu · T. Mekuriaw · T. Geleta · W. Chiche
Ethiopian Institute of Agricultural Research, Addis Ababa, Ethiopia

A. Fikre

Ethiopian Institute of Agricultural Research, Addis Ababa, Ethiopia

International Crops Research Institute for the Semi-Arid Tropics, Hyderabad, India

J.-C. Rubyogo

International Centre for Tropical Agriculture (CIAT), Cali, Colombia

E. Akpo · C. O. Ojiewo

International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Nairobi, Kenya

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associations with the help of R&D partners and currently they are the major suppliers nationwide. Side by side, the platform strengthened the extension effort and triggered dissemination of improved technologies to a large number of farmers. As a result, productivity of the crop by model farmers increased by fourfold and the national productivity has been doubled to 2 ton ha⁻¹ in the last decade. The platform also worked on improving access to market and recently chickpea joined the Ethiopian Commodity Exchange market. Cognizant of the huge development potential of the crop, the platform is striving to further strengthen the intervention and reap opportunities.

Keywords

Stakeholder innovation platform · Chickpea value chain · Seed dissemination

7.1 Introduction

Chickpea (*Cicer arietinum* L.) accounts more than 17% of legumes in Ethiopia with a production of 0.47 million tons on an area of 258,486.29 ha (CSA 2016) with the engagement of over one million households. Chickpea is also an important export commodity where both export volume and export earnings of the country are increasing, especially in the last decade (FAOSTAT 2016). Ethiopia is the leading producer, consumer and exporter of chickpea in Africa, and is among the top ten most important producers in the world.

However, its production is challenged by low productivity of landraces, poor farming practices, biotic and abiotic stresses, among others. The chickpea improvement program in Ethiopia made considerable efforts to overcome the aforementioned constraints and developed 27 improved varieties and management technologies coupled with their dissemination to farmers. This resulted in paradigm shift of the Ethiopian chickpea production that progressed from landrace cultivars to improved varieties together with enhanced adoption of production packages recommended by research.

Although considerable improvement has been attained, it has not been to the level expected, due to lack of efficient coordination and collaboration among the concerned stakeholders for the enhancement of the sub-sector. Moreover, there was critical shortage of seed to push the technologies to the producers. This could highly be attributed to low interest of the formal seed system in the country that comprises of the few public seed enterprises and private seed companies to produce seed of pulse crops in general (Chichaybelu et al. 2018). In addition to this, less attention was given with regard to the extension of pulses as compared to cereal crops.

Cognizant of the aforementioned bottlenecks, attempts were made to tackle them through joint effort of concerned stakeholders. To this effect National Chickpea Stakeholders Innovation Platform was established with the objective of bringing together various stakeholders in order to identify major challenges and opportunities of the chickpea sub-sector to pave ways of synergetic actions to facilitate interaction

and collaboration within and between networks of farmers, governmental and non-governmental service providers, policymakers, researchers, private sector players, and other stakeholders along the chickpea value chain. Innovation Platforms are equitable and dynamic spaces designed to bring together heterogeneous stakeholders to share their knowledge and find solutions to a common problem (ILRI 2012). These heterogeneous stakeholders are more easily able to identify the innovations adapted to a given context than homogeneous groups like agricultural cooperatives which only include a single type of stakeholder (Gabriel and Jean-Joseph 2016).

7.2 Establishment of the Multi-Stakeholder Platform

Stakeholder platform for chickpeas in Ethiopia was necessitated initially out of the need for technology promotion. Technology promotion could not stand alone without a functional seed system, regulatory system, market system, input system, etc. which must operate in tandem for successful adoption of new technologies. This brought about the concept of “coming together” to fill gaps. Hence, following this, a brainstorming session followed by diverse group dialogue forum was organized which finally gave the platform called common interest groups or stakeholder platform. It was instrumental to respond to issues which only one system could not be able to answer completely. This story was fundamental in the birth of the chickpea stakeholder platform, which is big in diversity and in number this time.

The conventional approach to agricultural research emphasized developing new technologies mainly through on-station research that are then supposed to reach farmers through the public sector extension system. As this linear top down approach was not successful, an innovative multi-stakeholder approach was designed in which several parties contribute relevant insights to address the issue that impedes many value chain actors. The Ethiopian chickpea multi-stakeholder innovation platform was established on January 23, 2013 with the initiation of the ICRISAT led Tropical Legumes II project of the Debre Zeit Agricultural Research Center. It was established with 17 members comprising representatives from the agricultural research system, federal Ministry of Agriculture and regional agricultural bureaus, Agricultural Transformation Agency (ATA), farmers' primary cooperatives and unions, food processors, seed producers, chamber of commerce and export partners. The innovation platform (IP) was strengthened through time, that cause regional IP birth, and has 65 members currently, though only 5 are females. An estimated 60% of platform members were below 40 years old.

7.3 Composition, Roles and Responsibilities of the Platform Members

The chickpea stakeholders' innovation platform is composed of major stakeholders along the value chain. The platform members can be broadly categorized as (a) the agricultural research system, (b) public institutions that support agricultural development, (c) seed producers, (d) farmers' primary cooperatives and unions, (e)

entities working on bio-fertilizer and storage management, (f) food processors and (g) exporters. Responsibilities of the various stakeholders are presented in Table 7.1.

The composition of the platform has also expanded by including universities, private entities working on post-harvest handling and bio-fertilizer production and CG centres, in addition to the members at the establishment. The forum of the platform discusses major gaps of the chickpea value chain, proposes solutions and shares and assigns responsibilities among concerned stakeholders. The forum also emphasizes experience sharing among stakeholders through targeted presentations.

The forum assigned EIAR to lead the platform and organize meetings and related activities. The EIAR team involve professionals of different disciplines (breeding, agronomy, seed technology, soils, economics, extension, etc.). In order to give timely solutions to key problems in chickpea production, seed system and marketing, the IP sets its own principles, rules and regulations. The platform had a steering committee comprising three sub-committees, namely, (a) Technology generation and promotion sub-committee, (b) Seed and other inputs sub-committee and (c) Marketing and value addition sub-committee, whose leaders are members of the steering committee. The platform steering committee was assigned the following responsibilities.

1. Lead development of the chickpea value chain
2. Represent the General Assembly on various fora
3. Organize and call GA meeting

Table 7.1 Roles and responsibilities on chickpea innovation platform

| Stakeholders | Roles and responsibilities |
|---|---|
| Agricultural Research Institutions | Technology generation, pre-extension demonstration, training development partners and farmers |
| Universities | Technology generation, pre-extension demonstration, develop trained human resources |
| Ministry of agriculture (extension, input and regulatory departments) | Identify farmers' production constraints, technical support to the development, popularize technologies at national level |
| Regional bureaus of agriculture (extension, input and regulatory departments) | Identify farmers' production constraints, technical support to the development, popularize technologies at regional level |
| Seed producers | Produce quality seeds of improved varieties |
| Bio-fertilizer producer | Produce bio-fertilizers |
| PICS bag producer | Produce PICS bag for grain storage |
| Exporters | Investigate export market niche, and export produces |
| Agro-processors | Value addition to the agricultural produce |
| Agricultural transformation agency (ATA) | Support the development sector to bring transformation |
| Farmers' primary cooperatives and unions | Facilitate input supply, support marketing of members' production |
| Farmers | Forward production problems, implement technologies |

4. Report progress of the platform to the GA
5. Provide directives to the sub-committees
6. Lobby with policy makers and donors

7.4 Platform Activities

The major objective of the platform is to discuss major problems of the chickpea value chain, propose solutions and share and assign responsibilities among concerned stakeholders in order to enhance promotion of improved chickpea technologies to increase the productivity and production thereby improve the income and livelihood of the farming communities.

The identification of the production bottlenecks is mainly conducted by public institutions working in the agriculture sector jointly with key stakeholders. These are the federal Ministry of Agriculture and Natural Resource and the regional bureaus of agriculture and natural resources. These institutions have well organized hierarchical structure that reaches the farmers at the smallest administrative unit known as Kebele. The institutions have professional staff at various levels of the hierarchy and trained development agents located at Kebele level to provide on the spot technical support to the farmers. Hence, the problems raised by the farmers are collected and forwarded to the upper structure. These institutions also bear the responsibility of disseminating improved agricultural technologies and knowledge to the farmers through their extension systems.

Therefore, they bring the problems raised by the farmers to the platform. If there are technological solutions that answer the problem, they are presented by the research system and the forum assigns the extension system to take them to the farmers. On the other hand, if there are no technological options to respond to the problems, the research system takes the responsibility to conduct experiments and bring about solutions. Problems requiring policy intervention are forwarded to the concerned government office.

One challenge of the platform is problem related to inputs, mainly seed shortage. The issue was taken by the inputs directorate of the agricultural offices and the research system to provide the utmost support to the seedy producers. Farmers' primary cooperatives and unions in seed deficit areas take the responsibility of buying seed from the producers and supply to their member farmers. As a solution to alleviate shortage of seed many improvements have been attained by the efforts made with the platform in establishing farmers' seed producer association in different parts of the country and strengthening the extension system that enabled us to reach large number of farmers with improved technologies.

Another challenge of the platform is problem related to the quality of the grain produced by the farmers having mixture of varieties that incurred high cost of sorting by exporters. Efforts are being made in training farmers on the benefit of producing quality grain in order to reap the advantage of export market. Awareness has been created by the platform with regard to the use of bio-fertilizer and considerable proportion of farmers adapted the technology and improved their productivity.



Fig. 7.1 Tall and erect Dhera variety released for mechanical harvesting

Close to a million hectares area in the Arsi and Bale zone of Oromia regional state is wheat belt of the country dominated by mono cropping, where ploughing and harvesting are almost mechanized and weed is controlled by herbicide spraying. The attempts made to improve the farming system in such a way that wheat is rotated with pulse crops could not go further because farmers are looking for technology that can be harvested with machine harvesters. Hence the platform assigned the research system to develop varieties for mechanical harvesting. In response to this, the chickpea improvement program developed tall and erect variety called “Dhera” in 2015 (Fig. 7.1).

It has also been suggested to validate released desi popular variety *Natoli* (Fig. 7.2) which was recommended afterwards for mechanization.

Popularization of this variety has encountered problem related to weed management because farmers are not ready for hand weeding. Hence the chickpea improvement program is currently working on the development of varieties that have herbicide tolerance and fit for mechanical harvesting to satisfy the interest of farmers in these areas.

7.5 Facilitation of Platform Activities

The Ethiopian Institute of Agricultural Research took the initiative of establishing the chickpea innovation platform through the Tropical Legumes project. The Institute calls the platform annual meeting where problems related to the sector are discussed, solutions proposed, and assignments given to concerned members for action and progresses are evaluated. Key issues raised are critically debated and relevant decisions are made by the forum through consensus.

Farmers’ participatory variety selection trials and technology demonstrations are conducted by farmers who bear the responsibility to manage the trials. Those host farmers were purposely selected by development agents. After awareness on the



Fig. 7.2 Popular cultivar Natoli, validated and recommended for mechanical harvesting

technologies was created to the farming communities, the technologies were disseminated to those showing interest to produce based on the amount of seed available.

7.6 Achievements of the Platform

7.6.1 Access to Knowledge and Farm Advisory Services

The Ministry of Agriculture develops production package for the improved technologies in collaboration with the research system. Before any intervention with farmers' participatory variety selection and demonstration of improved technologies the research system provides detailed training to agricultural experts at various levels of the ministry and regional bureaus of agriculture on improved production technics and post-harvest handling of the produce. These experts then train development agents who are responsible to further train the farmers, as they are working at the lowest administrative unit (kebele) close to the farmers. Moreover, the development agents make close follow up of the farmers' fields and provide on-the-spot technical advice, whenever they need. Therefore, this shows that farmers have easy access to knowledge through trainings and receive advisory services from trained development agents in their vicinity.

Such trainings and awareness creation efforts equipped the farmers with the required knowledge and made real difference in the crop's farming system. For instance, the farmers traditionally used to plant chickpea at the end of the rainy season (late September) and grow the crop on residual moisture and harvest less due to terminal moisture stress effect. Because of the trainings, the farmers drew the planting time back to mid-August that gives the crop better growing period with

sufficient moisture that resulted in bumper productivity. The other common problem that chickpea suffers from is damage by pod borer (*Helicoverpa armigera* Hübner), merely due to the farmers' reluctance in taking timely and proper control action. As a result of routine advises given to them to make at least weekly pest scouting in order to take action on the early instars and use recommended insecticides significant improvements have been attained on the management of the pest.

Moreover, farmers' participatory variety selection (FPVS) trials are conducted by the research system where farmers learn about improved technologies and get chance to select varieties of their preference for future use. Such participation at the start of intervention is believed to build farmers' confidence on improved chickpea technologies (Chichaybelu et al. 2018). Following this pre-extension, demonstrations of the technologies selected by the farmers are conducted by the research system and bureaus of agriculture, where large numbers of farmers get awareness about the technologies on farmers' field day occasions. Because member farmers realized the benefit of using improved technologies, they access the development agents or agricultural experts whenever they have query.

7.6.2 Access to Improved Seed and Other Complimentary Inputs

In earlier times there was shortage of seeds of improved varieties largely due to the low interest of the formal sector (the public and private seed producers) to produce seeds of grain legumes in general and chickpea in particular. Due to this most farmers used their own saved local desi chickpea whose productivity is as low as 1 ton per hectare. The majority of smallholder farmers who grow chickpea as major crop have limited access to improved seed and many of the released varieties with superior traits have not been widely disseminated (Atilaw and Korbu 2016). Such low productivity of the majority of the farmers pulled the national productivity of the crop to about 1.3 ton per hectare.

To solve seed shortage problem, the platform identified the involvement of the informal seed producers as an immediate and innovative solution. To this effect, the platform worked on the organization of chickpea farmers in the vicinity of the centre on seed production (Chichaybelu et al. 2018). Trained on basic seed production techniques, farmers established seed producer associations as a legal entity and entered into the business under close supervision and technical backstopping of the project. The achievements obtained by these associations encouraged the platform to establish more in different parts of the major chickpea growing regions of the country. Hence production of chickpea seed showed drastic increment over the recent years (Fig. 7.3). These associations got significant strength in short time and became major chickpea seed suppliers of the nation and recently two of them grew to private limited company (PLC) level.

Earlier technology intervention was not adequate to access most chickpea farmers, especially those who are at a distant from research centres. With a joint effort of the stakeholders, improved chickpea technologies were disseminated to farmers in major production regions, where high productive Arerti, Habru, Ejere, Natoli,

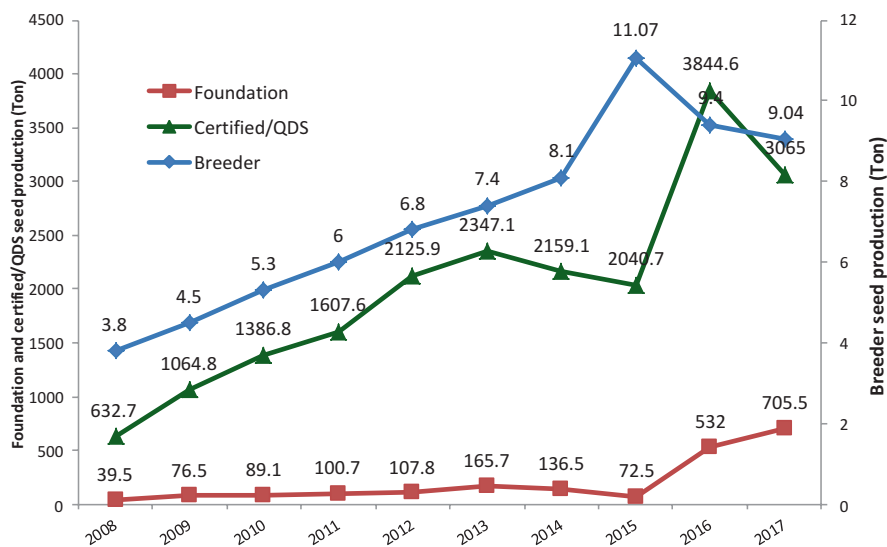


Fig. 7.3 Production of various classes of chickpea seed in Ethiopia (Source: CSA 2008–2017)

Dalota and Teketay varieties dominate the uptake. In 2015, for instance, 2.1–3.5 ton ha^{-1} average productivity of improved chickpea varieties were obtained by the farmers who handled pre-extension demonstrations at various districts. Atilaw and Korbu (2016) also stated that seeds of improved chickpea varieties have resulted in yield increase of some innovative model farmers by three to fourfolds over local varieties. As a result, there is huge gap between the national average productivity and the productivity levels attained by the model farmers; thus, investing on improved seed is a critical step and catalyst for agricultural transformation. Fikre (2014) reported that best adopter and medium adopter farmers of improved chickpea technologies produced 3.5 and 2.2 T ha^{-1} on average compared to 1.2 T ha^{-1} productivity of the farmers that had no access to improved technologies (Fig. 7.4).

The intervention thus completely changed the scenario and farmers are currently asking for new technologies. This generally brought drastic increment in chickpea production in recent years that could be largely attributed to the significant improvement in the national productivity of the crop that doubled to over 2 tons ha^{-1} , coupled with increased area dedicated to improved chickpea (Fig. 7.5) and increased number of chickpea farmers.

7.6.3 Access to New Markets and Finance and Other Services

The platform recognized problems related to chickpea grain market, though there was no quotable intervention made. Lack of a well-coordinated supply chain that links producers and buyers that increases the transaction costs and lowers the share of the consumer price that is received by small producers, absence of efficient

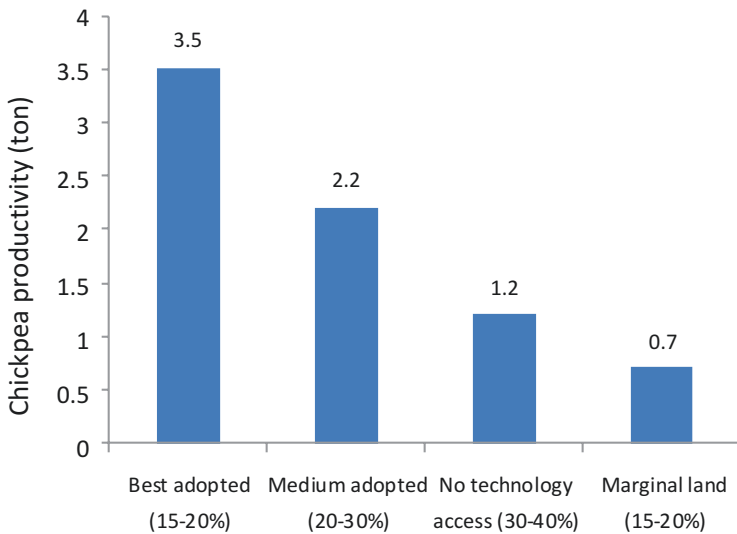


Fig. 7.4 Gaps among the strata of technology applications (Source: Fikre 2014)

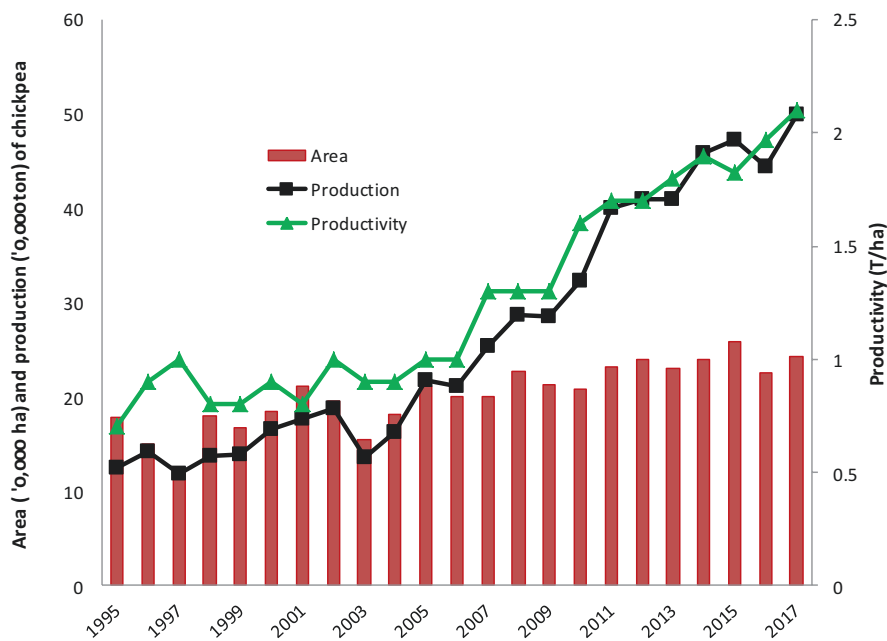


Fig. 7.5 Trends in area, productivity and production of chickpea in Ethiopia (Source: CSA 1995–2017)

mechanism for delivering market information to the producers and traders at local markets on issues related to seasonal prices, demand, and quality requirements in different markets across the country and lack of a well-established system of grades and standards in the chickpea marketing system are reported to be the major threats to chickpea marketing (Asfaw et al. 2010). Alemu et al. (2010) pointed out the high domestic demand, misbehaviour of brokers, capacity of exporters and wholesalers to store quality seeds, high transportation cost, and decline of demand in importing countries as major constraints to the export market of pulses in general. Despite these challenges, the market and price of grain chickpea have drastically improved. Ferede et al. (2018) reported the improvement and competitiveness of the Ethiopian chickpea in the export market and indicated the need for improvement in terms of quality, volume and continuity. Recently chickpea entered high marketing platform where it is traded through Ethiopian Commodity Exchange (ECX). Therefore, much needs to be done by the platform on the improvement of the chickpea marketing and related issues in order to exploit the huge potential both in the domestic and export market.

On the other hand, successful intervention was made with regard to the chickpea seed marketing. The platform linked seed producer associations to regional bureaus of agriculture, NGOs and other institution that buy and distribute seed of improved varieties to the farmers. Hence, seed producers have better market and sell their seed with a minimum of 15% higher premium price over the current grain price.

7.6.4 Social Assets

Day to day and on-the-spot awareness creation on the improved technologies has been made by agricultural development agents and leaders of the lowest administrative unit (Kebele) who invite the farmers to visit and evaluate technologies being demonstrated. Moreover, farmers from neighbouring kebeles also participate on farmers' field days and the information is conveyed to other farmers on various social events. Farmers who are interested to use the technologies interact with the demonstration farmers to get seed on buying or exchange basis. Atilaw and Korbu (2016) reported that farmer to farmer seed exchange is the major informal system playing unsubstituted role in the expansion and supply of chickpea technologies throughout the chickpea growing areas. Farmers preserve seeds not only for their own but also for exchange with other producers at planting time based on whether the new cultivars have better merit. Hence considerable number of non-member farmers accessed seed through the platform members. Such interactions improved socialization among farmers.

7.6.5 Addressing Gender and Youth Issues

Women are highly encouraged by the platform to engage themselves on the production of improved chickpea technologies. However, their participation in most areas

is not satisfactory (10–20%), as the male is largely responsible for field management of the farm in Ethiopia. Better participation of up to 30% women was observed in southern region of the country. According to Zegeye et al. (2016) women have increasingly benefited from research outcomes on account of the steps taken by the research system to improve their access to and control over, agricultural technologies in recent times. The author reported that among those who get improved technology directly from the research system, about 30% are female headed households (FHH). He also reported cases of successful women farmers who managed to produce about 4 tons ha⁻¹ of improved chickpea varieties and those benefited from being members of farmer seed producer associations; one of whom said that she had never thought chickpeas could bring her such high returns.

The Chickpea Improvement Program at the Debre Zeit Agricultural Research Center (DZARC) of the Ethiopian Institute of Agricultural Research, along with ICRISAT and ICARDA, devised a strategy to change the low representation of women in the chickpea value chains in Ethiopia. The strategy had objectives of (a) organizing women and youth into associations and provides them with skills and knowledge about chickpea production and (b) further enabling the women and youth to form clusters of seed production that would be linked with seed laboratories for certification. Hence DZARC organized a training workshop for 95 women and 22 youth organized in Ada'a district on the benefits of improved seeds, modern production practices and local and export market potential. Each member was then provided with 30–35 kg of chickpea seeds as a revolving loan, that were produced under technical support from the district Bureaus of Agriculture and DZARC.

Moreover, five women members per PA were selected to conduct farmers' participatory variety selection (FPVS) trials on their farms, which would act as learning centres for other women evaluating and selecting varieties, based on their own criteria and preferences for further testing on their own farms. These groups of women and youth implemented the skills and knowledge they are equipped with and currently became one of the seed producers that produce quality seed certified by the regulatory laboratories.

Farmers supported by the platform witnessed the benefit they got from using improved chickpea technologies. Before their engagement in this business they used to produce local varieties in small areas of less than 0.25 ha to meet their own consumption need, but currently produce chickpea as a cash crop on more than a hectare. Farmers who are engaged on seed production are doing good business out of it. Zegeye et al. (2016) reported a case of Denkaka Megertu Seed Producer association whose members' livelihood has improved and as a seed producing cooperative, they have a future plan to supply seed of improved varieties throughout the country and sufficient grains to meet the export market requirements. The author also reported that growing chickpea has relative advantages for women over growing other crops. This is largely because of low cost of production for chickpea as compared to other crops. This is the fundamental issue that makes chickpea more responsive to women farmers because of their limited resource base and in-ability to afford the production cost of other crops.

7.6.6 Sustainability of Multi-Stakeholder Platforms

Since the establishment of the chickpea innovation platform, the organization of events to bring the members together was handled by the research system, particularly Debre Zeit Agricultural Research Center, with the support from the Tropical Legumes project. It is well understood that despite the significant contribution the platform can make, institutional leadership appears critically a necessity from the perspective of coordination, resource soliciting and mobilization and sharing issues. Hence, we recommend that the Ministry of agriculture and the research system should look forward as host institution to ensure sustainability of the platform in the absence funded projects.

7.7 Reflections on the Process

The National Chickpea Innovation Platform identified major actors and enabled whole system understanding of the sector, where gaps are identified, solutions proposed, and responsibilities shared, and action taken. In general, the platform played significant role in supporting the sector and improving the productivity and production of the crop that in turn improved the livelihood of member farmers and associated communities. Achievements in the area of improving availability of seed through establishing and strengthening the informal seed system can be taken as a game changer success. Moreover, farmers' participatory variety selection (FPVS) approach at the start of intervention built farmers' confidence on improved chickpea technologies and enabled faster and smooth uptake. Demonstration of technologies selected by the farmers' participation and concomitant farmers' field day visit created awareness and raised interest of wider mass of farmers.

Despite the achievement made the platform in improving the availability, there still shortage of seed to satisfy the farmers' demand. On the other hand, gap observed among the members of the platform resulted in limitations in the achievements attained so far. It was also not possible to organize frequent gathering of the platform because of resource limitations. Therefore, in order to sustain and strengthen the platform extra dedication of the actors and fulfilling its resource requirement are crucial.

7.8 Areas for Focus in the Future

Interventions made by the platform largely focused on improving productivity, quality and production of chickpea through popularization and dissemination of improved technologies to the farmers. However, the crop has great opportunity with regard to mechanized farming, agro processing and wide export market. Therefore, future interventions should give due—attention in the improvement of quality of production for better local and export market and satisfy the local agro-industries and management of emerging threats such as diseases. In order to prove large scale

production, the cropping system needs to be mechanized. Therefore, efforts on the development of more and better machine harvestable and herbicide tolerant varieties are mandatory.

Hence ensuring sustainability of the platform and application and mainstreaming of its recommendations in the overall development of the sector would enhance efforts on improving the sector.

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Organized Farmers Towards Chickpea Seed Self-Sufficiency in Bundelkhand Region of India

Uma Sah, S. K. Chaturvedi, G. P. Dixit, N. P. Singh,
and P. Gaur

Abstract

Smallholder partner farmers under TL-III project were organized into four registered Farmers' Seed Societies for addressing the challenge of constrained availability of quality seed of improved chickpea varieties in Bundelkhand region of Uttar Pradesh state, India. These seed societies formed in Banda, Hamirpur and Chitrakoot districts contributed towards strengthening the formal seed system of chickpea by contributing 21.8 tons of chickpea seed (FS/TL) of recommended varieties (kabuli: Ujjawal, Shubhra; Desi: JG 14, JG 16 and JAKI 9218) and marketed it to institutionalized seed chains. More than 1500 partner farmers directly received the improved seed through farmers 'seed societies while 1788 non-partner farmers received it indirectly through social networks. The interventions boosted chickpea productivity from 0.78 to 1.19 t/ha in the project villages. The efforts of the farmers' societies to strengthen the informal seed system through farmer-to-farmer horizontal diffusion resulted in area enhancement under the introduced chickpea varieties up to 68% in the project villages while putting in place a system for supply of improved chickpea seed which can be replicated in other districts in India.

Keywords

Farmers society · Chickpea · Seed self-sufficiency · Bundelkhand region · India

U. Sah (✉) · S. K. Chaturvedi · G. P. Dixit · N. P. Singh
ICAR-Indian Institute of Pulses Research, Kanpur, India

P. Gaur
International Crops Research Institute for the Semi-Arid Tropics (ICRISAT),
Patancheru, India

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8.1 Antecedent

Chickpea is an important pulse crop of India that occupies about 10.75 million hectares and contributes 11.23 million tones to the national pulse basket. It is primarily cultivated as a rainfed crop with limited external inputs. Bundelkhand region of Uttar Pradesh state in central India is a traditionally important chickpea-growing region (416,007 ha) that produces about 148,408 tons of chickpea. Spanning over 7.1 million hectares in the central semi-arid plateau, the region is drought frequented and represents one of the poorest regions of the country. Chickpea crop holds a prominent position in all the major cropping sequence, especially in the marginalized production situations, followed in region. In water constrained situations, chickpea crop is grown under rainfed mono-cropped conditions.

Poor seed replacement and low productivity levels, high incidence of pod borer and root disease coupled with several abiotic stresses limit the average chickpea productivity in the region to 400 kg/ha, against the national average (1037 kg/ha). Smallholder farmers of the region often cite poor quality of seed as a major issue restraining the chickpea productivity level (Dixit et al. 2019).

Improving farmers' access to quality seeds of chickpea in this rainfed-dominated ecology is a challenge. Chickpea seed sector in the region is dominated by public sector agencies that have limited coverage and often the delivery mechanisms are complicated to be availed by smallholders. The farmers lacked access to new high yielding, diseases resistant chickpea varieties. As a consequence, smallholder farmers operating in the region continue to use farm produce of non-descript varieties as seed across, for all the major pulse crops especially chickpea crop that demands a higher seed rate for sowing (70–80 kg/ha). Farmers often exchange home grown seeds with apparently better yielding varieties available within their informal social networks including fellow farmers, friends and relatives. These factors have direct bearing on the chickpea productivity figures in the region (Srivastava et al. 2017).

For addressing the challenge of constrained availability of quality seed of improved chickpea varieties, partner farmers under TL-III project were organized into four formal groups as registered farmers' seed societies in Banda, Hamirpur and Chitrakoot districts in Bundelkhand region of Uttar Pradesh state of India. The innovation platforms were established with the following specific objectives: (1) to enhance farmers' knowledge related to seed production, processing and storage of chickpea crop for ensuring seed self-sufficiency at village level; (2) to promote diffusion of seed production technologies among farmers of the region; (3) to enhance the production of chickpea through dissemination of recommended and farmer-preferred varieties in the region; (4) to enhance chickpea production and consumption for overcoming protein malnutrition in the region; (5) to encourage scientific cultivation of chickpea crop in the region.

8.2 Establishment of the Platform

The progressive partner farmers of TL–III project villages of Hamirpur, Chitrakoot and Banda districts in Bundelkhand region were encouraged and facilitated to form village level formal farmers' seed societies. Smallholder farmers in groups of 11 to 13 members each were organized as a Farmers' Society under Society Registration act no 21, 1860, Uttar Pradesh Government, India. The four farmers' seed societies that were formed included *Khurahand Beej Vikas Samiti* (12 members) in Banda district, *Kusmara Beej Vikas Samiti* (11 members) in Hamirpur district, *Kalla Beej Vikas Samiti* (12 members) and *Baglai Beej Vikas Samiti* (13 members) in Chitrakoot district of Bundelkhand region of Uttar Pradesh state, India.

A series of sensitization meeting were held with partner farmers in the project villages wherein they were briefed about the benefits of organizing themselves, organizational structure, the functioning and governance, membership fee registration process and related aspects. The farmers were also informed about the expected responsibility of the societies in complementing chickpea seed supply chain in their respective region. The partner farmers who volunteered to be a part of the society were supported for electing the office bearers of the society. The societies were also facilitated in developing the profile document of the society and in registration as formal farmers' seed societies.

8.3 Composition, Roles and Responsibilities of the Platform Members

The farmers' seed societies were registered with primary mandate of diffusion of seed production technologies for ensuring enhanced seed availability at the regional level. Special emphasis was given to pulse crops in these efforts. The members of the society elected the office bearers that included President, Vice President, Secretary and Treasurer (executive of the society) for five years tenure. The members of these seed societies were expected to formally meet to discuss on agenda related to functioning of the society. The executive and the general body in each society had well specified roles and responsibilities. Researchers and project staff from ICAR-IIPR facilitated the farmers' societies and were mainly responsible for advisory role. The formal seed system supported the farmers' societies in capacity enhancement in aspects related to chickpea seed production.

8.4 Platform Activities

The four formal seed societies were provided knowledge support on chickpea seed production technologies under TL-III project. In addition, these societies were provided higher yielding and root rot tolerant improved chickpea varieties (Kabuli: Shubhra, Ujjawal; Desi: JG-16, JG 14, RVG 203, RVG 202, JAKI 9218). These societies further engaged in chickpea seed production at village level through the

member farmers and other who volunteered. This effort led to strengthening the formal as well informal seed chain of chickpea in the region as well as it contributed towards developing village level entrepreneurial activities. The activities undertaken by the farmers' seed societies included:

The executive body of the seed societies arranged seed of recommended chickpea varieties from ICAR-Institute of Pulses Research (ICAR-IIPR), Kanpur, India for initiating the seed production (FS/TL) in their districts. Further, members of the executive received training on seed production technologies at ICAR-IIPR and diffused the learning to other farmers who participated in the seed production programme at village level.

The farmers' seed societies were responsible for decisions related to selection of member farmers and fields for chickpea seed production. This involved ensuring recommended isolation distance in seed production plots. The executive of the society facilitated the ICAR-IIPR seed team and Uttar Pradesh State Seed Certification Agency in seed certification in their respective villages.

After harvest, produced seed was sorted, cleaned and graded under supervision of executive of the seed societies to ensure seed quality. The seed was then aggregated and marketed. Arrangement of pooled transportation facility on shared basis for carrying the seed to the selling platform was also a function of the executive.

The platforms also facilitated horizontal diffusion of introduced improved chickpea varieties through social networks in the respective districts. The research staff monitored the seed plots under guidance of researchers from ICAR-IIPR.

8.5 Facilitation of Platform Activities, Including Meetings

The platform activities were primarily carried out by the office bearers of farmers' seed societies with support from the field level staff of TL-III project posted at the district level. The societies held meeting periodically for discussion on agenda items with the members. The decision-making processes were carried out in a participatory manner with due consensus. The meetings of members of the farmers' societies with scientists and project team of TL-III project were also facilitated by the executive of the respective societies.

8.6 Achievements of the Platform

The seed societies developed linkages with formal agencies like ICAR-IIPR, Kanpur and Uttar Pradesh State Seed Certification Agency. ICAR-Indian Institute of Pulse Research, Kanpur provided the needed technological backstopping to these societies for chickpea seed production. The farmers' seed societies contributed towards strengthening the seed system of chickpea in the targeted districts. During 2015–16 to 2017–18, the farmers societies produced 21.8 tons of chickpea seed (FS/TL) of recommended varieties (kabuli: Ujjawal, Shubhra; Desi: JG 14, JG 16 and JAKI 9218) and marketed it to institutionalized government seed chains.

The farmers societies formed in three districts also developed horizontal linkages with each other for exchange of learning and seed. Farmer-to-farmer informal diffusion of improved seed of chickpea was facilitated by the societies in their respective districts, which contributed in supporting the farmers' seed system.

The farmers' seed societies coordinated the capacity enhancement programmes (17) organized by ICAR-IIPR, Kanpur for the partner farmers engaged in chickpea seed production at village level in the targeted districts. The programmes were conducted at institute as well as at village level. The executive also facilitated application of the learning of these programmes in real field conditions and helped them realize higher productivity.

With the purpose of supporting the partner farmers through real-time agro-advisories, the members of the seed societies were linked to the mobile based voice advisory service of ICAR-IIPR, Kanpur '*Dalhan Sandesh*' wherein they received customized advisories on chickpea crop.

Partnership based efforts were made during 2015–2019 under Tropical Legumes-III project to increase quality seed availability of newer varieties locally to small holders in the project villages through the farmers societies. About 58.3 tons seed of improved chickpea varieties (Kabuli: Shubhra, Ujjawal; Desi: JG 14, JAKI 9218, RVG 202, JG 16, RVG 203) was infused into the seed system in Banda, Hamirpur and Chitrakoot districts.

For identification of farmer-preferred varieties of chickpea crop, On-farm participatory varietal selection trials (102) were conducted with inclusion of improved chickpea varieties (Kabuli: Shubhra, Ujjawal; Desi: RVG 202, JG 16, RVG 203, JG-14, JG-16) along with advanced breeding lines, viz. IPC 04-01, IPC 04-98, IPC 5-62, IPC 6-77 in the region. For rapid varietal diffusion of identified varieties, seed packs of 6–8 kg each were provided to partner farmers (1129). Large-scale participatory demonstrations (293) for purpose of showcasing the disease resistant improved chickpea varieties in farmers' fields were conducted in eight project villages.

Partner farmers' preferences for offered varietal options varied with existing agricultural production situations. In general, chickpea is mostly grown as a rainfed crop on the residual moisture in the region and, therefore, farmers have the preference for varieties of shorter duration. In Banda district, farmers preferred short duration varieties JG 16 and JG 14 as these varieties fitted well in dominant paddy–chickpea cropping sequence being followed in the district. JAKI 9218 and Ujjawal varieties were preferred varieties for irrigated conditions, while JG 14 was preferred by partner farmers of rainfed situations in Hamirpur district. Smallholder farmers preferred JG 16 and JG 14 varieties for cultivation in Chitrakoot districts.

8.6.1 Achievements in the Areas of Access to Improved Seed and Other Inputs

8.6.1.1 Varieties Used by Farmers Before Membership and Access to Quality Seed

The smallholder farmers operating in the targeted districts primarily resorted to use of farm saved produce as seed for chickpea crop before the project interventions were initiated. The primarily farmers used seed of non-descript varieties or their mixture for raising chickpea crop. However, they practiced exchanging chickpea seeds in their informal social networks. Some farmers were aware of the improved chickpea varieties like KWR 108 and Radhey that were released more than 20 years back.

8.6.1.2 Different Varieties Accessed by Farmers After Membership

Initiatives taken under TL-III projects in collaboration with the farmers' seed societies contributed to increased availability of quality seed of improved chickpea varieties to small holders in the region. Improved chickpea varieties (Kabuli: Shubhra, Ujjawal; Desi: JG 14, JAKI 9218, RVG 202, JG 16, RVG 203) were introduced in the seed system in the targeted districts. A total of 1524 smallholder farmers directly received seeds of above-mentioned improved chickpea varieties under the project as a result of activities of the platforms.

8.6.1.3 Number of Non-Member Farmers Who Accessed Seed Through the Platform Members

A total of 1524 partner farmers could directly receive the improved chickpea seed under the project activities through farmers seed societies. Encouraged with the improved productivity (from 0.78 to 1.19 t/ha) of chickpea crop with introduced chickpea varieties, the area enhancement under the introduced improved varieties in the project villages was recorded to be 361 ha that accounted for 68 percent of the total cropped area (530 ha) during 2018–19. The highest area expansion (89%) under improved chickpea varieties was witnessed in Hamirpur district. The expansion resulted due to farmer-to-farmer horizontal diffusion of varieties to 1788

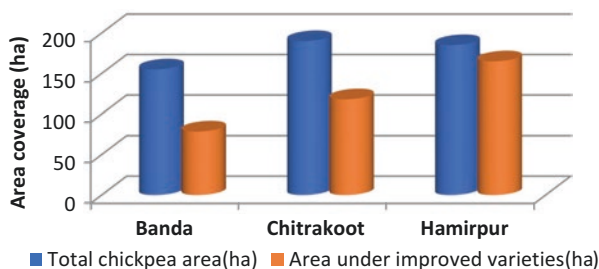


Fig. 8.1 Area coverage under introduced chickpea varieties in project villages in targeted districts. Source: Authors' calculations from data collected from project villages

non-partner farmers from villages within 35 km radius around the project villages (Fig. 8.1).

8.6.2 Acreage Grown to Improved Seed by Farmers Before Membership

8.6.2.1 Increase in Acreage Under Improved Seed by Farmers After Membership

The member farmers of the farmers' seed societies who participated in the seed production programme have completely shifted (100%) from non-descript varieties to the improved chickpea varieties introduced by the project interventions in project villages. The same trend was witnessed among the smallholder farmers who indirectly received the introduced chickpea seed from their informal networks. Reduced losses due to root rot incidences and higher productivity of chickpea crop due to improved varieties led to the mentioned shift.

8.6.3 Achievements in the Areas of Access to New Markets and Finance Services and Other Services

The partner farmers were linked to chickpea seed value chain and could earn a higher income collectively. The farmers received about 15–20% higher income by organized seed production than they earned for producing grain.

8.6.4 Achievements in the Areas of Social Assets

With the learnings in chickpea seed production, farmers' seed societies have started searching for partnership opportunities with National Seed Corporation, Agricultural Science Centres and other agencies located in their respective districts for seed production programmes of pulse crops. The members of the farmers' societies have gained recognition as reliable seed source in the region and this facilitated horizontal diffusion of chickpea seed in the region through informal social networks.

8.6.5 Achievements in the Areas of Gender Equality and Youth

Women involvement in seed systems related activities enhanced to 17% in 2018–19. This is a positive change from almost no involvement at the start of the project interventions. The continued persuasion of farmers' seed societies and TL-III project team gradually worked towards a better participation of women in the project activities. This insight led to initiating women specific capacity building programmes, wherein women could interact freely.

8.6.6 Main Challenges Addressed for Youth

The existing social taboo against involvement of women in activities facilitated by outside agency was a major challenge in the project activities. The social disapproval of women participation in these programmes also hindered the women involvement in project interventions initially but the situation has now significantly improved, and women participation is no longer seen as a taboo.

8.6.7 Perceptions of Platform Performance

The partner farmers were organized to form the village level farmers' seed societies as a part of interventions under TL-III project in the targeted districts of Banda, Hamirpur and Chitrakoot. These efforts provided the smallholder farmers their first experience of engaging in any formal seed platform. Many farmers were initially sceptical about joining the formal seed society as the membership was paid and it involved commitment and had financial provisions. With facilitation from project team and their successful experience in the initial year of operation, they gradually gained confidence to handle the seed production activities. In addition, based on the successful experience from engaging in chickpea seed production, the farmers' seed societies are keen on newer collaboration opportunities in seed production of other pulse crops.

8.6.8 Sustainability of Multi-Stakeholder Platforms

Efforts were made towards linking the farmers' seed societies with national and state level seed agencies operating in the region. These include organizations like Uttar Pradesh State Seed Development Agency, National Seed Corporation and Banda University of Agriculture and Technology, Banda, Uttar Pradesh State, India. Currently two farmers' seed societies operating in Hamirpur and Banda districts are starting to collaborate with the above-mentioned organizations.

8.7 Reflections on the Process

The farmers' seed societies formed could contribute towards strengthening the formal as well as informal seed system of chickpea in the region. The efforts helped farmers realize higher income (Rs 14,300 to Rs 31,160) from chickpea crop and sharing of associated risks. The successful experiences encouraged farmers' seed societies to expand their area of operation to other agricultural crops. The decentralized model of seed production at districts level evolved in the project contributed significantly towards improving the smallholder farmers' access to quality pulse seed in the targeted geographies. The model is especially relevant in context of

constrained socio-economic and agro production situation in which chickpea is grown in the region.

8.7.1 Brief Description of the Different Issues That Happened Over the Course of the Platform Activities' Implementation

With limited prior interactions with public sector institutions, farmers were initially hesitant to the concept of organizing into farmers' seed society and collaborating in the process of strengthening seed system of chickpea. The cost involved towards receiving the membership of farmers' societies also influenced the farmer. However, with continued persuasion of the project team through series of discussion and meetings and matching of their need for quality seed of chickpea, farmers organized themselves into formal seed societies. The existing social dynamics influenced the process of group mobilization with incidences of preferences for a particular social group within villages.

The registered farmers' seed societies indirectly worked towards developing group bonding and facilitated farmer to-farmer exchange of information related to improved agricultural technologies and seed among the group members. The formal structure of the societies also facilitated member farmers in communicating their perceptions on chickpea production technologies with the project team and other agencies. The member farmers attached social prestige to their membership to the seed societies and to their contribution for improving the chickpea seed availability at village level.

8.7.2 The Significance of Observed Achievements for the Livelihood of Different Stakeholder Involved

Pulses assume special significance in the nutrition as well as economy of the farm households of the targeted geographies in India. The mentioned achievements had a direct impact on chickpea productivity and income levels of smallholder farmers through enhanced availability of quality seeds at village level.

8.7.3 The Significance of Observed Achievements for the Communities at Whole

The interventions contributed in strengthening the formal and informal seed system of chickpea in the region. A significant area expansion (68%) under improved chickpea varieties was witnessed in the project villages.

8.8 Areas to Focus on in the Future

Sustainability of the farmers' seed societies formed is a major challenge. The formal seed societies formed are still in the stage of evolving and growing, they need to be supported for becoming financially self-sustainable for some more years. Member farmers need handholding in record keeping and developing alternate income sources through appropriate linkages and collaborations.

The societies also need to be supported by providing them with some more opportunities to practice and perform the function of strengthening the chickpea seed system in the region.

Enhancing the coverage of the farmers' seed groups with respect to the agricultural crops, associated members and land under seed production needs focus in future efforts. Developing appropriate structural mechanisms for integration of the farmers' seed societies with public seed system may be explored for their sustainability.

8.9 Lessons Learned

8.9.1 Highlights of Key Achievements

- Partner farmers were organized into four registered farmers' seed societies in TL-III project districts in Bundelkhand region of India.
- The farmers' seed societies contributed towards strengthening the seed system of chickpea in the region by producing 21.8 tons of seed (FS/TL) of improved chickpea varieties (kabuli: Ujjawal, Shubhra; Desi: JG 14, JG 16 and JAKI 9218) and marketed it to formal seed chains.
- The interventions boosted chickpea productivity from 0.78 to 1.19 t/ha in the project villages.
- The efforts lead to area enhancement under the introduced improved chickpea varieties in the project villages to 361 ha that accounted for 68% of total cropped area (530 ha) during 2018–19.

8.9.2 Major Lessons Learned

- Developing decentralized seed system with involvement of farmers could contribute for creating huge impact on enhancing the access of smallholder farmers to quality seed of improved varieties.
- Due consideration to farmers preference for varietal options, based on their perception of appropriateness, is crucial for ensuring greater horizontal farmers-to-farmers diffusion of improved seed.

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Developing Sustainable Cowpea Seed Systems for Smallholder Farmers through Innovation Platforms in Nigeria: Experience of TL III Project

Teryima Iorlamen, Lucky O. Omoigui, Alpha Y. Kamara, Umar Garba, Nater Iyorkaa, Temitope Ademulegun, and Reuben Solomon

Abstract

Limited access to and low use of quality seed of improved varieties rank among the topmost causes of persistently low cowpea yields in Nigeria. This paper presents experiences under the Tropical Legume III (TL III) project in facilitating the access of smallholder farmers to seeds of improved cowpea varieties through the establishment of innovation platforms (IPs) that were introduced in 2015 as part of the activities of the TL III project. There was rapid adoption and use of newly released varieties by farmers as a result of increased awareness of improved varieties through multi-media and user-friendly communication strategies and tools. During the four years of the project (2015–2018), a total of seven multi-stakeholder platforms (MSPs), which comprised six seed companies, 46 farmer groups, five public seed enterprises, two NGOs, and 718 individual seed entrepreneurs and other stakeholders, were established/strengthened to link actors in the cowpea value chain. Community-based seed producers were linked to seed companies while seed companies were linked to research institutions to access early generation seed (EGS). These activities led to the production of over 532 tons of basic seed and 8366 tons of certified/QDS seed of improved cowpea varieties that were entrenched in the seed system. Yield also increased almost two-

T. Iorlamen (✉) · N. Iyorkaa
Federal University of Agriculture Makurdi, Makurdi, Nigeria

L. O. Omoigui · T. Ademulegun
International Institute of Tropical Agriculture, Kano, Nigeria

A. Y. Kamara · R. Solomon
International Institute of Tropical Agriculture, Ibadan, Nigeria

U. Garba
Kano State Agricultural and Rural Development Programme, Kano, Nigeria

fold from 500 to 900 kg/ha on farmers' field. Women and youth incomes increased as a result of seed entrepreneurship activities. The small packs approach was an efficient and cost-effective means of reaching more farmers with affordable quantities of seed and a wide range of preferred varieties.

Keywords

Cowpea · Seed systems · Multi-stakeholder platform · Early generation seed (EGS)

9.1 Introduction

Approximately 90% of the world's cowpea is grown in sub-Saharan Africa, most of which is in West Africa particularly in Nigeria (FAOSTAT 2017). Nigerian agriculture, as in other developing countries, is confronted with an actual problem of productivity. Smallholder farmers face multiple challenges that impede cowpea production and productivity because cowpea cultivation is mainly under traditional systems, with low grain yield (400–450 kg/ha) in farmers' field. The low yield is attributed to severe attacks of pest complexes, diseases, low soil fertility, drought, poor agronomic practices, and limited access to improved seed. Among these constraints, limited access to and low use of quality seed of improved cowpea varieties by farmers rank topmost among constraints leading to persistent low yields among smallholder farmers. Over the years, national and international centers have developed several improved cowpea varieties that are resistant to most of the production constraints, but very few made their way to the farmers' fields on account of weak seed systems. Due to limited commercialization of cowpea varieties by the private seed sector, the cowpea seed system has remained underdeveloped and weak, resulting in a large seed gap. The private sector, on the other hand, is not interested in investing in cowpea seed production because of the perceived weak market outlet and low returns on investment. This then calls for strategies to catalyze sustainable supply while imparting knowledge and skill in the production and marketing of cowpea between released varieties and those available at community level for farmer use.

Given the existing evidence and this caveat, strategies were developed to create opportunities among the different actors and identify their roles in the cowpea value chain that could stimulate more demand for improved cowpea seed. The actors include farmer cooperatives, traders, processors, women groups, seed companies, individual entrepreneurs, research institutes, grain aggregators, and agro-dealers

The Tropical Legumes III (TL III) project funded by the Bill & Melinda Gates Foundation was a major leap towards achieving sustainable cowpea seed systems that will meet the needs of different categories of farmers. One of the key pillars of the TL III project was the establishment and utilization of multi-stakeholder platforms as fora for skill and knowledge enhancement, in linking legume value chain actors, as well as enhancing efficiency and effectiveness in technology promotion and dissemination for increased access by smallholder farmers to quality seeds of

improved cowpea varieties. The platform also provided avenues for training, skill enhancement of members, and enhancing efficiency and effectiveness in technology development, promotion, and use. Seed systems stakeholders, including national partners, private seed companies, small seed producers, and farmer-based seed producing units were trained on seed catalogue and digital seed roadmap to build their skills in planning, producing, tracking, and delivering quality seeds to smallholder farmers in Nigeria. The objective of the IP was, therefore, to strengthen linkages among various cowpea seed value chain actors to catalyze sustainable production and supply of quality seeds of improved cowpea varieties to smallholder farmers in Nigeria.

9.1.1 Establishment, Membership, and Composition of the Platforms

9.1.1.1 Overall Process of the Platform Establishment

According to Tukahirwa et al. (2013), IPs serve as a forum to facilitate interactions and learning among stakeholders with a common challenge to address. The joint efforts of the stakeholders led to participatory diagnosis of problems—joint exploration of opportunities and investigation of solutions that will lead to promotion of innovation. In most of the communities, the process of establishing MSPs started with the formation of a small interest group composed of individuals with like minds to strengthen their agricultural activities. The IPs consisted of a local community village, women leaders, researchers, and development agents. Each IP elected its own leader, who was responsible for (1) registration of interested members, (2) organizing meetings and field visits in the absence of researchers or development workers, and (3) monitoring the implementation of agreed farm schedules. Local by-laws were formulated to ensure equal and sustained participation, although their effectiveness was constrained by the existence of close relationships among IP members and weak enforcement mechanisms.

A sustainable cowpea production arrangement begins with the production of quality seed at the farm level and good participation of all the actors involved. TL-III's strategy for improving access to improved seed was based on establishing a MSP. This was designed to ensure the active participation of all the major stakeholders in the cowpea value chain in each community together with researchers, NGOs, farmers, extension agents, and the private and public sectors in the identification and prioritization of local problems and their solutions. Major problems identified during community mobilization activities were declining soil fertility, the parasitic weed *Striga*, crop pests, poor access to improved seed, high price and unavailability of fertilizer, and lack of credit. An agreement was reached to give priority attention to these problems.

During planning activities, local MSPs were identified and, in some cases, new ones formed to formulate and implement action plans to overcome identified problems. This involved the selection of leaders by each group, who would be responsible for testing and sharing experiences on the new technologies. Subsequently

each leader worked closely with other farmers within the same platform group to support their use of new technologies and at the same time, help to ensure that improved cowpea varieties were properly introduced. Individuals were identified by each group to be trained as community seed producers. The seed produced under this arrangement was tagged “informal seed production” that does not require rigorous supervision by the National Agricultural Seed Council (NASC). The community-based seed production scheme was for local use under the supervision of extension agents and the TL-III team. Other farmers were identified to produce certified seeds under the supervision of NASC officers, who were also members of the platform. To help the farmers to produce or to buy the cowpea, the majority of them were linked to private seed companies and financial institutions to facilitate access to credit at low interest rates.

A number of initiatives aimed at supporting and empowering women were also identified. These included:

- Support to women farmer groups, female-led farmers, and female seed producers.
- Support for postharvest activities for cowpea processing and utilization.

After that, 20 women per MSP were identified to produce community seeds. There were also specific efforts to ensure the inclusion of youth to guarantee creating a cradle of informed future farmers (Table 9.1).

Table 9.1 Establishment and composition of the innovation platforms

| Innovation platform | Year established | Membership at establishment | Current membership | No. and % women ^a | No. and % youth ^b |
|---|------------------|-----------------------------|--------------------|------------------------------|------------------------------|
| Dawakin Tofa | June 2014 | 225 | 300 | 60 (20) | 130 (43) |
| Makoda | June 2018 | 225 | 270 | 45 (17) | 100 (37) |
| Tsanyawa | July 2015 | 225 | 300 | 75 (25) | 80 (27) |
| Bichi-Rano farmers' association | June 2017 | 150 | 210 | 31 (15) | 79 (38) |
| Sule-tankarkar cowpea producers association | May 2014 | 69 | 115 | 13 (11) | 55 (48) |
| Ukange-Ukpam cowpea and soybean farmers association | June 2013 | 65 | 160 | 62 (39) | 60 (38) |
| Ucha-Abwa cowpea producers association | April 2016 | 85 | 200 | 104 (52) | 110 (55) |

^aPercentage in parenthesis

^bYouth is under 35 years of age

9.2 The Different Categories of Stakeholder Members of the Platform

The categories of the stakeholder members in the IPs comprised CBSOs/seed companies, farmers, agro-dealers, research institutions, state agricultural research projects, contract sprayers, and grain merchants (Table 9.2).

9.3 Platform Governance Structure (Steering Committee and Arrangements in Place to Facilitate Smooth Implementation of Platform Activities)

During the establishment of the platform, the stakeholders were trained on the importance of setting up the IP, how it will function, the prospects of cowpea seed production, and best production practices using the latest technologies/products delivered by research institutes. Stakeholders were encouraged to work together to achieve a robust and rewarding cowpea seed industry. After setting up the IPs, the members elected leaders to effectively run the affairs of the IP. A chairman and secretary were appointed to coordinate the activities of the IP and interface with other stakeholders when necessary. They will also disseminate information to members and organize meetings to deliberate on matters.

9.3.1 Composition, Roles, and Responsibilities of the Platform Members

The MSP is composed of diverse stakeholders including farmers, input dealers, transporters, seed regulatory agency, service providers, financial institutions, extension agents, research institutions, policy makers, and grain merchants/retailers/consumers. Their roles and responsibilities are presented in Table 9.3.

Table 9.2 Number of individuals per representatives per category

| Categories of members | Number of representative persons at the establishment |
|------------------------|--|
| Chairman | 1 |
| Farmers | 300 |
| Traders | 12 |
| Processors (all women) | 12 |
| Research institutes | 3 (IITA, IAR, UAM) |
| CBOs | 15 |
| Media | 4 |
| Grain off-takers | 2 (Dawanau market) |
| Seed companies | 5 (Maina seeds, Greenspore, Happy seed, AU saye, and Seed project) |
| Agrochemical company | 3 |

Table 9.3 Roles and responsibilities of different stakeholders in innovation platform

| Stakeholders | Roles and responsibilities |
|---|--|
| Farmers | Problem identification, indigenous knowledge, development of solution, testing and evaluation of solutions, and adoption of solutions |
| Service providers | Hired contract sprayer to protect the cowpea being produced by the outgrowers, seed producers, and other individual farmers' |
| Input dealers | Timely delivery of quality and affordable inputs/information |
| National Agricultural Seed Council (NASC) | Register all seed producers, supervise seed production of all seed classes produced by private and public seed companies for quality control |
| Private companies | Production and marketing of certified seed |
| Farmer groups | Engaged in informal seed production especially at the grassroots level |
| Transporters and other services | Guarantee timely service provision |
| Financial institutions | Develop financial products/services that support interventions |
| Extension agents | Provide information on identification, development, and implementation of projects |
| Research institutions | Critical problem analysis, provide solution to the problem, conduct new research where necessary. Production of early generation seed (breeder and foundation seeds) |
| Policy makers | Mobilization of farmers, support formulation of appropriate policies and policy advocacy |
| Merchant/retailer | Procurement of grains produced by farmers. Feedback on perception and consumer behavioral change |
| Media | Dissemination of information |

Platform Governance and Decision-Making The leadership of the platform comprises the Chairman, Vice Chairman, Secretary, Assistant Secretary, Financial Secretary, and Treasurer that run the activities and administration of the MSP in order to facilitate smooth implementation of platform activities.

The leaders ensure the following:

- Dialogue and promote understanding among stakeholders and provide an avenue for them to create a common vision and mutual trust.
- Enable partners to identify the bottlenecks hindering innovation and develop solutions beyond what individual actors can achieve alone.
- Create motivation and a feeling of ownership of the solutions that members have developed.
- Facilitate upward communication which enables weaker actors (such as small-scale farmers) to express their views on an equal basis with the more powerful actors.

9.3.2 Facilitation of Platform Activities, Including Meetings

The MSP members met at least once a month to discuss the focal areas and identify challenges and opportunities. To enhance stakeholder participation, especially for the weak ones, the platform developed a constitution that governed its operations. It had rules, regulations, and by-laws that were followed especially during meetings and other engagements of the members. Ground rules were normally spelled out during meetings to ensure that each participant had equal opportunities to participate actively in the deliberation of affairs. This was necessary to minimize marginalization of the weak, especially women and youth. In addition, the TL III project team held at least two meetings with MSPs, three times in a year: the first in February (in-house stakeholders meeting) to evaluate previous season cowpea production activities, the second (May–June) was to plan the activities of the next rainy season and provide pre-season trainings to the new producers. The third meeting was during October–November on seed business skills particularly for the seed entrepreneurs.

9.3.3 Platform Activities

Training Having recognized the significance of capacity building of the MSP to achieve its objectives, the project organized and facilitated several capacity development activities for its MSP. The MSP members were trained in quality seed production techniques (foundation and certified seeds), GAPs, IPM, data collection, and postharvest processing and storage. Agro-dealers were trained to market cowpea seed through innovative marketing (sale of small seed packets; 0.25, 0.5, 1, 2, 5, 10, and 20 kg) to ensure that quality seed of the new varieties was made available to farmers at affordable prices. Through “training of trainers” workshops on the use of improved integrated production technologies, management practices were promoted to narrow yield gaps to enhance cowpea grain and fodder production. Demonstration of best varieties and IPM options were established to reduce yield losses in cowpea cultivation. Training on improved cowpea storage was organized in partnership with the PICS (Purdue Improved Cowpea Storage) project to promote safe storage of cowpea to reduce insect infestation. Processors were also trained on seed processing (cleaning, sorting, grading, and packaging), storage, and marketing. The repeated trainings of male/female farmers and seed producers in the proper management of cowpea production and management increased grain yields by over 50% over the four-year period compared with the yield levels prior to project intervention.

Seed Supply Research institutes (IITA, IAR, UAM) were responsible for producing early generation seeds (breeder and foundation seeds) of identified preferred varieties and making these available for foundation and certified seed production by the private seed companies. The seed companies produce foundation seeds with the

research institutes also backstopping to meet the demand. The community-based organizations (CBOs) produce quality declared seed (QDS) with minimum supervision from the NASC to sell in their communities. The CBOs were linked to the private seed companies to access certified seed. This was to ensure that seed of the improved crop varieties was accessible to farmers in the remote areas. Individual men, women, and youth were also involved in seed production and acted as out-growers to seed companies.

Popularizing New Varieties To create awareness on the availability of improved cowpea seed, various complementary awareness creation approaches were adopted. These included technology demonstrations, farmer field days, distribution of technology promotional materials (production guides, flyers, leaflets, and manuals), media (radio/TV programs, newspapers, and bulletins), and agri/seed fairs. Other activities facilitated include credit, introduction of machinery and farming equipment/labor-saving devices, and market development/developing linkages to facilitate collective marketing. All these awareness creation activities helped to stimulate the demand for the use of quality seed of improved cowpea varieties.

9.3.4 Main Challenges Addressed by the Platform

Some of the main challenges addressed by the platform were:

- Non-availability of quality seed to farmers particularly in the remote areas were overcome to a large extent through the promotion of community-based seed production (CBSP). The use of community-based seed production schemes has helped to produce and made available farmers preferred quality seed to farmers in the remote areas at affordable prices and also linked the seed producers to emerging markets. The market linkages encouraged seed producers to improve and increase their seed production.
- Input supplies: TL III improved access to fertilizer and agro-chemicals by linking farmers directly to independent village suppliers. This contributed to a reduction in their transaction costs and ensured that farmers had access to good quality fertilizer and agro-chemicals.
- Access to credit: Credit is a constraint in improving agricultural production and can only be accessed by those that have a proven production record, with the necessary bank deposits, and are credit worthy. Of concern is that to obtain credit, farmers are often faced with bureaucratic procedures and long waiting periods. To reduce transaction costs and waiting periods, TL-III strengthened MSPs and encouraged group members to open accounts and learn to save. Consequently, there has been great improvement in the provision of credit to farmers by microfinance banks. A change in the bank's strategy is to grant credit to farmer groups rather than individuals. This strategy before has favored women more than men as women groups are seen to be more trustworthy.

9.4 Achievements of the Platform

Significant progress was made in addressing key problems of access to improved seed and other inputs. Before the Tropical Legume project started in 2007, access to good quality seed of cowpea varieties was a challenge to the smallholder farmers in Nigeria. To ensure that seed of the improved crop varieties was accessible to farmers, the project introduced a community-based seed production scheme. This integrated system allowed various actors to engage in the production of different seed classes (Fig. 9.1).

The NARS produced and made available, early generation seed (EGS), and breeder and pre-basic seed to the private seed companies for production of basic and certified seeds under close supervision by NASC. Two public institutions with mandate for genetic improvement of cowpea now produce EGS in Nigeria. The institution has their own seed unit with a revolving funds that guaranteed the unit financial autonomy.

The private seed companies then made available the basic/certified seed to local seed producers (individuals or groups supported by development partners such as farmer organizations).

These activities led to the cumulative production of over 532 tons of basic (foundation) seed and 8366 tons of certified/QDS seed of improved cowpea varieties which have been injected into the cowpea seed system in Nigeria in the last four years. Due to the strong partnerships supported by appropriate capacity building and availability of improved and end-user preferred varieties, seed production and

Availability and accessibility of various seed grades of newly improved and farmer demanded legume varieties in the target countries

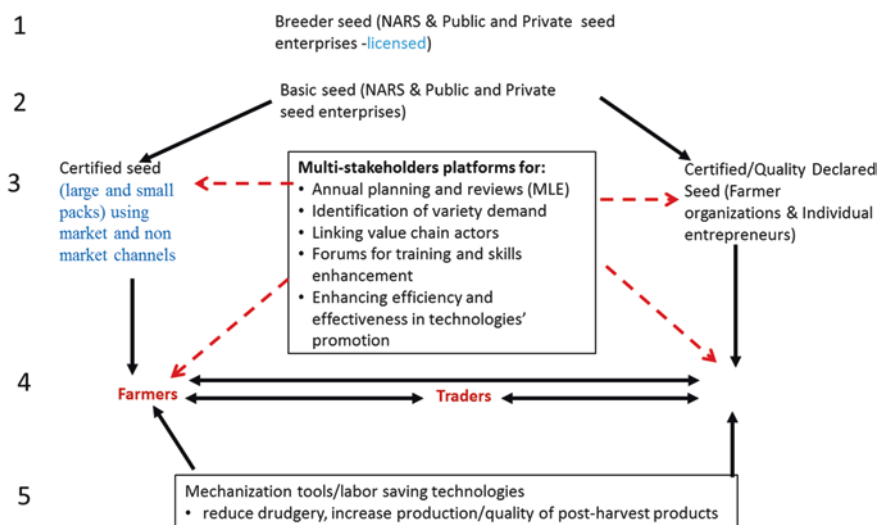


Fig. 9.1 Multi-stakeholder’s platform for the seed delivery model

supply were significantly increased. Thanks to community seed producers, the seed produced was available for smallholder farmers in remote areas. A large proportion of the cowpea varieties used to produce certified seed by farmers are still within 10 years of their release date.

Cowpea production in the projects from 2007 to 2019 showed an upward trend. For example, in Nigeria, seed production moved from 755 to 8366.3 tons within four years, representing about a 900% increase in production. Under TL-II and III, several new cowpea varieties (IT97K-499-35 [in 2008], IT89KD-288 and IT89KD-391 [in 2009], IT99K-573-1-1 and IT99K-573-2-1 [in 2011], IT07K-292-10 and IT07K-318-33 [in 2015], UAM09-1055-6 and UAM09-1051-1 [in 2016], IT07K-297-13 and IT08K-150-2 [in 2018]) were released in Nigeria. The number of farmers seeking improved cowpea varieties for planting has increased over the years. As a consequence, many private sector players (seed companies and individual entrepreneurs) are investing in the production and sale of quality seeds of improved varieties.

9.4.1 Demonstration with Improved Varieties and Technologies

Demonstration tests were set up in farmers' fields to compare improved varieties to farmers' local varieties. Field days were organized for farmers to appreciate and choose the best varieties at vegetative growth phase and at harvest time. From the activities conducted in all MSPs during the four years, improved varieties were always preferred by farmers. The yields of these varieties were superior to those of the local or previously released varieties.

During the four years of project implementation, significant progress was made towards achieving targets. A total of seven MSPs were established or strengthened to link actors in the cowpea value chain (seed producers, grain traders, researchers, extension staff, agro-dealers, and other input suppliers). Forty-two trainings and short courses were organized benefiting 13,220 (m: 10,416; f: 2804) platform members of which 21% were female. A total of 298 demonstrations, 10 field days, 29 media programs (electronic and print), and eight agri/seed fairs/exhibitions were organized to create awareness about improved cowpea varieties in the country.

9.5 Achievement in Seed Production of Different Classes of Seeds

The participation of several community seed producers and some private and public seed companies led to increased production of foundation, certified, or quality declared seed of cowpea, ensured farmers had access to improved seeds, and facilitated access to agricultural support services, particularly in the remote areas. Five organizations which comprised six seed companies, 46 farmer groups, five public seed enterprises, two NGOs, and 718 individual seed entrepreneurs were engaged in production and marketing of cowpea in Nigeria. These activities led to the

cumulative production of 532.5 tons of basic (foundation) seed and 8366.3 tons of certified seed/QDS of improved cowpea varieties injected in the Nigerian seed sector. The projects ran in three phases: TL-II Phase I (2007–2011), TL-II Phase II (2012–2014), and Phase III or TL-III (2015–2019). The pragmatic effort witnessed a huge success in cowpea seed production and delivering of improved seed varieties to farmers (Fig. 9.2). The use of small packs was also successful in ensuring farmer access to improved cowpea varieties. Over 1600 tons of cowpea seed were sold using small packages representing about 20% of the total seed produced over the four-year period. The project facilitated the introduction of two labor-saving technologies/mechanization (planter and thresher) tools to reduce drudgery especially among female farmers.

There was also rapid adoption and use of newly released varieties by farmers as a result of increased awareness on improved varieties through multi-media and user-friendly communication strategies and tools. In addition, there was an increase in the number of channels and outlets that conveniently availed seed to farmers packaged in small, affordable packs.

9.6 Achievements in the Areas of Access to New Markets, Finance Services, and Other Services

The project also facilitated the use of small packs to enhance wider access to seed of improved varieties at affordable price. The use of small packs has been very successful in ensuring that many farmers have access to improved cowpea varieties.

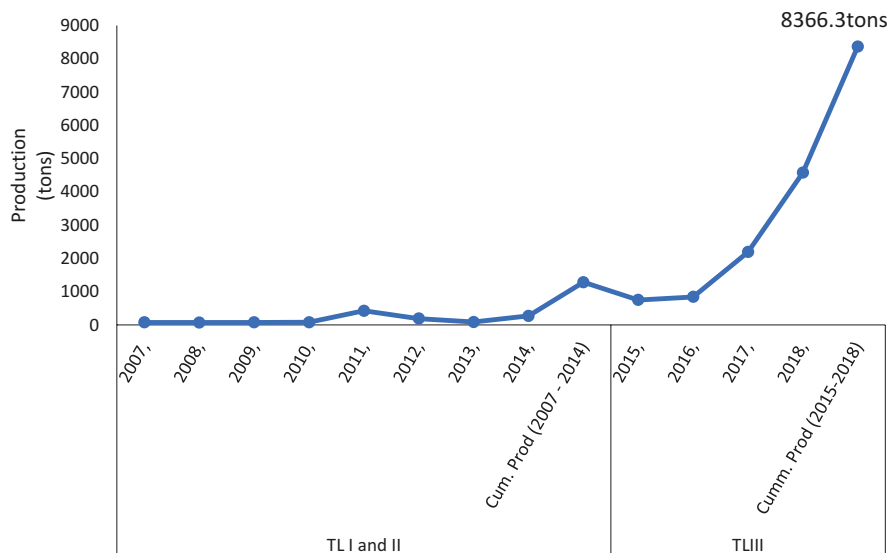


Fig. 9.2 Cowpea certified seed production in Nigeria from 2007 to 2018

The small packs approach was extensively used; several farmers and CBOs were trained in seed packaging and are selling large volumes of quality seeds in small packs to other farmers at affordable prices. All the certified seeds produced were sold, 30% of which were sold in small packs (1, 2, 5, 10, and 20 kg), exceeding the 20% target. Marketing of seed in small packs has proven to be a handy strategy for wider impact. The strategy is convenient, enhances affordable seed access to farmers, and is an affordable means of testing new varieties with farmers. The approach also presents an opportunity for private companies to expand seed business to remote and poor, hard-to-reach women farmers.

9.6.1 Appropriate Input and Output Marketing Strategies Identified for Male and Female Farmers

One of the key factors to successful and sustained adoption of yield-enhancing agricultural technologies is an assured market, through which farmers can sell their production. Marketing and production are interdependent and mutually beneficial for both producers and marketers. Producers must be convinced that a remunerative market exists, particularly for “new” varieties, before they produce commercially. An attractive market prospect combines a “good” price and an assured sale. In addition, adoption and commercial production can be enhanced by the timely availability of adequate and appropriate inputs at reasonable prices.

TL-III undertook a market survey to identify input and output dealers and processors with the aim of developing an appropriate agricultural input and output marketing strategy for male and female farmers. This provided information that facilitated market links between service providers (input suppliers and dealers) and farmer groups for bulk delivery of inputs at conditions agreeable to both parties.

9.6.2 Increased Access to and Understanding of Market Information by Male and Female Farmers in the Project Area

Awareness of price information plays a critical role in bargaining power and competitiveness in business transactions. Agricultural markets are largely imperfect due to lack or limited access to market information, which is vital in marketing agricultural produce. Market information also assists farmers to decide the when, where, and how of their marketing strategies. It also contributes to the operational efficiency in commodity markets.

The dissemination of market prices was significant in promoting transparency in business transactions among farmers, middlemen, and processors. It strengthened the bargaining power of farmers with middlemen who are usually better informed about prices and demand prospects. As a result, farmers were better informed on developments in the agricultural markets which helped them to decide when and where to market their produce.

9.7 Achievements in the Areas of Access to Knowledge and Farm Advisory Services

Significant progress was made in addressing the key problems of farm advisory service (extension, NGO, research) after membership of the MSP. Field observation revealed that most farmers now use new management practices on their fields. Most farmers now plant cowpea on ridges and practice closer spacing than in the past. A survey of farmers' field showed that farmers spray their cowpeas at least twice, with many spraying three times to control insect pests as against the past when farmers give reasons not to spray cowpeas due to lack of finance. In most of the communities where TL-III was not working, adoption of improved cowpea varieties was limited; it was restricted to those who had some contact through friends or relatives with TL-III. Of the new management practices, agro-chemicals for pest control had been widely adopted. There were, however, considerable concerns about the safe use of agro-chemicals and lack of training of contract sprayers especially in the non-TL-III areas. This concern was addressed by further sensitization and repeated training in the use of agro-chemicals in most of these areas.

The main benefits reported by farmers as the direct impact of the interventions were improved food security, improvements to people's lives, and the acquisition of additional assets. Specific indicators reported included:

- Improved food security: Increased yields, improved household nutrition with harvest lasting from one season to the next, more cowpea in the house with enough for both consumption and sale.
- Improvements in livelihood: Higher incomes, improved food availability, ability to pay school fees of children, ability to honor social commitments, and improved health. Honoring social commitments resulted in better family and community relationships, indicating building of social capital in the community.

9.8 Achievements in the Areas of Gender Equality and Youth

To ensure the production of high-quality seed and maintain seed standard among farmers in the project areas, the project facilitated the training of platform members in all the communities. Activities were conducted towards training of platform members across communities for cowpea production and marketing. A total of 123 trainings and short courses were held in various field agronomy aspects including quality seed production, group dynamics and management, GAPs, postharvest handling, and pest management, benefiting 20 395 (m: 13 861; f: 6534) platform members (farmers, seed producers, seed companies, grain traders, researchers, extension staff, scientists, technicians, farmer organizations/CBOs, and agro-dealers), of which 32% were women have been trained.

To improve the efficiency of data and information gathering and dissemination, and technical reporting; the project facilitated the training of NARS staff, mostly

youth, on data collection tools which are now used for effective data capturing (ODK platform) and monitoring. The project also facilitated the capacity development of local partners who are the frontlines in technology dissemination to farmers. These include extension agents from the agricultural development programs (ADP) and NARS in the participating countries. In Nigeria, a total of 15 extension staff of ADPs and three seed companies have been trained in seed certification and quality control. Partners were also trained on seed catalogue and digital seed roadmap to build their skills in planning, producing, tracking, and delivering quality seeds to smallholder farmers in Nigeria.

9.9 Main Challenges Solved for Women

Land tenure and other cultural issues hinder women from farming cowpea on their own. However, enlightenment campaigns and mobilization efforts by extension agents and project staff are encouraging more women to be cowpea farmers. About 30.2% of the networked farmers were women and there are indications that the number will continue to increase. The project through the MSP facilitated the introduction of two labor-saving technologies/mechanization tools (planter and thresher) to reduce drudgery especially among female farmers.

9.10 Main Challenges Addressed for Youth

Training on the safe use of pesticides has helped to reduce the risk of exposure to toxic chemicals during spraying. Youth in agribusiness were also trained in cowpea seed production and linked to seed packaging companies.

9.10.1 Sustainability of Multi-Stakeholder Platforms

TL-III's success has been built on the development of strong partnerships among MSP members. Strengthening of community-based organizations, the mainstreaming of gender combined with the use of research knowledge and proven technologies will ensure sustainability. The increased capacity of partners, particularly seed producers, to produce and market improved seed will make a significant contribution to sustainability. The linkages between community-based seed producers, seed companies, and research institutions will ensure sustainability of seed production of different classes. Similarly, strengthened linkages among farmers, market agents, and processors will ensure sustained market for the product.

9.11 Elements of Sustainability

Sustainability will depend on the release of farmer-preferred cowpea varieties and promoting these varieties at scale to reach the smallholder farmers in the rural areas. That implies knowledge in product development and deployment in a challenging environment. Access to quality seeds of cowpea varieties that are adapted to the needs and production systems of farmers is essential for sustainable cowpea production. A sustainable seed system will ensure that farmers have timely access to affordable quality seeds of the most suitable cowpea varieties. Over the years, IITA has worked with NARS, research and breeding institutions, seed companies, seed enterprises, and community-based seed organizations to develop and operate a sustainable seed sector value chain. Most of the farmers trained as seed producers are still producing. There are prospects that some of these seed producers will develop into self-sustaining rural enterprises with the capacity to meet the demand for quality seed of improved cowpea varieties for farmers within and around their communities. Other elements of sustainability include private–public partnership, capacity building, and strengthening of institutions to produce and supply EGS to seed companies for production of foundation and certified seeds. Promote community based seed production (CBSP) using out-growers scheme and linking the CPS to seed companies for seed buy-back their seed. This encouraged the CPS to produce seed in the rural area because of the ready market. The success of local seed production and local seed associations and its links to the formal seed sector may play an important role in ensuring the sustainability of increased quality seed of cowpeas.

9.12 Steps Taken to Enhance the Sustainability of Platform Activities and Achievements after TL III

The project facilitated the establishment and strengthening of multi-stakeholder seed delivery platforms that include stakeholders across the entire cowpea seed value chain in Nigeria. TL-III facilitated the establishment or strengthening of seven platforms across four states in Nigeria, to link actors in the cowpea value chain, avenues for training and skill enhancement were provided along with improved efficiency and effectiveness in technology development and use. The multi-stakeholder approach is hinged on several overarching components including partnership building, capacity development, exposure to innovative seed systems approaches, and intensifying efforts to reach the last-mile smallholder farmers with improved technologies. This innovative platform approach exposed farmers to new varieties and complementary technologies while gaining affordable access to these technologies within their proximity.

9.12.1 Perceptions of Stakeholders

For many of the stakeholders interviewed, the MSP has had a positive impact on efficient seed delivery systems and has ensured the availability of quality seed of improved crop varieties which has benefited farmers particularly those at grassroot level. Others viewed information sharing between platform members as beneficial and it helped members to grow their activities together.

Some members mentioned that the MSP taught them that working together was an effective way of mutually improving their activities and income. The MSP members stated that joint activity planning had enabled them to understand that they could immediately call the service providers when there was an attack by insect pests that need to be sprayed, which they were not doing before the establishment of MSP because of the lack of connection with the service providers and input dealers. Under TL-III, contact was made on time with the service provider and the cowpea farm sprayed, thus, grain yield increased almost twofold. Through MSP meetings of farmers and traders, the farmer groups have contact with grain merchants for their products, even before harvesting; they contacted the traders in advance to find out what their needs are. This has reduced the uncertainty around product market values at harvest time, and so has contributed to improved production, as farmers can now produce with less fear as to the potential market outlet. According to other members of the MSP, cowpea seed production skills and pest management techniques have been enhanced. The IP meetings provided a forum for the exchange of information and knowledge between the diverse participants, which is crucial for networking and improving agricultural activities. The test demonstration plots were very useful in convincing many of the stakeholders to use quality seeds of new, improved cowpea varieties rather than the recycled seed of old varieties.

9.12.2 Reflections on the Process

The MSP has helped to foster the integration of diverse stakeholders to address a common challenge of low crop productivity in many communities in Nigeria. The process has also facilitated access to improved seed and provided information on the acquisition of other inputs and market knowledge to members. Cowpea farmers on the platform have increased their cowpea production with appreciable yield per unit area. With the representation of the various stakeholders on the platform, members are better informed on issues pertaining to the cowpea value chain. They are also familiar with how to obtain credit from financial institutions, consequently ensuring joint learning and cooperation among diverse actors to solve problems and reduce uncertainties. The MSP created opportunities for research to be demand-driven as they identify and present researchers with critical issues for research, results of which are disseminated to the target beneficiaries.

The community-based seed producers having been trained to produce quality seed at community level and are linked to private seed companies. Members of the

MSP are actively engaged in producing and packaging cowpea seed for sale and are engaged in other operations/activities during the off-season for self-reliance.

9.12.3 Areas to Focus on in the Future

- Work with the private sector to further strengthen the seed system to truly meet the needs of the smallholder farmers especially women in Nigeria to ensure women farmers have equal access to improved seeds.
- Generate gender-responsive demand through linkages and innovative public–private partnerships.
- Ensure that there is an efficient cowpea market-led seed industry for the production and distribution of high-quality cowpea seed that is accessible and affordable for the majority of farmers.
- Engage the private and public sectors, particularly the agricultural universities, to boost the production and availability of EGS to meet market demand. This will be achieved by strengthening the technical and business acumen of those involved.

Mechanization of cowpea production will be promoted to reduce drudgery and ease production. More local partners will be engaged in the fabrication and maintenance of more efficient cowpea pre- and postharvest machine technologies in the rural areas. The adoption of such labor-saving technologies will make cowpea production more attractive to the youth who can produce foundation and certified seeds. Facilitate a stronger linkage between the public sector, private seed companies, agro-input service providers, and community-based seed producers. Community-based seed production is promising for sustainable seed production, to ensure the continuous availability of quality seed to farmers in local communities. Other innovations to focus on will include increasing farmer access to inputs such as fertilizer and agro-chemicals and continued linking of farmers with financial institutions. Involving NARS partners and seed companies in the business of producing early generation seeds to meet the growing demand for certified seed. Crop modeling for decision-making on productivity of cowpea in different ecological zones.

Finally, engagement of the private sector for massive awareness campaign at the community, local government, state, and national levels, to sensitize farmers on the availability of new varieties, and the benefits of using quality seed of improved cowpea varieties through demonstration and other complementary technologies.

9.12.4 Lessons Learned

- Engagement of community-based seed producers increased the supply of quality seeds of improved cowpea varieties in the remote areas. Through this arrangement, a large number of farmers were reached.

- Resource-poor farmers are ready to adopt new improved cowpea varieties if they possess end-user characteristics.
- An efficient seed system for delivering varieties must be linked to the commodity value chain. The developed grain markets are an obvious driver of seed demand through which the need for productivity is justified.
- The multi-stakeholders approach enhances efficiency and effectiveness in technology promotion. Diversification of seed sources by linking formal and informal seed systems to enhance seed access to smallholder farmers especially those in remote areas.
- Using smaller seed packs as a marketing approach has the potential to reach hundreds of thousands of farmers quickly, including women. The sale of small packs has helped to expand the use of certified seeds. It has also given farmers the opportunity to experiment with new varieties at minimum risk.
- Well-structured, in-country review and planning meetings will provide stakeholders with the opportunity to understand procedures for better implementation of project activities.

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Cowpea Seed Innovation Platform: A Hope for Small Seed Producers in Mali

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Zoumana Kouyate, Kléouforo M. Dao, Oumar Togola,
Abdoul Karim Malle, Oumar Malle, Kaly Diakite,
and Abdoulaye Traore

Abstract

Cowpea is a food crop of great importance to the people of Mali due to its contribution to food security, improvement of producers' incomes, a price that is higher than that of cereals, and an important role in social relationships. However, the availability of good quality seeds is a major constraint to its production and productivity. As seeds are the key input in agriculture, an innovation platform has been established at the Cinzana Agronomic Research Station in May 2016 to improve the production and distribution of cowpea seeds in Mali. It brings together farmers, distributors, transporters, financial and technical services, and NGOs. This ensures greater sharing of information and knowledge among the different actors involved in the cowpea seed value chain. Two bodies of governance were set up: Program Planning Committee and Executive Office. Significant results have been achieved in three years of existence: the number of varieties used has increased from 5 to 12. The amount of foundation seeds produced annually has increased from 1 t to more than 20 t. The sales strategy in small packs proved very effective by reaching more farmers. Promotional activities involved 25 training sessions for 1097 farmers in different aspects of the value chain and 299 demonstrations, involving 2934 producers and benefiting 12193 farmers.

Z. Kouyate (✉) · K. M. Dao · O. Togola
Institut d'Economie Rurale (IER), Cinzana Agronomic Research Station, Segou, Mali

A. K. Malle
Cooperative Society of Agricultural Services (Zamoho/Koutiala), Koutiala, Mali

O. Malle
Cooperative of Seeds Producers at Dakoumani/Bla, Bla, Mali

K. Diakite · A. Traore
Group of Research and Support to Seed Producers, Bla, Mali

© The Author(s) 2021

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Keywords

Mali · Innovation platform · Cowpea seeds · Cowpea value chain

10.1 Introduction

Cowpea is emerging more and more as a food and cash crop by its contribution to food security and increase in the incomes of the population. In Mali, the annual production of cowpea has risen to 180,080 t from an area of 426,870 ha (CPS/SDR 2017, Seventh Bulletin of Tropical Legumes III (TL III) publication 2017.)

However, this crop remains confronted by many constraints: low access to good quality seeds, problems with quality assurance/quality control (purity maintenance), and lack of market information, all owing to weak seed systems. Opportunities include the availability of several varieties (through the efforts of agronomic research during the last decades) and the existence of several agricultural input distribution companies interested in the seed value chain.

To sustain cowpea production, more efforts need to be made to optimize the use of quality seeds of improved varieties, good agronomic practices, and fertilizers. There is also the need to develop more effective commercial marketing channels for the grain. It is in this context that the setting up of an innovation platform (IP) of cowpea seed production and dissemination was considered in Cinzana. A workshop about setting up this platform took place on 17/19 May 2016 at Cinzana Agronomic Research Station, which is about 45 km from Ségou. The cowpea seeds market was inefficient because of either lack or distortion of marketing information. To deal with such situations, the authorities implemented market information systems (MIS) in order to (1) exchange and share information, (2) build social capital and trust, and (3) create a framework or conducive environment for innovation.

Innovation platforms (IPs) offer a framework for cooperation and learning through the direct networking of actors of a sector or community of common destiny in order to address the problems of informational asymmetry and the situations of mutual distrust that accompany them. They are increasingly mobilized in the programs of Research and Development to produce more impact on the beneficiaries.

Cowpea seed production and distribution in the IP of Cinzana Rural Commune is part of the TL-III project seed system to ensure more sharing of information and knowledge among the different actors in the cowpea value chain in Mali. The objective was to improve the production and the distribution of good quality seeds of improved cowpea varieties.

10.2 Establishment of the Platform

The IP was established in May 2016 at Cinzana Agronomic Research Station through a workshop attended by 53 participants representing a diversity of stakeholders in the value chains for production and distribution of cowpea seeds. The MSP is made up of three cowpea seed cooperatives (CPDS, COPROSEM, and CPS/SSN), three seed groups (G.Sem/Minankofa, GRAPS, and ARCAD), four NGOs (AMEDD, CRS, AMASSA, and Faso Jigui), two unions of cooperative societies (USCABI and UCPC), two seed companies (Faso Kaba and GRAADEC), one agro-dealer (Agri Sahel), three extension services (Segou Regional Agriculture Service, Local Agriculture Service of Cinzana, and the National Seed Service), one research center (Cinzana Agronomic Research Station), two radio networks (ORTM/Ségou and Radio Fôko), one microfinance institution (Dondalasso), and one private transporter (Table 10.1).

10.3 Overall Process of Platform Establishment

In the process of setting up the platform, contacts were made with various actors with common interests (farmers' organizations, agro-dealers, seed companies, NGOs, technical services, research, microfinance institutions, radio companies, transporters, consumers/users of cowpea seeds). The workshop was scheduled, and invitation letters were sent to the different organizations (Table 10.1).

The workshop was held on 17/18 May 2016 in the meeting room at Cinzana Agronomic Research Station. A brief overview was given on the general principles of operating an IP. The importance of cowpea in food security in Mali and the lack of access to seeds of improved varieties by smallholder farmers justify the setting up of the IP on production and distribution of seeds.

Seed producers highlighted the constraints relating to the adoption of new varieties and related crop protection measures. Seed distributors highlighted the weaknesses in the distribution channels and the low awareness and low visibility of cowpea-based products in the market. In its intervention, the National Seed Service emphasized the need to intensify the training of seed producers, strengthen the relationships among producers, trainers, and financial partners, and facilitate access to the required inputs for producers.

The participants were divided into two groups, seed producers and seed distributors. The first group identified and prioritized the constraints to production and distribution and the second prioritized the planning of activities.

The first three constraints identified and prioritized by the producers were the low availability of breeder and foundation seeds, problems of crop protection (phytosanitary treatment), and storage and conservation of production.

The constraints from the distributors' group were the lack of planning in the production and distribution of breeder, foundation, and certified seeds, the low level of training of the actors, and difficulties of access to credit.

Table 10.1 Categories of the stakeholders at platform establishment and current numbers of members

| Stakeholders | Organizations present at the establishment | Number of members at establishment (2016) | Current number of members (2018) | | |
|--|--|---|----------------------------------|----------------------|------------|
| | | | Men | Women | Total |
| 3 cooperatives of cowpea seed producers | CPDS | 20 (4 women) | 16 | 04 | 20 |
| | COPROSEM | 33 (7 women) | 85 | 40 | 125 |
| | CPS/SSN | 42 (15 women) | 39 | 19 | 58 |
| 3 groups of seed producers | G.Sem/Minankofa | 152 (99 women) | 53 | 99 | 152 |
| | GRAPS | 30 (11 women) | 18 | 14 | 32 |
| | ARCAD | | | | |
| 1 cooperative society of agricultural services | Zamoho/Koutiala | 25 men (19 < 35 years) | 47 (36 < 35 years) | 906 (817 < 35 years) | 953 |
| 4 NGOs | AMASSA | 66 (5 women) | 99 | 15 | 114 |
| | Faso Jigui | 13 (1 women) | 12 | 01 | 13 |
| | AMEDD | | | | |
| | CRS | | | | |
| 2 unions of cooperatives societies | USCABI | | | | |
| | UCPCC | | | | |
| 2 seed companies | Faso Kaba | | | | |
| | GRAADECOR | | | | |
| 1 agro-dealer | Agri Sahel | | | | |
| 3 technical services | DRA/Segou | | | | |
| | Cinzana subsector of agriculture | | | | |
| | National Seed Service (SSN) | | | | |
| Research | Cinzana Agronomic Research Station | | | | |
| 2 radio networks | ORTM/Segou | | | | |
| | Foko radio | | | | |
| 1 microfinance service | Dodalasso | | | | |
| 1 transporter | Private carrier | | | | |

The outputs from the workshop were as follows: (1) Lists of prioritized constraints in cowpea seed production and distribution, (2) Elaboration of platform workplans, and (3) IP for cowpea seed production and distribution. Roles and responsibilities of the different stakeholders involved in the IP are summarized in Table 10.2.

10.4 Structure of the Governance of the Platform

Two organs have been established for the seed production and distribution IP:

1. Committee composed of 21 members responsible for planning activities.

Table 10.2 Roles and responsibilities of the different stakeholders involved in the activities of the IP for the production and distribution of cowpea seed

| Stakeholders | Roles and responsibilities |
|---|---|
| Producers of certified seed (cooperatives and groups) | Produce certified seeds in quantity and ensure their availability |
| Seed distributors (seed companies, agro-dealers) | Supply or provide agricultural inputs (seeds, fertilizers, pesticides) and agricultural equipment |
| Cowpea seed consumers (NGOs, farmers, unions) | Ensure good production and wide diffusion/popularization of varieties |
| Microfinance | Facilitates access to credit |
| Transporters | Guarantee timely seed delivery in good condition |
| Technical services and NGOs | Support for technical advice, support, and monitoring of production and certification activities |
| Communicators (radio networks) | Information dissemination |

2. An Executive Office or Activity Unit, composed of 16 members, responsible for the implementation/execution of platform activities.

The members ensure the following:

- The Chairman/President coordinates, directs, and organizes the activities of the platform.
- Chief Secretary is responsible for archives and logistics and represents the President when absent.
- General Treasurer is responsible for financial management and platform property.
- Secretary for information, responsible for all aspects of communication.
- Secretary for external relations, responsible for relations with NGOs, projects, and national and international institutions.
- Secretary for development, responsible for gathering the training needs of IP members.
- Secretary for production, supervises activity planning and innovation dissemination, maintains data sheets and other documents.
- Chairman of the Board ensures execution of the decisions of the General Assembly and compliance with the rules and procedure of the MSP.

10.5 Facilitation of Platform Activities, Including Meetings

Platform members meet formally with the TL-III team twice a year. During these meetings, the previous year's activities and results are reviewed and the workplan for the following year is developed and validated.

Implementation of platform activities is conducted based on the experiences of members and with support from a specialist on the operationalization of platforms. The participatory approach and brainstorming during general meetings and annual reviews are the democratic tools and mechanisms used to encourage the

participation of all members. Decisions are taken by a majority of the members present. Also, the TL-III team is regularly in contact with the different cooperatives, associations, and producer associations for the exchange of experiences and advisory support.

10.6 Activities of the Platform

As part of the implementation of the platform, different activities have been executed:

10.6.1 Workshops

Five workshops were organized as follows: one workshop for platform setup, 17–18 May 2016; one workshop for planning platform activities and setting up the Executive Office, 23–24 November 2016; two workshops for review and planning of activities, 7–8 February 2017 and 20 March 2018; and one workshop on introduction of platform members to marketing techniques, 19 July 2017.

10.6.2 Trainings

Different training sessions for seed producers and extension agents were held in Segou, Mopti, and Sikasso Regions. Men and women from different associations and cooperatives and technical agents were trained. The general objective was to strengthen the producers and agricultural agents' capacities on seed production, postharvest technologies, and seed sector legislation.

Different sessions focused on technical procedures for certified seed production, the principles and methods of certification (field and laboratory control), plot isolation, and storage and preservation techniques. The importance and characteristics of good quality seed and seed policy in Mali (organization of seed production, roles and responsibilities of the different actors in the sector, categorization of seeds, their producers and distributors) were explained in detail. The local language Bamananka was used for ease of communication. The participatory approach was the methodology used for better understanding of the different topics.

10.6.3 Seed Supply

Institut d'Economie Research (IER) was the only institution authorized by law to produce foundation seed. However, currently, professional seed-growers can produce basic/foundation seed provided they have the requisite technical capacities. For certified seed production (first and second reproduction, R1 and R2), foundation seeds are delivered by Research or by some relevant seed producers, then certified

seeds first reproduction (R1) and second reproduction (R2) are delivered by seed producers. TLIII project provides foundation seeds to projects, farmers' organizations, cooperatives, NGOs, State Services, and seed societies for certified seed multiplication. Partners producing certified seeds are listed per Region as follows: Ségou Region (G.Sem./Minankofa, DRA, GRAPS, CPDS, Faso Jigui, COPROSEM, AMASSA) and seed producers; Mopti (AMASSA and CRS); Sikasso Region (Zamoho, GRAADECOCOM, and SOPROSA); Koulikoro Region (Faso Kaba, Shi cololo Ton of SSN/Samanko). Over a period of 11 years (2007–2018), the Tropical Legumes project led to the production of about 1952.3 t of certified seed of improved varieties entrenched in the Malian seed systems (Fig. 10.1).

10.6.4 Popularizing New Varieties

Three main strategies were adopted to popularize new cowpea varieties: demonstration (demo) plots, field days, and radio programs. The objective of demonstration is to evaluate the farmers' preference and the yield of new improved varieties compared to the farmers' local check or standard control variety. The demo plots were established by individual farmers or farmer groups. Field days have been organized during the period from bloom to maturation at Cinzana Agronomic Research Station and at farmers' cowpea demo and seed multiplication plots. Farmer participatory variety selection was also done in the demonstrations. Radio programs were broadcast from July to September to highlight different stages of crop growth and development. The broadcasts focused on the importance of cowpea, climate and soils, site selection for production, varieties, planting dates, spacing, weed control, insect pest control in the field, harvesting, and the control of storage pests.

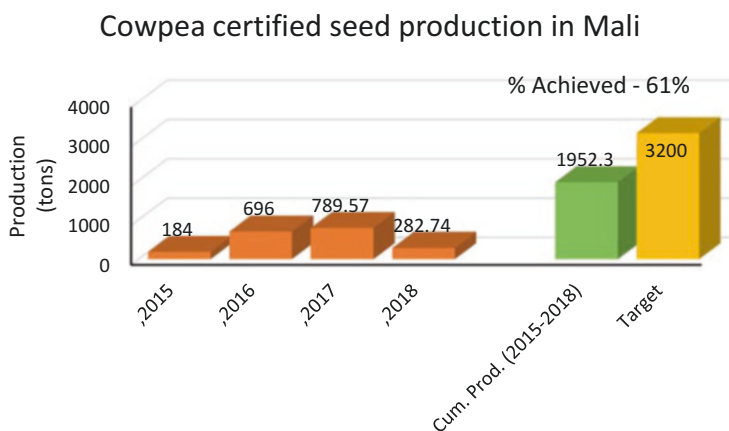


Fig. 10.1 Certified seed production between 2015 and 2018

10.6.5 Seed Marketing

The seed market is liberalized and dominated by the private sector. The State ensures that legislation and the regulation of the market are in accordance with the country's seed law. There are several actors in the seed market: producers and producer organizations, independent or dependent collectors, agro-dealers, seed companies, and NGOs, etc.

Often TL-III facilitates the sale of seeds produced by certain producers or cooperatives and also facilitates access to certified seeds by some organizations. In the villages, weekly fairs and the focal points of seed sales in small packages are key strategies used to promote new cowpea varieties and facilitate small farmers' access to improved seed. The strategy of seed sales in small packages of 1 kg in weekly fairs (exhibitions) is more adapted to the context. The number of producers reached by this strategy is higher. The case of Zamoho/Koutiala, a member of our cowpea seed platform is a good example.

10.6.6 Challenges

The IP for cowpea seed production and distribution faces a number of challenges: platform formalization, the acquisition of financial resources, the implementation of certain activities, production and productivity increases, dissemination and wide adoption of improved varieties, and training of the actors. With regard to platform problems, these are the lack of suitable harvesting and post-harvesting equipment, the lack of stakeholders trained in marketing and business management, the technical procedures for production, and the insufficiency of breeder seed. At policy level, the problems are the absence of operating procedures governing the platforms. On the organizational and managerial level, the problems are the unavailability of some stakeholders at certain meetings of the platform and the insufficiency of financial resources.

10.7 Results/Achievements of the Platform

The IP on cowpea seed production and distribution recorded different results:

10.7.1 Trainings (Access to Knowledge and Advisory Services)

Twenty-five training sessions were conducted for seed producers and extension agents in Segou, Mopti, and Sikasso Regions. A total of 1097 participants (912 men and 185 women) from different associations and cooperatives and technical agents were trained on seed production techniques, postharvest technologies, and seed sector legislation.

10.7.2 Collaboration/Partnership

The partnership/collaboration between actors in the value chain (seed producers, researchers, agricultural extension services, NGOs, agro-dealers, seed companies, and National Seed Service) was strengthened through platform training workshops, the conduct of demo plots, field days, exchange visits, and the supply of foundation seeds.

10.7.3 Popularization of New Varieties

Various complementary approaches for awareness creation were employed to popularize new improved varieties in the last three years.

10.7.3.1 Establishment of Demonstrations in Target Communities

In three Regions (Koulikoro, Sikasso, and Segou) 299 demo plots were established across different organizations to promote the use of improved varieties, and to create awareness for the community through training on cowpea production. A total of 2934 producers (401 men, 2533 women) participated in the demonstrations. A total of 12,193 farmers (men: 5766; women: 6427) were reached through the demo plots.

10.7.3.2 Organization of Field Days in Target Communities

Forty field days were organized during the period from bloom to maturation of cowpea at farmers' demo and seed multiplication plots and on Cinzana Agronomic Research Station and were attended by 1866 participants (1140 men and 726 women).

10.7.3.3 Dissemination by Radio Programs

Fifty-two radio broadcast messages on promotion and production techniques for cowpea varieties were broadcast from July to September for the attention of the rural community in the local language, Bamanan. They focused on the importance of cowpea, climate and soils, site selection for cowpea production, varieties, planting dates, plant spacing, weed control, insect pest control in the field, harvesting, and the control of storage pests.

10.7.3.4 Seed Fairs

Eight seed fairs were organized through collaboration with USAID-Groundnut scaling project, Faso Kaba Seed Co., with a total of 780 participants including 466 women. In addition, more than 7000 people have been briefed across two circles (Koutiala and Yorosso) through participation in 13 weekly fairs.

10.8 Access to Improved Seed

In the domain of access to improved seed, the number of varieties used increased from 5 (Korobalen, Sangaraka, Dounan, Djièmani, and Yèrè wolo) to 12 (Korobalen, Sangaraka, Dounan fana, Cinzana télimani, Djièmani, Yèrè wolo, Gana shôni, Djiguiya, Wilibali, Fakson, Acar 1, and Simbo). The quantity of foundation seeds produced increased from 1–1.250 t to 20–30 t per year. Foundation seed supply has been improved through the cooperatives and members' groups of the platform who have priority in the supply of foundation seed. Several non-members including farmers from other villages are able to access improved seed through members of the platform (e.g., OPROSEM/Dakoumani, 32 men and six women; G.Sem/Minankofa, more than 40 producers). Land area cultivated to improved seeds has increased significantly with the platform. As examples: before the platform, the average area was 0.5 ha for G. Sem/Minankofa, compared to 3 ha per producer after the establishment of the platform. With COPROSEM/Bla, the average total area was about 11 ha, compared to more than 20 ha with platform membership.

10.9 Access to New Markets

In Mali, the market for agricultural products, including seeds, is liberalized and dominated by the private sector. Prices vary according to demand and production. The cowpea seed market is irregular and variable. The acquisition of new market opportunities is also irregular, but the platform is already making headway. In 2018, for example, G.Sem/Minankofa sold seeds to five new customers [Dry Dev/Cinzana (project), UPM/Segou (Union), Sahel Seed Production/Kayes (Cooperative Society), ADDAR/Mali (NGO), and USC/SOS Canada-Mali (NGO)] as a result of new linkages developed through the platform.

10.10 Relationship with Other Platforms

TL-III IP for cowpea seed production and distribution has good collaboration with Cinzana and Baroueli cowpea IPs, supplying them with good quality early generation seeds sourced from TL-III IP. These platforms aim to contribute to improvement in food security by training their members to increase production and productivity through new improved seeds thereby improving members' income. With the support of TL-III project, two associations (Jama jigui of Samine and Jiguiya Ton of Wolona) were created and specialized in cowpea seed production in Segou Region. Because of the collaboration between TL-III and NGO AMEDD, the Center of Agricultural Service (CSA) of Yorosso has also been motivated to promote seed production in Sikasso Region, circle of Yorosso. With the development of cowpea sole cropping in the area, the improvement of production and purchase of new assets are visible changes in the community. The

capacity of producers has been strengthened through training, conduct of demo plots, field days, and exchanges/visits.

10.11 Social Assets and Gender

Social relationships have been improved by increasing direct contact between producer associations and groups, through the platform. Memberships of women in the cooperatives and associations have increased (for example: COPROSEM/Bla has 91 members, including 30 women; G.Sem./Minankofa has 153 members, including 99 women). The IP improved the women's livelihoods (Fig. 10.2) by increasing their income to satisfy some of their financial needs. It has helped to ease rural work by regrouping, and diversifying food by the purchase of other food products after selling cowpea seeds, securing food, engaging in other income generating activities such as rearing of small ruminants by women. The example of Minankofa is an illustration of this (Fig. 10.2). As for the youth, the rural exodus to the gold mining sites and the big cities has decreased considerably (Minankofa). Their standard of living has improved. Motorcycles have replaced bicycles as a means of transportation. Their clothing is becoming more and more up to date.

For elderly people, their health status has improved through the increased family income enabling them to seek better health services and eat better, more nutritious foods.

10.12 Sustainability of the Platform

The following are platform activities aimed to contribute to its sustainability: strengthening of funding sources including member annual contributions from seed sales, formalization of the platforms (through legal recognition), and by putting in place a system of mobilization of internal resources (including contributions proportional to seed sales).



Fig. 10.2 (a) Mrs Albertine Dabou, Minankofa (I am owner of sheep through the platform) and (b) Mrs Jandark Coulibaly, Minankofa (I am owner of goats through the platform)

10.13 Reflection on the Process

The importance of the results on the various stakeholders involved is assessed through the increase of the income of producers, the adoption of improved varieties, the increase in production and sales by seed companies (e.g., Zamoho/Koutiala, 6 t in 2017 and 12 t of certified seeds by 2018 plus 1 t of foundation seed), and the strengthening of capacity of foundation seed production in addition to the certified seed (R1) by some professional seed companies through the trainings offered.

10.14 Importance of Results for Communities

- Construction of community store by G.Sem/Minankofa (Fig. 10.3).
- Contribution to food security.
- Wide dissemination of varieties and improved seeds.
- Membership of many women cowpea seed producers (COPROSEM/Dakoumani).
- Involvement of women's groups in the production of cowpea seed, case of Zamoho/Koutiala.
- Tendency for reduction in the area under cotton in favor of cowpea (Zamoho/Koutiala cases).
- Increase in cowpea sole cropping areas.
- Impact on livestock from forage production.
- Positive impact of the small packages “mini sachets” on the accessibility of seed to small producers (Zamoho/Koutiala).



Fig. 10.3 A store for seed to Minankofa for the benefit of the community through the IP; February 2019, Mr Prosperous Traore (hands on the back), Chief of Minankofa village

10.15 Vision of the Future

Strengthening the achievements of the platform by substantial funding, self-reliance (payment of contributions), formalization (legal recognition), a system of mobilization of resources (levy proportional with sales), wide dissemination of improved varieties, adoption capacity building on cowpea processing, and building the capacity of key actors in their activities.

Eventually, field trips for sharing experiences with other platforms in the subregion will be organized.

10.16 Lessons Learned

The development of cowpea sole cropping and the improvement of production and purchase of new assets are visible changes in the community. Cowpea seeds are more expensive than seeds of other crops (millet, sorghum, and corn). The cowpea seed market is irregular and variable. In the villages, weekly fairs and focal points of seed sales in small packages of 1 kg (Fig. 10.4) are key strategies to promote new varieties and facilitate small farmers' access to improved seeds. Demo plots, field



Fig. 10.4 (a) Cowpea seed in small packages of 1 kg for sale; Zamoho, 2018 and (b) sales of cowpea seed in small packages of 1 kg in weekly markets; Zamoho, 2018

days, and the broadcasting of radio programs are three main strategies to popularize cowpea varieties. The tendency for a reduction in the area under cotton in favor of cowpea has been noted in Zamoho/Koutiala zone. Social relationships have been improved by increasing direct contact between producers of associations and groups through the platform. Membership of women in the cooperatives and associations has increased (for example: COPROSEM/Bla, 91 members, including 30 women; G.Sem./Minankofa, 153 members, including 99 women). For the youth, the rural exodus to the gold mining sites and the big cities has decreased considerably (Minankofa). Their standard of living has improved. Motorcycles have replaced bicycles as a means of transportation. The platform ensures greater sharing of information and knowledge between the different actors involved in the cowpea seed value chain.

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Cowpea Innovation Platform Interventions and Achievements in TL III Project in Burkina Faso

11

Batieno Benoit Joseph, Poda Saadon Leandre,
Barry Silamana, Compaore Evelyne, Zongo Hamadou,
Sidibe Hamadou, Gnankambary Karidiatou,
Sanou Ouedraogo Adelaide, and Neya B. James

Abstract

In June 2015, four multi-stakeholder platforms (Sanguie, Zondoma, Soum, and Association Yiye) were established in different regions of Burkina Faso to promote agricultural activities. By 2018, more than 200 farmers had already been trained on different aspects of the cowpea value chain including grain production, storage, and food processing skills. The platforms played a key role in the dissemination of new cowpea varieties through demonstrations, field days, the mass media, and social media. About 160 demonstrations were established by the members of the platforms every year from 2015 to 2018. Each platform was supported to produce 10 ha of certified seeds making a total of 40 ha each year and 160 ha during the four-year period. Due to the demand for foundation seeds that was increasing year after year in Burkina Faso and the inability of INERA to produce enough seeds, the most successful platform members were contracted by the INERA Seed Unit to produce foundation seeds in order to meet the high demand in the country for certified seed production. Although there are no official statistics about certified seeds produced in Burkina Faso in terms of demand, recent happenings have shown their increased production. For instance, in 2018 about 1000 tons of certified seeds were produced compared to previous years which had less than 700 tons.

Keywords

Cowpea · Multi-stakeholder platforms · Burkina Faso · Technology dissemination · Mass media · Social media

B. B. Joseph (✉) · P. S. Leandre · B. Silamana · C. Evelyne · Z. Hamadou · S. Hamadou · G. Karidiatou · S. O. Adelaide · N. B. James
Institut de l'Environnement et de Recherches Agricoles (INERA),
Ouagadougou, Burkina Faso

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11.1 Introduction

Cowpea is one of the most important and widely cultivated legumes in the world particularly in Africa (Verdcourt 1970). The development of new varieties in Burkina Faso is basically ensured by INERA, which is a public institution. According to Tignegre (2010) and Batiemo (2014), the low adoption rate for new varieties is due to the fact that the end-user preferences were not taken into account during the process of variety development. On the other hand, there is low adoption of the new varieties that were developed after taking the farmers' preferences into account. This arises from farmers' inability to have access to adequate quantities of the new improved varieties owing to poor commercialization networks, lack of performing seed companies, or poor production resulting from inadequate agronomic production packages or post-harvest losses from insect pests and poor storage conditions. Despite the fact that farmers recognize the importance of high-quality seeds, the seed sector in Burkina Faso continues to face numerous problems even with the interventions made by the Government and donors such as BMGF via the Alliance for Green Revolution in Africa (AGRA) or Tropical Legumes (TL III). The uptake of improved varieties by the resource-poor farmers is inhibited by the cost of seeds and by the less than perfect channels of communication between them and the breeders/seed producers. INERA is the mode of acquisition of the new varieties through its demonstration (demo) plots, Government-supported agricultural extension services, and NGOs.

11.2 Objectives of the Platform

The platforms were created to constitute a framework for consultation and exchange of experiences around the cowpea value chain. It is an approach that connects all value chain actors in the cowpea industry and all the activities required for the realization of innovation by a group of individuals or representatives of institutions that interact according to rules set by themselves to fulfill a common function. The key objectives are to: (1) increase the capacity to manage and use existing knowledge to innovate, and (2) build individual and/or institutional capacity and integrate cowpea research with other actors in society to produce good quality seed. In this sense the actors cooperate, communicate, interact, and share objectives to collectively support the processes of development while making use of the innovations of a value chain.

11.3 Establishment of the Platform

Year of the establishment (for each platform)

Four different platforms were established between 2016 and 2018 in different regions of Burkina Faso. The platform of Sanguie was the first to be established on 24/25 May 2016; it was followed by the platform of Soum on 6/7 June 2016. The platform of Zondoma was set up a few days later on 9/10 June 2016. The Association

Yiye was the last to be established on 12/13 June 2018. The number of men and women in the platforms grew from year to year (Table 11.1).

11.4 Overall Process of Platform Establishment

Innovation platforms were established in a province of the different regions concerned. This implementation was carried out in the presence of producers and processors, members of the Steering Committee, as well as certain provincial officials. A research team is also present during the installation of the various platforms. After being made aware of their different responsibilities the members of the Steering Committee were officially installed by the provincial administrative authorities.

11.5 Composition, Roles, and Responsibilities of the Platform Members

The Burkina Faso cowpea platforms are multi-stakeholder in nature, consisting of researchers, seed producers, grain producers, food processors, agro-input dealers, community local authorities, microfinance institutions, and representatives of the Ministry of Agriculture—each of them with defined functions and responsibilities as outlined in Table 11.2.

11.6 Platform Activities

The platform activities are planned every year by the governance body. A special review and planning meeting (RPM) will be convened by each governance body under INERA coordination. During this RPM members will present the results of

Table 11.1 Number of members in the platforms from 2015 to 2018

| 2015 | 2016 | 2017 | 2018 |
|---------------------|----------------------|----------------------|----------------------|
| 264 (m: 200; f: 64) | 558 (m: 357; f: 201) | 888 (m: 616; f: 272) | 968 (m: 580; f: 388) |

Table 11.2 Roles and responsibilities of different stakeholders participating in platform activities

| Stakeholders | Roles and responsibilities |
|---|---|
| Researchers | Coordination, technology diffusion, capacity building |
| Seed producers | Make the seeds available for farmers |
| Grain producers | Produce for consumers |
| Agro-dealers | Provide inputs (insecticides, herbicides, and fertilizers) |
| Local authority | Facilitates cohesion between the different actors |
| Microfinance | Facilitates availability of finance to producers |
| Representative of Ministry of Agriculture | Extension agents |
| Food processors | Transform cowpea into different sub-products (value addition) |

the past year for demo plots, field days, seed production, and quantity of seeds sold, and quantify the amount of support received from the project. After the review, the activities for the next year will be planned. The members will identify the activities to be conducted, identify training themes, and identify people who should be trained under the topics prioritized. The main challenge is implementation of the many different agreements with partner members, proper use of financial resources from seeds sold to sustain more production, and the absence of a smooth flow between different links in the chain. These challenges served as a justification for developing a Managerial Guide document for all members of the platforms with highlights on training sessions that include implementation of demo plots, production of cowpea seeds, and production of cowpea grain. Best practices for soil fertilization were also taught to the different members of the platforms. The members learned how to identify different diseases on cowpea and how to deal with them. Platforms also facilitated the dissemination of new varieties of cowpea through the implementation of demo farms and also field days. During these field days participants are asked to give their opinion on the different varieties involved, to choose the best varieties, based on their own criteria, and play a key role in giving names to the different varieties that will be released.

The best farmers among the members were chosen to sign contracts with INERA in the production of foundation seeds. We also involved the different platforms in the production of certified and quality declared seeds (QDS).

11.7 Facilitation of Platform Activities, Including Meetings

11.7.1 Description of How the Process Was Led and Which Actor Helped Platform Members to Implement Their Activities

Each platform has a scientist from INERA who is responsible for technical and financial support where it applies, ensures that all the other activities are executed as planned, and holds discussions with other members of the governance body to prepare meetings and field days and collect information. The local authority helps in facilitation including availability of agricultural inputs while the agricultural extension officers work directly with farmers to ensure that recommended production packages are correctly applied.

11.7.2 Use of Democratic Tools and Mechanisms to Enhance Stakeholder Participation

Meetings are planned by the governance body and each member of the value chain will participate and share information with the members of its link in the chain. For example, the stakeholder representing other seed producers will participate and share information with them.

11.8 Achievements of the Platform

The important achievement is the reinforced connection and trust built between extension services and small-scale farmers. Other important achievements facilitated by the platform include specialization of farmers in specific areas such as traders, processors, grain producers, and seed producers. A case study was conducted at Gourcy MSP through two focus group discussions with cowpea farmers, 12 females and 12 males, who have benefited from the project's seed dissemination schemes. A mixed methods research design was used starting with two separate discussion groups, male and female. Key informant interviews were held with two extension agents (one male and one female), two male seed producers, two females and two males from the multi-stakeholder platform, and a random sample survey of 200 respondents from five Gourcy communes. The sample size of 200 respondents was composed of 100 females and 100 males. In each commune 20 female respondents and 200 males were selected for the survey in each commune. The respondents were selected randomly with the help of the extension agents. In addition, a survey study was carried out of 200 respondents made of 100 females and 100 males that have actively participated in the project activities in the MSP. A structured questionnaire was designed for this survey. The questions that were used collected the quantitative data that quantified the qualitative data. The results of the questionnaire surveys were analyzed with SPSS and Stata software by using unpaired t test.

11.9 Achievements in Access to Improved Cowpea Varieties by Gender

The survey revealed that an average of 89% of the respondents have access to improved seeds. The level of access represents 88% for men and 90% for women, thus women have more access to improved cowpea seeds than men. This is due to different interventions of the Government, Projects, and NGOs in the area (Table 11.3).

About 80% of the producers surveyed have access to the improved variety Komcallé. It is also the most cultivated variety in the area where 81% of women have access to this variety compared to 79% of men. Access to improved seeds of Tiligré was 42% overall by men and women.

Table 11.3 Access to improved varieties of cowpea

| Do you have access to improved varieties of cowpea? | Gender | | Mean |
|---|--------|--------|------|
| | Male | Female | |
| Yes | 88 | 90 | 89 |
| No | 12 | 10 | 11 |
| Total | 100 | 100 | 100 |

Table 11.4 Access to the improved varieties of cowpea Komcallé and Tiligré by gender

| Access to improved varieties of cowpea | Sex | | Chi square |
|--|------|--------|------------|
| | Male | Female | |
| Yes | 88 | 90 | 0.2043 NS |
| No | 12 | 10 | |
| Total | 100 | 100 | |

NS not significant

Table 11.5 Chi square test of the acquisition mode of improved varieties of cowpea

| Mode of acquisition to improved varieties of cowpea | Komcallé improved seeds | | | Tiligré improved seeds | | |
|---|-------------------------|--------|------------|------------------------|--------|------------|
| | Male | Female | Chi square | Male | Female | Chi square |
| Purchase | 46 | 18 | 28.4018*** | 15 | 3 | 13.6127*** |
| Savings | 2 | 3 | | 0 | 1 | |
| Donations | 12 | 41 | | 17 | 31 | |
| Subsidies | 20 | 23 | | 10 | 7 | |

*** significant at 1%

The study revealed that there was no significant difference between men and women for access to all four improved varieties. Quantities available are not enough to meet the demand for seeds. Women have more access to improved cowpea seeds than men, though the difference was not significant. One extension agent said, “I received only 1250 kg of seeds this year (2018) for the whole province of Gourcy and because of that we favoured women during seed distribution.” (Table 11.4)

The main modes of acquisition of seeds of improved cowpea variety Komcallé are by purchase (38.8%), donations (32.10%), and subsidies (26.10%). Men (57.50%) buy more improved varieties than women (21.20%). Women receive more donations than men (48.20% vs 15%). Women benefit more from subsidies than men (27.10% vs 25%). The main acquisition methods for seeds of the improved seeds of the Tiligré variety are mainly donation (57.10%) followed by purchase (21.40%) and the grants (20.20%). About 73.80% of the women acquire the variety Tiligré by donation, while 40.50% of the men acquire it through this channel. 35.70% of men and 7.10% of women acquire Tiligré seeds through purchase. Men (23.80%) are much more subsidized than women (16.70%) for the Tiligré variety.

The Chi square test showed that there is a significant difference between men and women at the 1% level for Komcallé and Tiligré varieties (Table 11.5).

11.10 Sources of Seeds for the Improved Varieties Komcallé and Tiligré Disaggregated by Gender

The Government is the main supplier of seed of the improved variety Komcallé and 62.40% of producers obtained the Komcallé variety from the Government through the agricultural extension services in the province, while 71.8% of women obtained Komcallé through this channel compared to 52.50% for men. The second important

Table 11.6 Origin of the improved cowpea variety Komcallé and Tiligré by gender in percentages

| Origin of the variety | Variety Komcallé | | | Variety Tiligré | | |
|-----------------------|------------------|--------|-------|-----------------|--------|--------|
| | Gender | | Mean | Gender | | Mean |
| | Male | Female | | Male | Female | |
| State/government | 52.50 | 71.80 | 62.40 | 46.50 | 23.80 | 35.30 |
| NGO/project | 18.80 | 15.30 | 17.00 | 23.30 | 28.60 | 25.90 |
| INERA/TLIII | 28.80 | 10.60 | 19.40 | 25.60 | 47.60 | 36.50 |
| Savings | | 2.40 | 1.20 | 4.70 | | 2.40 |
| Total | 100 | 100 | 100 | 100.00 | 100.00 | 100.00 |

Table 11.7 Origin of improved varieties of cowpea by gender according to Chi square

| Origin of improved cowpea seed | Komcallé variety | | | Tiligré variety | | |
|--------------------------------|------------------|--------|------------|-----------------|--------|------------|
| | Male | Female | Chi square | Male | Female | Chi square |
| State/government | 42 | 61 | 11.6319*** | 20 | 10 | 8.1174** |
| NGO/project | 15 | 13 | | 10 | 12 | |
| INERA/TLIII | 23 | 9 | | 11 | 20 | |
| Savings | 0 | 2 | | 2 | 0 | |

NS not significant

significant at 5%; *significant at 1%

source of varieties is INERA/TL III where 19.40% of producers used INERA/TL III varieties mainly through demo tests. 28.80% of men obtained their supplies through INERA/TL III as well as 10.60% of women. NGOs/Projects are the third supplier of the improved variety Komcallé; indeed 19.40% of the producers' source of the variety Komcallé was through NGOs/Projects. 18.80% of the men obtained seed supplies from the NGOs/Project and 15.30% of women for the variety Komcallé. For Tiligré, 35.30% of cowpea farmers received seed from the Government against 25.90% from NGOs/Projects and 36.50% from INERA/TLIII. 46.50% of men bought from the State against 23.8% for women. 47.60% of women purchased from INERA/TL III against 25.60% of men. 36.50% of the producers acquired the variety Tiligré through INERA/TL III, while 35.30% of the women got their supplies from the extension services. 46.50% of the men bought from the extension services, while 47.60% of the women got their supply through INERA/TL III (Table 11.6).

Chi square tests show that there is a significant difference between men and women for seed origin. For the Komcallé variety the significance is 1%, while for the Tiligré variety the significance is 5% (Table 11.7).

11.11 Gender Factors Influence on Access to Seeds of Improved Varieties in Gourcy

A focus group survey was conducted to investigate factors influencing access to improved cowpea varieties, freedom of mobility, the right to buy improved seeds, access to transportation, land, extension services, information about and management of family revenue. The results are explained below and summarized in Table 11.8.

Table 11.8 Gender factors affecting access to improved seeds at Gourcy

| Gender factors | | Men | Women | Chi square |
|--|------------|-----|-------|------------|
| Freedom of mobility | Yes | 78 | 66 | 3.5714* |
| | No | 22 | 34 | |
| Woman's right to buy improved seeds without her husband's advice | Yes | 71 | 56 | 4.8538** |
| | No | 29 | 44 | |
| Decision-making on the choice of the cowpea variety to be produced in the family | Woman | 5 | 7 | 1.4690NS |
| | Man | 42 | 44 | |
| | Jointly | 52 | 49 | |
| | Others | 1 | 0 | |
| Main means of transportation | Foot | 11 | 39 | 43.6544*** |
| | Bicycle | 51 | 57 | |
| | Motorcycle | 35 | 4 | |
| | Others | 3 | 0 | |
| Possession of radio or television set | Yes | 87 | 51 | 30.2945*** |
| | No | 13 | 49 | |
| Management of the revenue from cowpea sales | Husband | 62 | 29 | 37.0903*** |
| | Woman | 3 | 33 | |
| | Jointly | 35 | 38 | |
| Can a woman contact an extension agent without the consent of her husband? | Yes | 73 | 61 | 3.2564* |
| | No | 27 | 39 | |
| Does the woman have enough time to take care of her individual field? | Yes | 92 | 70 | 15.7245*** |
| | No | 8 | 30 | |
| Does access to women's land limit access to cowpea improved seeds? | Yes | 83 | 64 | 9.2671*** |
| | No | 17 | 36 | |
| Is the land used by women adapted to cowpea cultivation? | Yes | 93 | 82 | 5.5314** |
| | No | 7 | 18 | |

***significant at 1%; **significant at 5%; *significant at 10%

11.12 Liberty of Mobility

The Chi square test shows that there is a significant difference between men and women compared to mobility at the 10% threshold. The focus group interviews actually confirmed these results in that the woman cannot move like the man. Her husband's permission is needed to avoid misunderstandings between the couple (Table 11.8).

11.13 Women's Right to Buy Improved Seed Without Their Husband's Consent

The results of the Chi square test show that there is a significant difference between the perception of the man and the woman on the right of a woman to buy improved varieties of cowpea without the advice of her husband. This is significant at the 5%

level. Focus group interviews showed that the woman must first seek her husband's advice before buying the improved cowpea varieties because it is the husband who gives the plot of land to the woman or who helps her to acquire the land. It is the husband who is the head of the family and has the power of decision.

11.14 Decision-Making About the Choice of Cowpea Variety to Produce in the Family

This variable is not statistically significant according to the Chi square test. Interviews at the focus group discussion showed that the decision to choose the cowpea variety to be produced varied from household to household. The decision was most often made by the husband; for some cases it is a joint decision. However, in a situation where the man is incapacitated, the woman the responsibility to choose the variety because she is in charge of preparing the meals. A number of characteristics (flavor, energy use for cooking, conservation, ease of transformation, etc.) are taken into account in making the decision.

11.15 Main Means of Transportation

The main means of transportation is a variable that is statistically significant at the 1% level. This means that there is a significant difference between men and women on their main mode of transportation. The means of transport is an important element for transporting products from the field to the home and from the home to the market. The results of the focus group interviews confirmed this difference between men and women. This fact certainly had an impact on access to improved cowpea seeds.

11.16 Possession of Radio or Television Set

Possession of a radio or television set can provide access to seed information. The results of the Chi square test show that there is a significant difference between men and women on the possession of a radio or television set at the 1% threshold. Focus group interviews confirmed this difference.

11.17 Management of the Revenue from Cowpea Sales

The management of revenues from the sale of cowpea based on the results of the Chi square test is statistically significant at the 1% threshold between men and women. This means that there is a significant difference between men and women. The interviews showed that the men who are the heads of families managed the income from the sale of cowpea. Sometimes the husband consults the woman on the management of this income. Management is rarely entrusted to women according to discussion results.

11.18 Contacts Between Women and Agricultural Extension Agents

The results of the Chi square test show that there is a significant difference (10%) in the responses of men and women on contacts between women and extension agents. The results of the interviews show that women prefer to seek the advice of their husbands before contacting the agriculture officer because this contact can be misinterpreted. A large number of men think that, out of respect for the husband, the wife must inform her husband.

11.19 Does the Woman Have Enough Time to Take Care of Her Individual Field?

The Chi square test results showed that there is a significant difference between the responses of men and women at the 1% level. The results of the focus group discussions show that women are overworked by housework as well as by work in the common field which means that they do not have enough time to properly maintain their individual fields.

11.20 Does Access to Women's Land Limit Access to Cowpea Improved Seeds?

The results of the quantitative surveys show that there is a significant difference in perceptions between men and women about women's access to land and access to seeds of improved cowpea in particular and improved seeds in general. This difference is significant at the 1% level according to the Chi square test results. During the interviews it was noted at the level of the women's group that land granted to women is small. However, men qualified this discrepancy by saying that the problem of land is general and concerns both women and men.

11.21 Is the Land Used by Women Adapted to Cowpea Cultivation?

The results of the Chi square tests show that there is a significant difference at the 5% threshold between the perceptions of men and women on the adaptation of land granted to women for cowpea production. The interviews revealed that the women's group felt that the land they are given is small and less fertile. The men think that there is more arable land and that the problem concerns both men and women.

The results in Table 11.9 show that the age of producers varies by gender. In fact, the average age of men is 47.42 years, while that of women is 44.47 years. In other words, on average, the men in the sample are older than the women by 2.5 years. There is a significant difference at the 10% threshold for men to be older than the

women in the sample. The average age for all producers combined is 45.9 years. The number of people per household by gender (household size) is the people who live with the producer and share the same roof.

The experience of the cowpea producer by gender showed that men are more experienced and older in cowpea production in the area. Indeed, men have 16.61 years of experience on average against 14.07 years for women. The average number of years of experience is 13.65 years. There is a significant difference between men and women in terms of experience in cowpea production at the 5% threshold as shown in Table 11.6.

In terms of area covered by cowpea, the results showed that men exploit larger areas of cowpea regardless of variety than women. In fact the average surface area for men is 1.075 ha and women is 0.81 ha. The areas under improved varieties of cowpea are always greater for men (0.74 ha) than for women (0.5 ha). There is a highly significant difference at the 1% level as shown in Table 11.6.

Distance between Improved Cowpea Variety Selling Point and the Closest House by Gender The results show that the average distance between the place of sale and distribution of improved varieties is 16.7435 km for any class of producers. However, women travel shorter distances to acquire improved cowpea seeds. This distance would be 14.93 km for women, while men travel an average of 18.557 km. Note that this distance is not statistically significant.

Quantity of Komcallé Seeds per Producer by Gender Of the improved varieties of cowpea, Komcallé is the most available. The average quantities used per producer is 8.86 kg. The average amount used by men (9.89 kg) is greater than the amount used by women (7.92 kg) and this difference in quantity is statistically significant between men and women according to the results in Table 11.6.

Quantity of Tiligré Seed per Producer by Gender The second most available variety is Tiligré. The average quantity by farmers is 4.212 kg. This quantity is higher for men (4.795 kg) as compared to women (3.634 kg). However, there is no statistical difference in quantity between the two groups as shown in Table 11.6.

Quantity of Cowpea Produced and Sold by Gender The quantity of cowpea produced and sold was estimated using 100 kg bags during the survey. The overall quantity of cowpea produced on average by men is 5.36 bags of 100 kg and by women 3.567 bags of 100 kg. The average quantity per producer regardless of sex was 4.463 bags of 100 kg. The analysis showed a significant difference between men and women in terms of production. The quantity sold also varied by gender. Men sold, on average, 3.8675 bags of 100 kg of cowpea, while women sold 2.53325 bags of 100 kg. The quantity sold, on average, was 3.2 bags of 100 kg of cowpea as a whole, regardless of variety and sex.

Capacity for Buying Seeds if all Improved Cowpea Varieties are available by Gender The potential purchase of improved variety seeds is on average 8.64 kg. The potential capacity of purchasing seeds varies by sex and is, respectively, 6.76 kg for women and 10.52 kg for men. The analysis showed a difference between men and women that is statistically significant (Table 11.9).

This study conducted in five communes of Gourcy using the mixed method revealed that there is no significant difference between women and men for accessing improved cowpea varieties. The main modes of acquisition of improved cowpea varieties in this zone are purchase (38.80%) and donation (32%). Women are the main beneficiaries of donations (48.2% of women vs. 15% of men). TLIII Multi

Table 11.9 Socioeconomic characteristics of farmers surveyed by gender

| Variables | Male | Female | Average of males and females | Difference | T-stat | P-value |
|---|---------|--------|------------------------------|------------|--------|-----------|
| Age (years) | 47.4 | 44.5 | 45.9 | 2.95 | 1.9594 | 0.05115* |
| Number of years of experience in cowpea production | 16.6 | 14.1 | 15.3 | 2.54 | 2.0749 | 0.0393** |
| Number of people per household | 14.4 | 12.9 | 13.7 | 1.56 | 1.0226 | 0.3077 |
| Total area owned (ha) | 5.77 | 2.64 | 4.20 | 3.13 | 7.144 | 0.0000*** |
| Total area planted (ha) | 3.56 | 1.70 | 2.63 | 1.86 | 8.534 | 0.0000*** |
| Area covered by cowpea (ha) | 1.08 | 0.81 | 0.94 | 0.26 | 2.5954 | 0.0102** |
| Area covered by improved cowpea (ha) | 0.74 | 0.50 | 0.62 | 0.24 | 3.0077 | 0.0030*** |
| Distance between improved cowpea variety selling point and the closest house (km) | 18.6 | 14.9 | 16.7 | 3.63 | 1.3447 | 0.1802NS |
| Quantity of Komcallé seed per producer (kg) | 9.89 | 7.92 | 8.86 | 1.96 | 1.6092 | 0.1096NS |
| Quantity of Tiligré seed per producer (kg) | 4.80 | 3.63 | 4.21 | 1.14 | 0.8597 | 0.3926NS |
| Quantity of cowpea produced (bags of 100 kg) | 5.36 | 3.57 | 4.46 | 1.79 | 3.2641 | 0.0013*** |
| Quantity of cowpea sold (bags of 100 kg) | 3.87 | 2.53 | 3.20 | 1.34 | 2.6067 | 0.0098*** |
| Value of cowpea sales in FCFA | 127,349 | 73742 | 100545.5 | 53607 | 2.0085 | 0.0459** |
| Capacity for buying seed if all improved cowpea varieties are available by gender | 10.52 | 6.76 | 8.64 | 3.76 | 3.3712 | 0.0009*** |

*** significant at 1%; ** significant at 5%; * significant at 10%; NS not significant

stakeholders' platform (MSP) method served as the second way to access cowpea seeds as a direct contribution from demos and local seed production. Gender factors affecting access to improved varieties of cowpea are freedom of movement, the women's right to buy improved seeds without her husband's advice, the main means of transportation, the possession of radio or television set, the management of the revenue from cowpea sales, the obligation for a woman to obtain the consent of her husband to contacting an extension agent, the lack of enough time for women to take care of their individual fields, and so on.

11.22 Reflections on the Process

11.22.1 Areas to Focus on in the Future

The main issues the platform has not been able to handle so far should be given due attention by future interventions (e.g., get back again on how to enhance sustainability of the platforms).

- We should think again our way of supporting these platforms so they can be less dependent on the support that the project is giving. Even if some few people can stand alone, most of the producers are dependent on the project and do not really know the opportunities that these platforms offer.
- In some of the platforms, communication between the different members of the platform was a serious issue and this shall be addressed to make the platform perform better.

11.23 Lessons Learned

Highlights of Key Achievements

- Made the newly released varieties of cowpeas more popular.
- Increased the adoption rate of improved cowpea varieties.
- Demo trials were very successful in introducing new varieties to the community.
- Provided opportunities to highlight success stories while identifying successful producers.

Three major lessons learned

1. A great opportunity is offered to all the actors working on the platform to make profit from their activity.
2. Land access to women is a challenging issue that needs addressing.
3. Most members of the platform are too dependent on the project. This is not good for sustainability.

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Impacts of Cowpea Innovation Platforms in Sustaining TL III Project Gains in Ghana

12

Julius Yirzagla, Ibrahim K. D. Atokple, Mohammed Haruna, Abdul Razak Mohammed, Desmond Adobaba, Bashiru Haruna, and Benjamin Karikari

Abstract

Over the past decades, farm-level yields of cowpea have remained low (0.6–0.8 t/ha) compared to what is observed on research fields (1.8–2.5 t/ha). Lack of farmer access to quality seeds of improved varieties and inappropriate cultural practices are the major factors responsible for the low productivity of the crop. The use of Innovative Platforms (IPs) as a strategy to facilitate farmer access to quality seeds was, therefore, considered under the Tropical Legume (TL) III and USAID Cowpea Outscaling projects in Northern Ghana. The platform activities started in 2016 with a total membership of 100, which increased steadily to 820 by December 2018. The research team of the Council for Scientific and Industrial Research-Savannah Agricultural Research Institute (CSIR-SARI) trained platform members to produce certified seeds to be supplied to target communities, thereby enhancing smallholder farmers' access to improved varieties. A total of 1848 members of the platform were trained in various farm operations. A revolving system was set up in which each farmer group was supplied with improved seed and after harvesting returned the equivalent of seed received to the platform. Having been trained to produce their own seed, members of the platform are self-reliant in acquiring improved seed and are actively engaged in various operations that sustain the gains of the two projects that have been phased out.

Keywords

Revolving system · Stakeholder · Actors · Facilitate access · Strategy

J. Yirzagla (✉)
CSIR-SARI, Bawku, Ghana

I. K. D. Atokple · M. Haruna · A. R. Mohammed · D. Adobaba · B. Haruna · B. Karikari
CSIR-SARI, Tamale, Ghana

12.1 Introduction

In northern Ghana, cowpea is the second most important legume crop after groundnut. Its importance in food and soil fertility enhancement cannot be over-emphasized. The potential yield of cowpea is around 1.8–2.5 t/ha but current average yields are in the region of 0.6–0.8 t/ha (SARI 2008). Over the past decades, on-farm yields of cowpea per unit area have remained low (0.6–0.8 t/ha) compared to yields observed on research fields (1.6–2.5 t/ha). Lack of farmer access to high-yielding varieties, biotic and abiotic stresses, and inadequate cultural practices are the major factors responsible for the low productivity of the crop. The Savannah Agricultural Research Institute of the Council for Scientific and Industrial Research (CSIR-SARI), with support from the International Institute of Tropical Agriculture (IITA) has, therefore, developed and released several improved cowpea varieties with the aim of reducing poverty and malnutrition among smallholder farmers in Northern Ghana. Diagnostic surveys, however, show that rural farmers do not have access to the improved varieties. The seed industry in Ghana has been privatized and dealers find it unattractive to open sale outlets in the hinterlands (SARI 2009). Research and extension efforts aimed at developing sustainable cowpea seed production, and delivery systems are, therefore, necessary for increased production and productivity in Ghana.

The use of IPs as a strategy to facilitate farmer access to seeds of improved varieties of cowpea was, therefore, considered under the Bill and Melinda Gates Foundation (BMGF)-funded TL III and the USAID Cowpea Outscaling projects in Northern Ghana. An IP is a stakeholder-led body that brings together representatives of the various actors along crop value chains, including seed actors, to create synergies for diagnosing problems (strengths, weaknesses, and threats within existing legume seed systems), exploring opportunities, investigating/testing, and deploying best-bet solutions. The basic principle of multi-stakeholder platforms (MSPs) is to bring together stakeholders for continuous interactions, responding to emerging seed bottlenecks/demands and lesson learning to ensure that seed and non-seed technology development and dissemination take place for the benefit of target communities. It is made up of a group of individuals (who often represent organizations) with different backgrounds and interests. The members come together to diagnose problems, identify opportunities, and find ways to achieve their goals. They may design and implement activities as a platform, or coordinate activities by individual members.

A typical IP comprises members drawn from both the public and private sectors including public agricultural research institutions (NARS/CGIAR), seed producers (companies and individual entrepreneurs), agro-dealers for seed supplies and complementary inputs, farmers, business organizations, extension service providers, national seed authorities/certifying agencies, representatives of farmers, nongovernmental organizations, faith-based organizations, and other service providers. The interactions in the IP should be motivated by the common interests of members that ensure the development of sustainable seed systems that meet the needs of different actors.

Under the TL III and USAID partnership, four IPs were established; one each in Navrongo in the Upper East Region, Wa in the Upper West Region, and Walewale and Savelugu in the Northern Region. The aim of establishing these IPs was to bring together stakeholders for continuous interactions and to respond to emerging seed bottlenecks and demands, to ensure that seed and non-seed technology development and dissemination take place to the benefit of target communities. The objective of this write up is to share the experiences especially those of Navrongo IP in facilitating the access of smallholder farmers' to improved cowpea seed.

12.2 Establishment of the Navrongo IP

In the year 2011, a rice-based IP was set up in Navrongo in the Upper East Region by CSIR-SARI scientists under the AfricaRISING Project. With the commencement of TL III project activities in 2015, this rice-based IP served as a suitable entry point for mainstreaming cowpea activities to form the cowpea IP. The research team from CSIR-SARI under the TL III project interacted with the executives and the entire membership of the IP during which issues of mainstreaming cowpea activities were discussed. The issues bordered on identification of bottlenecks in the cowpea value chain, identification of the status of seed systems, variety demand, identification and setting joint goals/results, and definition of partners' roles and responsibilities. Other issues discussed included how to carry out activities to strengthen the capacity of platform members, e.g., training in seed production and business management and promoting linkages. Following consensus by members, the idea of incorporating cowpea activities into the existing IP was adopted on 2nd March 2016, which brings the total memberships to 100. The research team met regularly with the executives to review and plan activities. Membership increased steadily between 2016 and 2018 from 100 to 820 (Table 12.1). Some members have been linked to Heritage Seeds Company (HSC), a private seed company that runs an outgrower scheme. As a result, HSC expanded her outgrower scheme from a membership of 208 farmers to 285 within the period (2016–2017). The company has a seed processing unit and now serves as a major off-taker (market access) of the farmers' produce. This linkage, which has increased the demand for cowpea seed (market access) for the platform members, was achieved through the partnership between TL III and the USAID Cowpea Outscaling Project (COSP).

Table 12.1 Membership of Navrongo IP as at December 2018

| IP members | Year | | | |
|----------------|------|------|------|-------|
| | 2016 | 2017 | 2018 | Total |
| Men | 50 | 207 | 370 | 370 |
| Women | 42 | 103 | 292 | 292 |
| Youth under 35 | 8 | 70 | 158 | 158 |
| Total | 100 | 380 | 820 | 820 |

12.2.1 Composition, Roles, and Responsibilities of the Platform Members

The Navrongo platform is composed of farmers, input dealers, transporters and other services, financial institutions, extension agents, research institutions, policy makers, and retailers/consumers. Their roles and responsibilities are stated in Table 12.2.

An executive board was set up comprising the Chairman, Vice Chairman, Secretary, Assistant Secretary, Financial Secretary, Treasurer, and Organizer to oversee the day-to-day activities and administration of the IP. Among others, the board ensures the following:

- Foster dialogue and understanding among stakeholders and provide a space for them to create a common vision and mutual trust.
- Enable partners to identify the bottlenecks hindering innovation and develop solutions beyond what individual actors can achieve alone.
- Create motivation and a feeling of ownership of the solutions that members have developed.
- Facilitate upward communication which enables weaker actors (such as small-scale farmers) to express their views on an equal basis with the more powerful actors.

The individual roles assigned to the board members to achieve these tasks are as follows:

Chairperson Oversees the day-to-day functions and activities of the platform, presides over all meetings and related programs of the platform, and delegates power to other board members when necessary.

Table 12.2 Roles and responsibilities of different stakeholders participating in the platform activities

| Stakeholders | Roles and responsibilities |
|---------------------------------|---|
| Farmers | Problem identification, indigenous knowledge, development of solution, testing and evaluation of solutions, and adoption of solutions |
| Input dealers | Timely delivery of quality and affordable inputs/information |
| Transporters and other services | Guarantee timely service provision |
| Financial institutions | Develop financial products/services that support interventions |
| Extension agents | Provide information on identification, development, and implementation of projects |
| Research institutions | Critical problem analysis, provide solution to the problem, conduct new research where necessary |
| Policy makers | Mobilization of farmers, support formulation of appropriate policies |
| Retailer/consumer | Feedback on perception and consumer behavioral change |

Vice Chairperson Takes up the duties and functions of the chairman in the absence of the chairman as well as any other duties assigned by the chairman.

Secretary Responsible for record keeping of proceedings of platform meetings and all correspondences of the platform as well as any other duties assigned by the chairman.

Assistant Secretary Takes up the duties and functions of the secretary in his absence as well as any other duties assigned by the chairman.

Financial Secretary Responsible for recording all financial transactions, financial reporting, and correspondence of the platform, as well as any other duties assigned by the chairman.

Treasurer In charge of all financial transactions such as purchases, fund disbursement, reimbursements, record keeping of financial transactions, as well as any other duties assigned by the chairman.

Organizer Liaises with the chairman and other members of the executive to organize meetings and other platform engagements, procure logistics needed for meetings, as well as any other duties assigned by the chairman.

12.2.2 Platform Activities

Training Platform members were trained through demonstrations and a community seed production scheme on good agronomic practices (GAPs), integrated pest management (IPM), data collection, etc. Men, women, and young seed technicians (NARS, extensions agents, seed companies, etc.) and outgrowers were trained on foundation and certified seed production. Agro-dealers were trained to market cowpea seed through innovative marketing (sale of small seed packets; 0.25, 0.5, 1, 2, 5, 10, and 20 kg) to increase demand and sale of quality seeds. Through training of trainers' workshops on the use of improved integrated production technologies, management practices were promoted to narrow the yield gaps (between farmer field and research field) to enhance cowpea grain and fodder production. Demonstration activities using the best varieties and IPM options were established to reduce yield losses in cowpea cultivation. Training on improved cowpea storage was organized in partnership with Purdue Improved Crop Storage (PICS) project to promote safe storage of cowpea to reduce insect infestation and damage. Processors were also trained on seed processing (cleaning, sorting, grading, packaging), storage, and marketing.

Seed Supply CSIR-SARI was responsible for producing breeder and foundation seeds of identified preferred varieties. Together with seed companies, e.g., HSC, CSIR-SARI produced and supplied foundation seeds to community-based organizations to produce quality declared seed and certified seeds to sell in their communities.

Popularizing Improved Cowpea Seed Through the IP, farmer exchange visits were organized to popularize and expose large numbers of stakeholders to improved cowpea production technologies. The media (print and electronic) were engaged to disseminate information on seed of improved cowpea varieties and production technologies. Promotional material such as production guides, brochures, and flyers were produced and distributed to members.

Sensitization Consumers and households were sensitized on nutritional and health benefits of cowpea consumption. Linkages among cowpea farmers, grain buyers, and processors were facilitated. Policymakers and schools were sensitized on feeding programs related to the nutritional and health benefits of cowpea consumption to advocate for the inclusion of more cowpea in the school feeding programs.

Challenges A major challenge was inadequate agricultural extension staff to effectively manage the on-farm demonstrations. Efforts to secure new available markets for farmers' seeds have been a daunting task within the community.

12.2.3 Facilitation of Platform Activities, Including Meetings

Platform members met regularly (at least once a month) to discuss the focal areas and identify challenges and opportunities. To enhance stakeholder participation, especially for the weak ones, the platform developed a constitution that governs operations. It has rules, regulations, and by-laws that are followed especially during meetings and other engagements of the members. Ground rules were spelled out during meetings to ensure that participants have equal opportunities to contribute actively to the deliberations (Fig. 12.1). This was necessary to minimize marginalization of the weak especially women and the youth.

During decision-making processes, especially pertaining to problem-solving, platform members decide how to solve the problems or take advantage of already identified opportunities and when solutions are identified, they are tested and adapted to ensure that they are effective. The capacities of different actors were strengthened to enable them to solve their own problems. To ensure that platform operations are effective, two project-monitoring reports and quarterly reports were submitted to the project coordination unit at CSIR-SARI.



Fig. 12.1 Meeting of the Council for Scientific and Industrial Research-Savanna Agriculture Research Institute

12.2.4 Achievements of the Platform

Access to Knowledge and Farm Advisory Services In collaboration with the USAID-COSP Project, agricultural extension agents (AEAs) in the IP were trained on pre- and postharvest operations such as quality seed production, GAPs, postharvest handling, pest management and data collection, safe use of agrochemicals, proper identification of maturity periods, and timely harvesting of cowpea using the demonstration protocols. These extension agents in turn trained other platform members (farmers, input dealers, and processors) in the various operations. In all, 346 farmers were trained in 2016, 722 input dealers in 2017, and 1848 processors in 2018, in the various farm operations (Table 12.3). Another area of access to knowledge and farm advisory services was through demonstration fields which were used as a strategy to keep the stakeholders abreast of cowpea production technologies. These included GAPs, IPM, PICS storage, and nutritional issues. The practical demonstration training covered all production stages: land preparation, planting, crop management, harvesting, and storage. The quality seed production training was carried out with resource persons from the Ghana Seed Inspection Directorate of the Ministry of Food and Agriculture (MOFA).

In addition, radio jingles developed by Farm Radio International (FRI), in collaboration with local FM stations, also offered access to knowledge and farm advisory services on cowpea storage in local languages (Dagbanli and Dagare), and promoted knowledge of improved cowpea storage. The FRI radio program helped to sensitize households on nutritional and health benefits of cowpea consumption, reaching out to over 14,000 beneficiaries. Sensitization of farmers on improved high-yielding varieties of cowpea for increased productivity of smallholder

Table 12.3 Training of IP members disaggregated by sex and by types of training, 2016–2018

| Type of training | Sex | | Total | Sex | | Total | Sex | | Total |
|---|------|------|-------|------|------|-------|------|------|-------|
| | M | F | | M | F | | M | F | |
| | 2016 | 2017 | | 2018 | 2018 | | 2018 | 2018 | |
| Stakeholders | | | | | | | | | |
| Good agronomic practices | 54 | 46 | 100 | 180 | 50 | 230 | 260 | 230 | 490 |
| Integrated pest management | 50 | 48 | 98 | 113 | 102 | 215 | 302 | 178 | 480 |
| Quality seed production | 44 | 34 | 78 | 90 | 50 | 140 | 215 | 185 | 400 |
| Postharvest handling | 34 | 33 | 67 | 91 | 44 | 135 | 240 | 230 | 470 |
| Training of trainers on data collection | 2 | 1 | 3 | 1 | 1 | 2 | 5 | 3 | 8 |
| Total | 184 | 162 | 346 | 475 | 247 | 722 | 1022 | 826 | 1848 |

households was promoted through field days and mass media engagement. Field days were carried out at least two times in each participating community. The media: Ghana News Agency (GNA), Ghana Broadcasting Corporation (GBC), and FRI were engaged to popularize the improved cowpea varieties. The training opportunity for platform members, field days, and media engagement have enhanced their access to knowledge and farm advisory services (Quarterly bulletin 2017).

Access to Improved Seed and Other Inputs To facilitate access to improved seed and other inputs, foundation seed and quality declared seeds were supplied by the SARI research team through MOFA to platform members for the production of grain and quality declared seed. To ensure sustainability, plans are underway for SARI to supply the foundation seed to seed companies such as HSC and members of the platform who will sell certified seed to farmers for the production of QDS. Improved farmer-preferred, high-yielding pest and disease-tolerant varieties of cowpea identified and produced by CSIR-SARI were Songotra, Apagbaala, Padituya, Zaayura, Wang Kae, Kirkhouse Benga, Difeele, and Zaayurapali. Through training of trainer (ToT) workshops by extension staff of MoFA, the capacity of male and female farmers was strengthened in the production of cowpea seeds. Community seed fields were established alongside demonstration fields that showcased GAPs of cowpea production, spraying regimes, and use of host-plant resistance to control *Striga gesnerioides* in the target communities. Farmer Field Schools (FFSs) were used to train farmers on these technologies. With the increased (45%) availability and awareness of seeds of improved cowpea varieties, the overall acreage grown to improved seed by farmers increased by 37% in the target communities. This has offered opportunity even to non-member farmers to access seed through platform members. This has enhanced smallholder farmer access to improved cowpea seeds over time including non-members of the IP (Table 12.4). To disseminate the improved varieties widely, a revolving system was set up in which each farmer group was supplied with improved seed the equivalent of which would be returned to the platform after harvesting. In the following year, new groups were identified for the revolving system. Each community mobilized agents to follow-up for seed recovery. This arrangement ensures an average supply of 900 kg annually to the platform. Having been trained to produce their own seed, members of the

Table 12.4 Farmers' access to seed of improved cowpea varieties and total area grown to improved cowpea during the 2016, 2017, and 2018 cropping seasons

| Variable | Year | | | | Total |
|----------------------------------|----------------------|------|------|------|-------|
| | | 2016 | 2017 | 2018 | |
| | Number of farmers | | | | |
| | No. | 100 | 230 | 490 | 820 |
| Access to improved seed | Before IP membership | 15 | 50 | 200 | 265 |
| | After IP membership | 85 | 180 | 290 | 555 |
| Land area grown to improved seed | Before IP membership | 10 | 76 | 150 | 236 |
| | After IP membership | 90 | 154 | 340 | 584 |

N number of respondents

platform were self-reliant in acquiring improved seed and were actively engaged in various operations that sustain the gains of the two projects that have been phased out (DGIC 2001).

Access to New Markets and Finance Services To expand market access for platform members, SeedPAG established linkages with some agro-dealers (e.g., Simple Prince Enterprise in Bolgatanga) which served as off-takers of quality declared and certified seeds produced by members of the platform. SeedPAG also contracted the Plant Protection and Regulator Services Directorate (PPRSD) of MoFA to manufacture and supply 16,050 pieces of the packaging bags under the innovative marketing scheme to create demand for improved seed. Besides agro-input dealers, open market, community members, and seed companies are the major off-takers of the cowpea produced by members. An average of 930 kg (representing 50%) of seeds produced by platform members was sold in small packs (0.5, 1, 2, 5 kg) in 2016 with the percentage progressing to 100% by the end of project (2018). Within this period, almost 180 small packs of various sizes were sold, which benefitted more than 300 farmers from the innovative marketing scheme. This increased affordability and expanded the access of smallholder farmers to improved quality of cowpea seed. Radio broadcasts, agricultural shows and seed fairs were employed to market seed in small packets. The inclusion of a financial institution in the membership of the platform enhanced the access of members to credit facilities from financial institutions. This afforded some members the opportunity to secure credit to expand their cowpea fields for increased production and productivity.

Social Assets, Gender Equality, and Youth Other areas of achievement include areas of social assets, gender equality, and youth participation. Through sensitization workshops organized for platform members and other educational campaigns and for a women farmers in the platform now have equal access to agricultural lands and other social assets. Women hitherto did not contribute to discussions at gatherings even if they had useful contributions to make. It was considered disrespectful on the part of women to make a submission in a gathering involving both sexes, especially in the presence of their spouses. The youth as well could not make any submission at meetings except through an adult member. These were some of the social restrictions that marginalized women and the youth in many communities in northern Ghana. As a result of their membership of the IP the social status of women and youth has improved significantly; and they now have equal opportunities to social assets and other services. This became obvious when some women leaders in the IP gave a good account of themselves, earning a great deal of respect from their male counterparts.

A major challenge of the IP is that some of the stakeholders on the platforms are not well organized unlike the farmers who are well organized. The processors, for instance, are supposed to be organized in groups. Plans are, however, far advanced

to ensure that all stakeholders on the platforms are as organized as the farmer groups. Despite this challenge, members of the platform perceive the performance of the platform as laudable and are committed to the rules and by-laws governing its operations.

The success of the Navrongo IP depends largely on the harmonious interaction among the stakeholders. Sustainability measures have, therefore, been put in place to ensure the IP remains vibrant after TL III and USAID projects phase out. A number of lessons have been instilled in the members including, but not limited to the following:

- The need for well-defined and coordinated roles for all stakeholders.
- Recognition of synergy by all actors and their interest to benefit from it.
- Trust, confidence, and understanding among stakeholders.
- Good leadership and facilitation skills by the IP stakeholders and the facilitating institution and focal person(s).
- Facilitating and managing perceptions, competing interests, risks, availability, and access to resources among the diverse social and economic interests of stakeholders.
- Time and availability of individuals and groups.
- Reliable information, communication, documentation, and learning and sharing of best practices.

12.3 Reflections on the Process

The platforms created opportunities for research to be demand-driven as they identified and presented researchers with critical issues for investigation. This benefitted the platform members and the community as a whole and has afforded platform members and the community in general the opportunity to make informed decisions regarding their operations, thus ensuring joint learning and cooperation among diverse actors to solve problems and reduce uncertainties. The platform facilitated the acquisition of agro-input for the members. During the farming season, subsidized fertilizer is released from the various district offices of MoFA to the general public (farmers) for their farm operations. These fertilizers are usually more affordable than those sold on the open market, resulting in a rush and competition for their procurement. Individuals, therefore, find it difficult to secure these low-priced fertilizers and eventually have to buy the more expensive ones in the open market. However, with the assistance and influence of agricultural extension agents (AEAs) from MoFA in the platform, bulk procurement of these inputs is facilitated for platform members. Farmers in the platform are, therefore, able to improve their agricultural production and productivity. With good representation of various stakeholders in the platform, members are better informed on issues pertaining to the agricultural sector.

Having been trained to produce their own seeds, members of the platform are self-reliant in acquiring improved seed and are actively engaged in various operations that sustain the gains of the two projects that have been phased out.

12.4 Areas to Focus on in the Future

There is the need to explore opportunities for more off-takers to create demand for greater market access in future interventions. Efforts will be made to promote value addition to increase market demand. Issues of platform sustainability will be given priority attention by exploring avenues to source funds to run the activities of the platform. There is the need also for a meeting of partners, e.g., seed companies, MoFA, and registered seed producers to plan linkages between registered seed producers (men, women, and youths) and seed certification agencies. Organizational capacity development of producers and other community-based organizations needs to be developed to enable small-scale farmers to collectively act and innovate. The sure way to achieve this is to facilitate linkages among all the stakeholders. It must be recognized that focus group discussion is necessary to provide a forum for direct dialogue as well as participatory approaches to facilitate ownership of the platform. In addition, appropriate dissemination pathways are needed to catalyze entrepreneurship and market access. To improve performance, there is the need for functional learning to learn lessons and share experiences.

12.5 Lessons Learned

The IP has enhanced cowpea productivity and cowpea market demand among smallholder farmers. Production and supply of foundation, certified, and quality declared seed of released varieties have been catalyzed. The performance of popular and newly released varieties has been improved through sustainable intensification of production and postharvest systems. Innovative seed marketing targeted at women and the poor has been catalyzed, and professionalized. Awareness is created through multimedia systems (demonstrations, field days, ICT, resources manuals, TV/radios, and local and international newspapers) leading to food and nutrition security, and increased incomes, thus increasing the welfare of the target societies.

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A Cross-Case Analysis of Innovation Platform Experiences in Seven Countries in West and East Africa and South Asia

13

Emmanuel S. Monyo, Essegbemon Akpo, Chris O. Ojiewo, and Rajeev K. Varshney

Abstract

The Bill and Melinda Gates Foundation (BMGF) funded Tropical Legumes (TL III) project was implemented in seven sub-Saharan Africa countries (Burkina Faso, Ghana, Mali, Nigeria, Ethiopia, Tanzania, and Uganda) and South Asia (India). Shortage of seed of improved varieties has been identified as the greatest hindrance to farmer adoption of new agricultural technologies developed through this project. This chapter compares the different approaches followed by different countries in the establishment of Multi-Stakeholder Platforms (MSPs) for supply of improved legume seed to farmers. Achievements from this initiative are mixed and multi-dimensional. The details herein provide the reader with insights on the level of success of innovation platforms in the different countries and implications for agricultural technology dissemination to smallholder farmers. Key achievements include strengthened linkages among various legume seed value chain actors, participation of several cadres of seed producers in a decentralized system resulting into significant increase in the production of certified and quality declared seed of legumes, and rapid adoption and use of newly

E. S. Monyo (✉)

Alssem Company Limited, Arusha, Tanzania

e-mail: emonyo@alssem.com

E. Akpo · C. O. Ojiewo

International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Nairobi, Kenya

R. K. Varshney

Research Program – Genetic Gains, International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Patancheru, India

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released varieties by smallholder farmers. As for those areas where the initiative did not produce the desired results, it is a testament that unless a well thought-out inclusive and comprehensive approach which defines the critical roles of each player in the value chain is developed, current seed shortages will continue, eroding emerging market opportunities and good intentions of development partners. The reader is directed to individual chapters for details of the process followed by each country/crop in the establishment of MSPs, their composition, key achievements, challenges, and lessons for overall improvement of the national legume seed systems.

Keywords

MSPs · Tropical Legumes III project · Improved variety seed · Legume value chain · Seed systems

13.1 Introduction

Smallholder legume farmers, who tend to dominate the legume production sector, have many times cited lack of access to quality seeds of adapted and improved varieties as a major constraint to improving their productivity and production. Preliminary research results from the Tropical Legumes (TL II) baseline studies in all project countries found that there was very limited awareness about improved legume varieties, and that neither public- nor private-sector interventions to produce and market legume seeds had a successful track record (Ndjeunga et al. 2016). Most of these smallholders rely on own-saved seed or seed secured through informal networks such as local grain markets or farmer-to-farmer exchanges. Scholars reported that less than 10% of the crop seed planted in Africa is purchased from the formal market each year (Rohrback et al. 2003; McGuire and Sperling 2016). Generally, the traditional seed certification procedures do not facilitate the use of quality seed of improved legume varieties by the majority of resource-poor farmers who source about 90% of their seed from the informal sector (McGuire and Sperling, 2016). Although cheap and easily accessible, these informal seed sources may compromise quality, tolerance/resistance to pests and diseases and subsequent productivity. This is the reason why Quality Declared Seed (QDS) has been scaled up in most countries but at the same time catalyzing private companies' investments.

Pilot interventions through the Tropical Legumes Projects (TL II and TL III) have shown promise in making new varieties available to farmers who depend on the farmer seed system. These initiatives which included community seed schemes, seed recovery and seed bank schemes, seed fairs, contracting schemes, and small seed packs were further developed, and linked to participatory research, where farmers are directly involved in variety selection and testing. Since 2007 and through the BMGF funded Tropical Legumes projects, more than 21,000 farmer/legume seed producers (11,000 in Tanzania, 5535 in Uganda, 2300 in Ethiopia, 1381 in

Kenya, 677 in Malawi, and 860 in Mozambique) participated in a total of 171 farmer field days and 27 farmer fairs held on-farm and on-station (Gowda et al. 2014). If farmers want to compete in the global marketplace, their produce must meet the grades and standards desired by end-users. R&D agencies linked through TL III implementation have designed and tested several demand-driven seed supply strategies, which provide the necessary incentives for farmers to buy seed from the recommended sources (Rubyogo et al. 2019).

This approach was implemented in partnership with a range of organizations—to improve seed supply of legume varieties and create impact at farm level. It is based on two propositions; that different approaches are required for different crops and countries, and, that we must lay greater emphasis on stimulating seed demand rather than focusing exclusively on seed supply. Multi-stakeholder platform has been acknowledged as one of the means to get such partnerships shaped and operational. Through location specific innovation platforms, most of which have been formed and supported by the TL III project, collaborative networks of public–private sector stakeholders and development organizations in the legume value chain have been formed to bring together relevant partners that contribute to the efficient flow of information and seed between target stakeholders. The networks then share evidence on best practices, innovative ideas, and problem-solving expertise across their legume crops of interest, share facilities and services among those best equipped to carry out different tasks, coordinate and foster inter-disciplinary and cross-crop collaboration, mentor and train one another as they share ideas and their success stories, and create a consensus of opinion to informed practices and policy-making.

Having shared the experiences of various countries in the previous chapters, a synoptic look across the various chapters is provided in this chapter to draw the similarities and differences among countries and crops. Beyond a synthesis of all cases, this chapter presents the reader with the big picture arising from the experiences of different TL III countries with innovation platforms for legumes' seed supply to smallholder farmers, especially the ones in remote areas facing ever challenging production environment.

13.2 Overview of Country Approaches, Achievements, and Key Lessons

13.2.1 Cowpea and Groundnut Innovation Platform Interventions in Burkina Faso

Lack of access to seed of improved varieties is a significant constraint to farmer adoption of new agricultural technologies in Burkina Faso. The INERA cowpea team recognized this constraint and through the support of TL III project established four multi-stakeholder innovation platforms—one for each region for enhancing cowpea production and productivity in the country. Through the platform established in 2015, more than 200 targeted farmers were trained in different areas of the

cowpea value chain including seed and grain production, storage, and food processing skills. Through the platform, new cowpea varieties were disseminated through demonstration plots, field days, mass media, and social media. Each platform was supported to produce a minimum of 10 ha basic seed. As a result of the growing need for basic seed in the country and INERA's inability to meet this need, the more progressive out of the four platforms was identified and contracted to supply INERA's balance of basic seed requirement. This was pivotal in building sustainability of basic seed supply through the platforms as a result of the official link to fill INERA's deficit. By 2018, basic seed production through the platforms had peaked to 1000 metric tons per year. Following on the success of the cowpea team, groundnut innovation platforms were similarly established in the country from 2016. For the first time, farmers in the country were supplied with Quality Declared Seed (QDS) as a result of this initiative. By 2018, more than 10,000 farmers were reached with improved seed supplied through small seed packs annually, and farmer yields for groundnut had increased from 500–700 kg/ha to 1200–1500 kg/ha. Women and youth incomes from the project areas increased from US\$200 to 800 per year for farmers who utilized the rainy season only, but for those who got two seasons by supplementing with irrigation had their incomes increased to US\$1200–1500 per year. The platform successes were as a result of linkages to financial institutions for credit to farmers. Since farmers had increased incomes, they were able to service their loans and could continue accessing this facility. INERA was further facilitating sustainability of these platforms through introduction of annual membership contribution fees which the farmers are willing to pay since they are benefiting.

13.2.2 Enhancing Access to Quality Seed of Improved Groundnut and Cowpea Varieties Through Multi-Stakeholder Platforms in Northern Ghana

In spite of release of new varieties of cowpea and groundnuts in Ghana, for years, yields under farmer conditions remained low (0.5–0.8 t/ha) compared to more than 1.5–2.5 tons attained with improved varieties released by the national system. The main reason for this is the unavailability of seed of these improved varieties for farmers. Less than 5% of the crop is cultivated with certified seed purchased from the formal seed system, while the rest is sourced from farmers' saved seeds, gifts from family and friends and the grain market, often of questionable quality. Farmers' failure to use new varieties has been attributed to the inaccessibility and highly priced nature of seed in the formal system. Through use of funds from TL III project, the groundnut and cowpea research teams established MSPs for supply of improved variety seed and related agricultural technologies to farmers. Platform composition included farmers (over 70%), agro-input dealers, processors, traders, tractor service providers, research and extension. Though financial services were missing, each MSP built in a savings and loan scheme as a self-help funding mechanism. Eight MSPs were formed between 2015 and 2016 with membership totaling

347 for groundnut and 820 for cowpea. Key achievements under groundnut included an injection of at least 5 tons seed of the new improved varieties into the community annually. This resulted into a 70% increase in yields among platform farmers compared to those who were not being served. Similarly, the cowpea platforms trained members to produce certified seed for supply to their communities. More than 1800 members were trained in various farm operations including good agronomic practices that have managed to sustain continued availability of improved variety seed among platform members.

13.2.3 Cowpea and Groundnut Seed Innovation Platforms: A Hope for Small Seed Producers in Mali

Groundnut and cowpea are the most important legume crops in Mali contributing to food security and family incomes. The research system has developed and released several improved varieties but most of them have remained on the shelf due to the inadequacy of the seed supply system to the extent of reflecting a national decline in groundnut production. This constraint was identified by the groundnut team who decided to reverse the decline curve through establishment of the Kolokani MSP in 2012. Through additional resources from TL III, the platform was reorganized in 2015 to include more stakeholders representing the entire groundnut value chain—farmers, farmer associations, cooperative societies, seed producers, agro-dealers, transporters, financial services, grain traders, processors, research and extension. Variety promotional activities included 47 farmer participatory variety selection (FPVS), 50 demonstration plots, and three multi-locational variety trials conducted annually from 2016 to 2018. Two out of four released varieties in Mali (Fleur 11 and ICGV 86124) were identified through the FPVS and promoted through training of trainers to 1246 farmer seed producers; among them 928 women. Platform members and farmers were also trained in groundnut seed production, aflatoxin management, seed business plans, and small-scale mechanization to reduce drudgery and improve efficiency in production. Kolokani platform is capable of producing and marketing more than 85 tons of groundnut certified seed to farmers in Mali each year. This is expected to reverse the national productivity decline while improving platform members' livelihoods and family nutrition status. Similarly, an innovation platform for cowpea value chain players was established at Cinzana following availability of resources from the TL III project in 2016. Building on the groundnut platform, they added a program planning committee and an executive office so that feedback from stakeholders can receive immediate attention. Notable achievements through the cowpea platform included an increase in promotional activities—25 training sessions, 299 demonstration plots, involving 2934 cowpea seed producers and benefiting 12,193 farmers. The number of farmer preferred varieties used increased from 5 to 12, while the amount of basic seed produced increased annually from 1 to 20 tons serving more farmers through affordable small seed packs.

13.2.4 Sustainable Groundnut and Cowpea Seed Systems for Smallholder Farmers Through Innovation Platforms in Nigeria

MSPs for supply of improved seed of groundnut and cowpea to farmers were implemented in Nigeria in 2015 as part of the TL III project. Since the main purpose of the project was to improve the production and productivity of legumes in the country (namely cowpea and groundnut), it was clear that availability of seed of improved varieties was one of the greatest constraints to delivering on the project. MSPs were, therefore, established in specific project locations as part of facilitating the access of smallholder farmers to seeds of improved varieties. Members of the MSPs included seed companies, farmer groups, public seed enterprises, NGOs, and 718 individual seed entrepreneurs to link actors in the legumes' value chains. Community-based seed producers and individual entrepreneurs were linked to seed companies while seed companies were linked to financial services for seed purchase loans and to research institutions to access early generation seed (EGS) for supply to their contract growers. The results were phenomenal. There was a marked increase in access by farmers to services (e.g., improved variety seeds, extension, credit facilities, and markets) and enhanced production and productivity through increased availability of quality seed, increased farm size, and yields. About 532 tons of basic seed and 8366 tons of certified/QDS seed of improved cowpea were available to farmers. Cowpea yields almost doubled from 500 to 900 kg/ha in the project intervention areas. MSP members for groundnut recorded additional incomes ranging from \$214 to 453 per hectare in the wet season and \$193 to \$823 per hectare in the dry seasons as a result of project intervention through MSPs. Due to better farmer organization for collective marketing, farmers were able to improve their produce market prices by 21.5% and 18% for dry and wet season groundnut production, respectively. Selection of appropriate project location, reliable well-connected beneficiaries, timely supply of agricultural inputs, training on good agronomic practices (GAPs), and effective supervision on production were the major drivers of success.

13.2.5 Chickpea Production and Productivity Through Stakeholders' Innovation Platform Approaches in Ethiopia

Ethiopia is the leading producer and consumer of chickpea in Africa (Kassie et al. 2010). The country is among the top 10 producers in the world where, chickpea is also an export crop earning the country the much needed foreign currency. In spite of its importance, national production has been rated as low and below potential as production is challenged by low productivity of landraces, poor farming practices, biotic and abiotic stresses, among others. The chickpea improvement program made considerable efforts to overcome the aforementioned constraints and developed 27 improved varieties and management technologies for their dissemination to farmers. This resulted in a paradigm shift of the Ethiopian chickpea production that progressed from landrace cultivars to improved varieties together with enhanced

adoption of production packages recommended by research. In spite of the achievements recorded, the speed with which positive changes were being effected remained slow and productivity low compared to potential. To correct the situation, a national chickpea stakeholders' innovation platform was established in 2013 with the main objective of bringing together the key stakeholders acting on the value chain in order to identify major challenges and craft solutions that would be implemented through synergetic efforts. The platform would provide space for interactions and collaboration within and between heterogeneous group of individuals comprising the agricultural research system, public institutions that support agricultural development, seed producers, farmers' primary cooperatives and unions, entities working on bio-fertilizer and storage management, food processors, and exporters to complement one another for the benefit of the chickpea value chain. The platform identified seed as the major bottleneck in the sector. This gave room to the agricultural research systems that supported the platform with a mandate to take steps to address the seed constraint through establishing farmers' seed producer associations with the help of R&D partners. These farmer seed associations are currently the major suppliers of chickpea seed nationwide. Side by side, the platform strengthened the extension effort and triggered dissemination of improved technologies to a large number of farmers. As a result, productivity of the crop by model farmers increased by threefold and fourfold and the national productivity has been doubled to nearly 2 tons.ha⁻¹. The platform also worked on improving access to market, and chickpea is currently one of the commodities in the Ethiopian Commodity Exchange market.

13.2.6 Groundnut Seed Production and Distribution Through Multi-Stakeholder Platforms in the Southern Region of Tanzania

Over 90% of Tanzania's groundnut production is confined to four important production corridors—namely The Southern (Mtwara, Lindi, and Ruvuma), Central (Dodoma and Singida), Western (Tabora, Igunga, and Nzega), and Lake (Shinyanga, Geita, and Mwanza) regions of the country. Groundnut seed systems innovation platform was established for the Southern region in 2016 to enhance farmer access to improved variety seed. The platform key players are representatives from government extension services, NGOs, seed companies, farmer groups, and individual seed entrepreneurs (53 in total, with 42% female representation). Notable achievements included an increase in the frequency of farm advisory services from extension mainly facilitated by project funds, including establishment of community extension services and lead farmer concept. Better access to improved seed in the target areas has resulted into 11% increase in area under cultivation and 15% increase in production by 2018 as compared to before. Most of this has been possible as a result of 29 labor-saving technologies that contributed to reducing women drudgery and therefore increased efficiency. The platform facilitated new market linkages that have helped improve farm gate prices by 80% putting more money into farmers' hands. Farmer improved varieties choice has also expanded from 3

before the platform to 11. Unfortunately, there are no linkages yet to financial institutions for facilitation of platform activities. Platform membership might need to include this cadre of stakeholders for it to be viable and sustainable.

13.2.7 Organized Farmers Towards Chickpea Seed Self-Sufficiency in Bundelkhand Region of India

India is the largest producer and consumer of chickpea globally growing the crop on 10.75 million hectares and producing 11.23 million tons annually. Bundelkhand region of Uttar Pradesh state where the TL III project was implemented is traditionally an important chickpea-growing region with 416,007 ha that produces about 148,408 tons of chickpea—very far below the national average (0.35 vs 1.04 t/ha). Poor seed replacement and low productivity levels, high incidence of pod borer and root diseases coupled with several abiotic stresses limit the average chickpea productivity in the region. Smallholder farmers in the region often cite poor quality of seed as a major issue restraining the chickpea productivity level (Dixit et al. 2019). Farmers lack access to new high yielding, diseases resistant chickpea varieties. As a consequence, they continue to use farm produce of non-descript varieties as seed across, for all the major pulse crops. Farmers often exchange home-grown seeds with apparently better yielding varieties available within their informal social networks including fellow farmers, friends, and relatives. These factors have direct bearing on the chickpea productivity in the region (Dixit et al. 2019). To address the challenge of unavailability of quality seed of improved chickpea varieties, partner farmers under TL III project were organized into innovation platform with the objective of enhancing seed production, processing, and storage to ensure self-sufficiency at village level, promoting diffusion of seed production technologies; and dissemination of recommended and farmer preferred varieties. Through the seed societies, 21.8 tons improved seed of five recommended varieties were produced and marketed to institutionalized seed chains. More than 1500 partner farmers directly received improved variety seed from these societies, while 1788 non-partner farmers benefitted through social networks established as a result of this initiative. Chickpea productivity was boosted from 0.78 to 1.19 t/ha in the project villages. Area under improved chickpea varieties was increased by 68% in the project villages while putting in place a system for supply of improved chickpea seed which can be replicated in other districts throughout the country.

13.3 Cross-Case Analysis, Reflection on Key Lessons, and Drivers of Success

Agricultural innovation platforms are brought to play when systemic bottlenecks in the institutional arrangements make it difficult to bring about the changes needed. The critical challenge is that demand for innovation is low and therefore the driver which could push the delivery systems is weak. Under this scenario, most supply

driven innovation approaches fail because the demand is low. The strategy is, therefore, to enhance the demand for innovation to make the system works better. In cognizance of this, partner countries implementing the TL III set out to establish innovation platforms for improved seed supply to solve the bottleneck of seed unavailability. The results were mixed. Some platforms picked up very well and are on their way to sustaining the seed supply chain while others are struggling and need constant hand holding and maybe redesign. Each country followed the following recommended (Ngwenya and Hagmann 2011) steps in establishing its IP and business models (Table 13.1) to some varying degree hence the variable outcomes as well.

In Burkina Faso Although the platforms engaged in local seed businesses, no seed business model was developed as a way of creating incentives for the system to know that stakeholders can operate profitably and therefore incentivized to continue. They however put in place financial contribution by each member after selling their produce in order to be able to facilitate platform meetings without external financial support. The accessibility of seeds of improved varieties by farmers at low price was the target through the platforms as well as to increase the income of women who are the largest groups among farmers.

Table 13.1 A comparative analysis of the steps towards establishing the innovation platforms, partnerships, and business models

| Steps | BF | GH | ML | NG | ET | TZ | IN |
|--|----|----|----|----|----|----|----|
| Definition of a problem with high opportunity for impact | √ | √ | √ | √ | √ | √ | √ |
| Formulation of the innovation challenge—defining the scope and focus of the platform | √ | √ | √ | √ | √ | √ | √ |
| Identification of the functions required to make the system work as a system | √ | – | – | √ | √ | | √ |
| Identification of the actors who can best deliver these functions effectively and efficiently | √ | √ | √ | √ | √ | √ | √ |
| First meeting to analyze systemic blockages and first actions. | √ | √ | √ | √ | √ | √ | √ |
| Development of a compelling business model creating the incentives of the system to work | – | – | – | – | – | – | – |
| Assessment of systemic capacity including each individual actor's capacity and capacity development needs identified to strengthen the core actors' capacity | – | √ | – | √ | √ | – | – |
| Draw an action plan to start operating as a platform towards delivery. | √ | √ | √ | √ | √ | √ | √ |
| Review action, performance, and analysis in regular intervals. | √ | √ | √ | √ | √ | √ | – |
| Continuously assess and enhance the performance of the platform actors, including regular self-assessment to enhance the platforms' performance | √ | √ | √ | – | √ | | √ |

BF Burkina Faso, GH Ghana, ML Mali, NG Nigeria, ET Ethiopia, TZ Tanzania, IN India

In Ghana Poor consultation among MSP members and lack of clear-cut procedures on resolving conflicts were identified as major problems that needed to be prevented for the platform to smoothly operate as a system. Some members made up their minds to actively participate at meetings or to leave the group all together. These conflicts resulted from the fact that actors were drawn from different sectors of the groundnut value chain and as such had diverse views and sometimes conflicting interests. To address this challenge, a training on group dynamics was organized for members. The training was geared towards enabling actors to be more tolerant and positive towards diversity in order to promote a peaceful coexistence to ensure successful implementation of activities. Another big constraint was financial facilitation of platform activities. Members indicated that it was difficult getting money to plow their fields and buy the needed inputs such as seed and herbicides. Although there are rural banks and savings and loans institutions in many areas, high cost of borrowing and demand for collateral was a disincentive to many farmers. More so, these institutions are of the view that smallholder farming is a very risky business resulting in one of the highest interest rates applied (about 40% p.a) when lending to actors in agriculture. To address this challenge of funding, the platforms were introduced to and adopted the Village Savings and Loans Association (VSLA) concept. This self-help microfinance initiative was rolled out to help group members put monies together through weekly savings.

In Mali The cowpea and groundnut platforms followed similar approaches, but platform members dropped out for cowpea. The seed companies, Agro-dealers, microfinance, and transporters all dropped out because of low opportunities in commercialization of cowpea seeds. Fortunately, the same remained intact with the groundnut platform but the seed problem was far from over. Improved seed production has had its ups and downs. Today we cannot say that the end of the tunnel is reached because many problems remain unresolved. The price of seed is still high and out of reach of many smallholder farmers. It is still difficult to access financial credit for seed production and productivity is still low due to low levels of mechanization. Certainly, some efforts were made by the platform and its partners through TL III. Insufficiency, access, and price of certified seeds can be solved by expanding the production to farmer organizations and private organizations in partnership with research. As a perspective, the Kolokani platform adheres to the idea of creating a national platform to solve the improved variety seed constraint. The community of Kolokani has moved from traditional groundnut production to more business-oriented production as a result of the platform boosting groundnut farming culture while winning the fight against poverty among the masses and improving under-nutrition with its processors by incorporating groundnut into children's food.

In Nigeria Engagement of community-based seed producers increased the supply of quality seeds of improved varieties in the remote areas. Through this arrangement, a large number of farmers were reached. Resource-poor farmers are ready to

adopt new improved varieties if they possess traits the end-user wants. An efficient seed system for delivering varieties must be linked to the commodity value chain. The developed grain markets are an obvious driver of seed demand through which the need for production is justified. The multi-stakeholders approach enhanced efficiency and effectiveness to reach this goal. The IPs ranked inadequate capital as the most important constraint and inadequate credit facilities as the major constraints to seed production. This implied that, resource-poor farmers could not purchase quality production inputs, pay for labor and efficient postharvest operations. As such, using smaller seed packs as a marketing approach with engagement of private seed companies in MSPs has helped reach hundreds of thousands of farmers quickly, including women. The sale of small packs has helped to expand the use of certified seeds. It has also given farmers the opportunity to experiment with new varieties at minimum risk.

In Ethiopia The National Chickpea Innovation Platform identified major actors and enabled whole system understanding of the sector, where gaps are identified, solutions proposed, and responsibilities shared, and action taken. In general, the platform played a significant role in supporting the sector and improving the productivity and production of the crop that in turn improved the livelihood of member farmers and associated communities. Achievements in the area of improving availability of seed through establishing and strengthening the informal seed system can be taken as a game changer success. Moreover, farmers' participatory variety selection (FPVS) approach at the start of intervention built farmers' confidence on improved chickpea technologies and enabled faster and smooth uptake. Demonstrations of technologies selected by the farmers' participation and concomitant farmers' field day visits created awareness and raised interest of wider mass of farmers. Despite the achievements made by the platform in improving the availability, there is still shortage of seed to satisfy the farmers' demand. On the other hand, commitment gaps observed among the members of the platform resulted in limitations in the achievements attained so far. It was also not possible to organize frequent gathering of the platform because of resource limitations. Therefore, in order to sustain and strengthen the platform, extra dedication of the actors and fulfilling its resource requirement are crucial.

In Tanzania The collaboration between research and the private sector in demand creation activities enabled the Tanzania Agricultural Research Institute (TARI) to reach more farmers throughout the country. The operating cost of facilitating the innovation process was lowered as multiple partners were brought on board allocating their own resources to perform some of the activities, e.g. seed production, field days, and monitoring activities. The team only catalyzed the bringing together of stakeholders to pursue their common interests. This is a major step forward compared to many past and recent platform experiences where everything collapses at the end of the initiating project. Use of labor-saving technologies at scale will ben-

efit other players in the groundnut value chain like processors and manufacturers of farm implements who will fabricate the required equipment.

In India Platform activities were localized within villages in four regions of Uttar Pradesh. Farmers were initially hesitant to the concept of organizing into farmers' seed societies and collaborating in the process of strengthening seed system of chickpea. The cost involved towards membership also influenced the farmer willingness to belong to. However, with continued persuasion of the project team through series of discussion and meetings and matching of their need for quality seed of chickpea, farmers organized themselves into formal seed societies. The existing social dynamics influenced the process of group mobilization with incidences of preferences for a particular social group within villages. The registered farmers' seed societies indirectly worked towards developing group bonding and facilitated farmer-to-farmer exchange of information related to improved agricultural technologies and seed among the group members. The formal structure of the societies also facilitated member farmers in communicating their perceptions on chickpea production technologies with the project team and other agencies. The member farmers attached social prestige to their membership to the seed societies and to their contribution for improving the chickpea seed availability—unfortunately, these efforts were confined to village level meaning such need to be replicated in thousands of villages for this system to leave a mark at national level.

13.4 Conclusions and Way Forward

The key highlights emerging from looking at these eleven cases across seven countries are the fact that smallholder farmers in all these countries face very narrow windows of opportunity and the net benefits that they can capture from agricultural technologies are marginal at individual scale. Taking Ethiopia as a representative example, the average farm size in the TL III project study areas was about 2.24 ha. The average total land holding for the upper 25% of the sampled households is about 4.1 ha of which 3.8 ha is cultivated land and 0.5 ha is fallow land. For the lowest 25% of the households, the average land holding is just 0.6 ha of which the share of fallow land is nil. The average share of land under chickpea is 0.38 ha (Asfaw and Shiferaw 2009). This situation is typical of legumes farming in almost all project countries. Whereas at country level the margins resulting from improved agricultural technologies are surmountable, at individual level many smallholder farmers may not appreciate the change because of their very small farm sizes and for this reason some are hesitant to make changes to embrace improved technologies. Another important missing factor noticed in all cases is the partnership business model. The business model is likely the most critical component for sustainability and should be the basis for which the partnership on the innovation platform is built. This business model should also be adapted over time to ensure that all partners are really benefiting in ways that make their own delivery more

effective and efficient. Finally, the IP should build in capacity development mechanisms to continuously strengthen the core actors. This is the glue that holds them together.

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Innovation Platform for Catalyzing Access to Seed of Improved Legume Varieties to Smallholder Farmers

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Essegbemon Akpo, Chris O. Ojiewo, Issoufou Kapran,
Lucky O. Omoigui, Agathe Diama, and Rajeev K. Varshney

Abstract

Innovation platform resolves systemic problems and unlock opportunities for farmers and other stakeholders along commodity value chains. It brokers change in a wide variety of areas involving technological barriers for increased on-farm genetic gains, financial services and privileges for smooth running of seed business and other farming activities, social change and gender equality in society, new commodity market opportunities, increased interactions between stakeholders, e-services for increased crop productivity and production, sustainability of seed production and delivery systems through a variety of stakeholders for various seed classes.

Keywords

Improved legume variety · Productivity of smallholder farming · Systemic change · Innovation platform · Sub-Saharan Africa and South Asia

E. Akpo (✉) · C. O. Ojiewo
International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Nairobi, Kenya
e-mail: e.akpo@cgiar.org; akpo.essegbemon@gmail.com

I. Kapran · A. Diama
RP-WCA, ICRISAT, Bamako, Mali

L. O. Omoigui
International Institute of Tropical Agriculture, Kano, Nigeria

R. K. Varshney
Research Program – Genetic Gains, International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Patancheru, India

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14.1 Introduction

The power of innovation platform to solve systemic problems and unlock opportunities for millions of farmers and other stakeholders cannot be over-emphasized (Adekunle et al. 2013). The various contributions in this book have proved to light various areas where innovation platforms brokered social change and various kind of innovations. Ultimately, it permitted to millions of farmers, including the resource-limited farmers in remote areas, to access seed, other inputs, financial services and subsequently improved productivity and production of legume crops in sub-Saharan Africa and South Asia (India). The following sections provide a glance of those areas reported in this book in the different countries.

14.2 Breaking the Technological Barriers to Increase On-Farm Genetic Gains

The example of groundnut in Burkina Faso as reported by Miningou et al. ([this volume](#)) is illustrative. Through the innovation platform (IP), the groundnut breeders in the country took the opportunity to engage with agricultural service staff, NGOs (e.g. FERT) as platform members to help farmers on the ground. Before the IP initiation, the staff of those organizations were not trained on groundnut production practices apart from the basic courses they took in agricultural schools. After being brought in the platform, they got the opportunity to learn about good practices of groundnut production and the comparative advantages of improved varieties (early and medium maturity, and other major traits including disease resistance like rosette). The knowledge the agricultural service staff and the NGOs workers gained helped them to promote the improved varieties of groundnut, train community farmers to measure the size of their farms, impart skills to farmers to monitor their daily activities and provide various other advisory supports as per farmer need. As results of the tailored support received through the platform interventions, farmers in the target areas have more than double their previous yields from 500–700 kg/ha to 1200–1500 kg/ha. In India, there was a change in the knowledge of varieties by farmers from older than 20 years chickpea varieties (e.g. KWR 108 and Radhey) to new and recently released varieties (e.g. Kabuli: Shubhra, Ujjawal; Desi: JG 14, JAKI 9218, RVG 202, JG 16, RVG 203) (Sah et al. [this volume](#)). This is a good starting point for increased variety turnover in India in the near future. In Mali, the IP also facilitated weekly seed fairs to expose more farmers to new varieties and enhance cowpea productivity in the target geographies (Kouyate et al., [this volume](#)). These experiences prove that IP constitutes an effective mechanism to break technology barriers for enhanced on-farm productivity and production of groundnut, chickpea and cowpea in various countries.

14.3 Unlocking Financial Services and Privileges for Smooth Running of Seed Business and Farming Activities

In Ghana, groundnut farmers have challenges of getting financial resources to plough their fields and buy the needed inputs such as seed and herbicides (Puozaa et al. [this volume](#)). In the same communities where farmers face tough difficulty to access finance services, there are rural banks, savings and loans institutions. The main problem is the high cost of borrowing and demand for collateral that discard or constitute a disincentive to most farmers and most importantly, small scale farmers. The perceptions of these financial institutions that the agricultural sector is a very risky business hikes the interest rates applied that go up to about 40% per annum for farmers or someone venturing in agriculture. Thanks to the IP interventions, this challenge of funding has been effectively addressed. The platform members were introduced to the idea of the Village Savings and Loans Association (VSLA) concept. The VSLA is a self-help microfinance initiative where group members put money together through weekly savings for a period of nine months. The savings of GHS 203.00 (equivalent to US\$39) per member over the period are collected. Members are also allowed to buy shares at GHS 1.00 (US\$0.19) per share. Each member is allowed to buy a maximum of 5 shares per week. With the VSLA initiative, platform members were able to borrow money from the savings to attend their farming activities and their secondary income generating activities. The borrowed money is paid back with a maximum interest rate of 10% per annum. This interest rate is very low compared to the ones of the financial industry which vary between 25% and 40% per annum. This VSLA strategy that the innovation platform has facilitated proved to relieve farmers of financial burdens associated with high interest rates from banks and other finance institutions. Thanks to the platform, it is no longer a headache for farmers in the target communities to smoothly implement farming activities timely, and subsequent productivity and production enhancement of groundnut in Ghana.

14.4 Inducing Social Change and Gender Equality in Society

Thanks to the platform interventions in Burkina Faso, women have equal access to seed of improved cowpea varieties compared to men (Batiéno et al. [this volume](#)). Women saw their capacity built on good agricultural practices for cowpea as they took part in most training sections organized. Women's access to extension services has improved as well. Because of these enhanced capacities, women are no longer obliged to seek advice from their husband before buying seed of improved varieties. Before the platform intervention, women always consult their husband before getting a certain variety. The knowledge women gained from the various platform activities gave them a kind of independence and the power to confidently make their own decision. The observed change due to the platform activities has also positively impacted the women producing chickpea in India (Sah et al. [this volume](#)). Reports by the authors indicated that the involvement of women in seed systems activities

enhanced to 17% against the almost no involvement at the start of the platform interventions. In Mali for cowpea, the rural exodus involving the youth who go for gold mining sites and the major cities has decreased considerably (Kouyate et al. [this volume](#)). The improvement of their standard of living is the main leading factor. Motorcycles have replaced bicycles as the main means of transportation for most young farm entrepreneurs. These recorded changes are critical changes in society, especially in the area of gender integration, equality, empowerment and youth engagement in agriculture.

14.5 Access to New Commodity Market Opportunities

Chickpea farmers in various communities were facing major problems with respect to grain market in Ethiopia (Chichaybelu et al. [this volume](#)). There was a poorly coordinated supply chain that links the producers and the off-takers. As a consequence, this increases the transaction costs for farmers and therefore lowers the share of the consumer price that small producers finally receive. The absence of efficient mechanism for delivering market information to the farmers and traders at local markets regarding seasonal prices, demand, and quality requirements by different markets outlets and the lack of a well-established system of grades and standards are reported to be the major threats to chickpea marketing systems. Thanks to the platform interventions, recent reports indicate a significant improvement and competitiveness of the Ethiopian chickpea in both local and export markets. In the same vein, successful interventions by Ethiopian research institute and the Ministry of Agriculture enhanced the chickpea seed marketing. The platform linked seed producer associations to various seed buyers including the regional bureaus of agriculture, NGOs and other organizations that distribute seed of improved varieties to the farmers. Seed producers nowadays have better market and sell their seed with a minimum of 15% higher premium price over actual grain price most farmers receive. In Nigeria, Iorlamen et al. ([this volume](#)) reported that key factor to successful and sustained adoption of yield enhancing agricultural technologies was an assured market, through which farmers can sell their cowpea in Nigeria. Likewise, farmers' awareness of price information played a major role in their bargaining power and the competitiveness of their produce in business transactions. Similar experiences have been observed with groundnut farmers in Nigeria (Mohammed et al. [this volume](#)).

14.6 Effective Seed Delivery to Smallholder Farmers Requires Increased Interactions Between Stakeholders

The experience from the cowpea IP in Burkina Faso concluded that the observed success of the platform largely depended on the harmonious interactions among the stakeholders (Yirzagla et al. [this volume](#)). The sustainability of the interventions will require a number of actions that fall into close interactions between various

actors. According to Yirzagla et al. ([this volume](#)), these include (1) well-defined and coordinated roles for all stakeholders; (2) the existence of synergy among all actors but also their specific interests to benefit from platform achievements; (3) the mutual trust and understanding among various stakeholders complementing one another; (4) good leadership and facilitation skills by the platform stakeholders and the facilitating institution; (5) due attention to and managing of perceptions, competing interests, eventual risks, availability and access to common resources, among the diverse stakeholders; (6) the devotion of individuals and groups to implement the platform activities and finally (7) reliable information, communication, documentation, learning and sharing of best practices.

14.7 Expansion of E-Services for Increased Crop Productivity and Production

The members of the IP growing groundnut in Mali have used the social network SENEKELA of Orange mobile telecom company in Mali to get frequent weather reports, and early warning systems (Sako et al. [this volume](#)). This helps them to avoid crops failure and limits risks related to natural catastrophes. The farmer cooperatives which are part of the platform also exchange information with one another on the social networks to find a buyer for the surplus of their harvest. Many platform members have managed to open savings accounts. These breakthroughs observed within farming communities have significantly impacted farmer livelihood and prove the power of innovation platform to broker systemic and sustainable innovations et bring communities out of poverty.

14.8 Enhancing Sustainability of Seed Production and Delivery Systems Through a Variety of Stakeholders Involved in Various Classes of Seeds

The groundnut innovation platform established in Tanzania brought together a wide variety of actors each bringing a different expertise (Alex et al. [this volume](#)). The different categories included groundnut researchers, extension workers, private seed companies, public seed company (the Agricultural Seed Agency), media people, farmer research groups, policy makers, individual seed entrepreneurs, grain traders and processors, financial institutions, agro dealers, NGOs, local government authorities, seed regulatory authorities, transporters and agricultural marketing cooperatives. While the focus of groundnut researchers is breeder seed, public seed company and other private seed companies are in charge of foundation seed production and marketing. Private seed companies are responsible for certified seed production. Farmer research groups, individual seed entrepreneurs are producing quality declared seed that they spread through remote communities across agro-ecological zones of groundnut production in Tanzania. Efforts are made to strengthen the

linkages between these stakeholders. Grain off-takers are now brought on-board to secure market outlets for farmers.

14.9 Conclusion

The wide diversity of services that innovation platforms facilitate to farmers in addition to quality seed of legume crops proves that systemic problems can be solved, and opportunities can be effectively unlocked for farmers and other stakeholders along the commodity value chains. The cross-case analysis highlighted the overall outcomes of the various experiences and pinpoints some of the areas where the interventions could have brought more benefits and at scale (Monyo et al. [this volume](#)). We recommend innovation platforms as a strong tool for research and development interventions to harness opportunities for communities in the semi-arid areas. Smart partnerships among support organizations and value chain actors will help to cut cost involved in managing innovation platforms to make them sustainable.

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