



Stakeholder network analysis for developing a sustainable seed potato value chain in Oromia Region, Ethiopia

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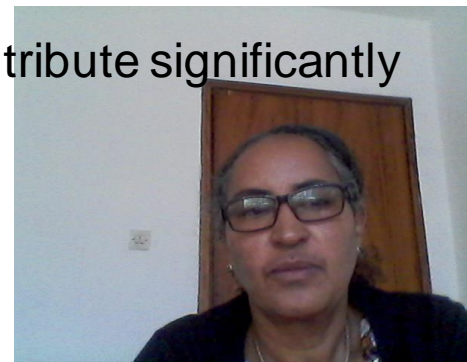
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RESEARCH
PROGRAM ON
Roots, Tubers
and Bananas

Introduction

- The agricultural sector in Ethiopia accounts for about 35% GDP, 72% of exports, and 80% of total employment.
- The sector is dominated by smallholder farmers and nomadic pastoralists.
- Drought, soil degradation and overgrazing are common in most agro-ecologies, reducing land productivity.
- Improved farm inputs are scarce, low in quality and expensive as food production remains largely traditional.
- Similarly, agriculture extension service delivery is inadequate, food production low, hunger is common and needs permanent solutions.
- Potato could be one of the crops in Ethiopia that would contribute significantly towards solving this problem.



Significance of potato in Ethiopia

- Potato is both food security and cash crop for most smallholders in Oromia, Amhara, SNNP and Tigray regions
- It has potential to feed high population densities in highland agro-ecologies because of its short maturity, high yield and good nutritive value.
- It is currently grown as a field crop, produced 2-3 times a year as rain-fed or in irrigated agriculture.
- It is first among roots and tubers in production area & tonnage. And one of the major food staples in the country (CSA, 2021).
- However, potato national yield is below expected potential partly due to use of poor-quality seed, which is the focus of this study.



Potato yields in Ethiopia

Yield levels

- The national average yield is about 13 t/ha
- But progressive farmers can get up to 25 t/ha and 35 t/ha at research stations

Causes of low yields at smallholder farm level

- poor agronomic practices.
- high incidence of pests and diseases.
- low level of potato technology adoption
- low yielding or inappropriate varieties for different ecologies.
- lack of quality seed in most potato growing districts.



Seed quality & potato productivity

Seed quality is defined by variety and seed health

- The potato varieties must be suitable for a given agro-ecology
- Seed should be of proven health since potato is prone to degenerative viral and bacterial infections.

Disease-infected seed significantly contributes to low yields because;

- viral infections cause seed degeneration affecting tuber yield.
- Latent bacterial wilt infection result in early plant wilting & death.
- Field BW infections may lead to tuber rotting before harvest
- Harvested infected tubers may have low table quality & short shelf-life.

Quality seed potato in Oromia is scarce & potato yields are low.

Thus, it is imperative to design evidence-based strategies for developing a sustainable seed supply system to build a profitable potato sub-sector.



Objectives

- To analyze linkages and gaps along the potato value chain and design interventions for developing sustainable seed potato supply models in Oromia
- To examine how the potato seed system functions and actors that are involved in order to identify areas that require optimization for improving seed potato delivery.
- To identify research and development interventions that would enhance seed quality, affordability, availability and accessibility for most smallholder potato growers in Oromia regional state.



Method

- ¹Used Multistakeholder Framework Analysis as a base tool
- Identified and prioritized potato value chain stakeholders.
- Developed & validated checklists per stakeholder category
- Conducted 21 FGD with seed & ware potato farmers
- Held 17 key informant interviews with institutional stakeholders
- Collected secondary data on cropping patterns from various publications and reports
- Data was processed & collated for comprehensive content analysis.

¹Bentley, J.W.; Mudege, N. and Andrade-Piedra, J.L. 2020. User guide to the multi-stakeholder framework for intervening in root, tuber and banana seed systems. Lima (Peru). CGIAR Research Program on Roots, Tubers and Bananas (RTB). RTB User Guide. No. 2020-2.



Sampling Method

Sampling frame for this study was based on;

- Defining zones and districts where potato growing is popular
- Classifying actors that move the potato value chain.
- Identifying stakeholders who are value chain enablers as key informants.

The selection of participants as KI was purposive and based on;

- Their knowledge and experience of potato cropping system
- Willingness to share their experience on the crop and time.

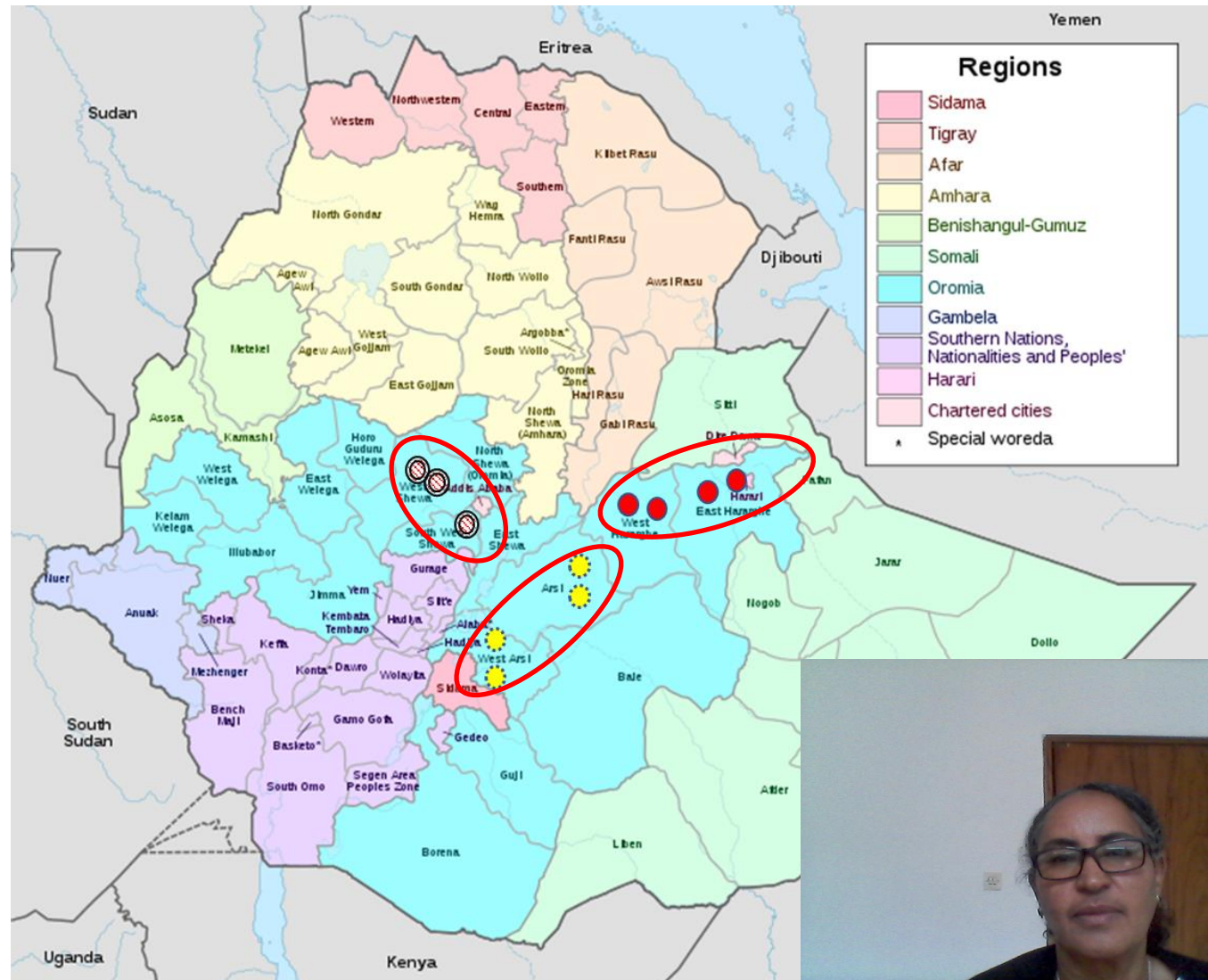


Sampling of the study sites

Districts = 11

- Central = 3
- Eastern = 4
- Southeastern = 4

22 Kebeles



Listening to women potato farmers in East Hararghe



RESULTS

Stakeholder engagement by category

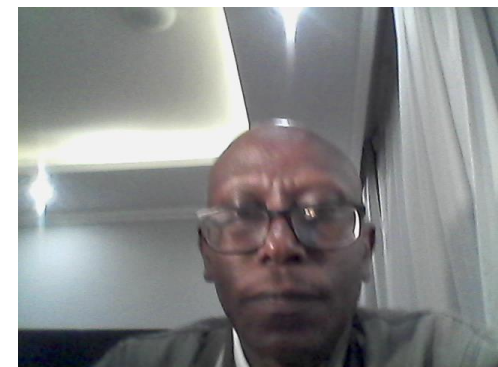
Stakeholder category	Interviewed
1.Ware potato farmers	241
2.Seed potato producers' coops	77
3.Extension & support services	31
4.Input dealers	30
5.Potato consumers	15
6.Research institutes	6
7.Seed regulators	8
8.Policy makers	2
9.Private QDS producers	7
10.Potato traders	2
11.Potato traders	7
12.Potato processors	4



Ranking of potato by land allocation among major food crops grown in the surveyed districts

District	Major crops (in order of importance)	Position
Shashemene	Barley, wheat, maize, potato	4
Kofele	Malt barley, potato , wheat, maize, food barley	2
Lemu&Bilbilo	Wheat, barley, potato , linseed, f. bean	3
Digalu&Tijo	Wheat, barley, potato , faba bean field pea	3
Jeldu	Wheat, barley, potato , tef, maize, sorghum	3
Wolmera	Tef, wheat, barley, potato , faba bean	4
Wonchi	Wheat, tef, barley, Potato , maize, faba bean	4
Jarso	Wheat, maize, potato , sorghum, barley	3
Gemechis	Maize, sorghum, potato , sweetpotato	3
Tulo (Hirna)	Maize, potato , sorghum	2
Kersa	Maize, Sorghum, Potato , Onion, Wheat	3

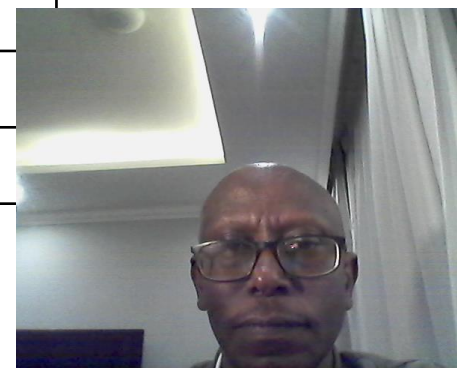
**Potato is in 2nd or 3rd position
in most of the sampled districts**



Main potato varieties grown (Local varieties in red colour font)

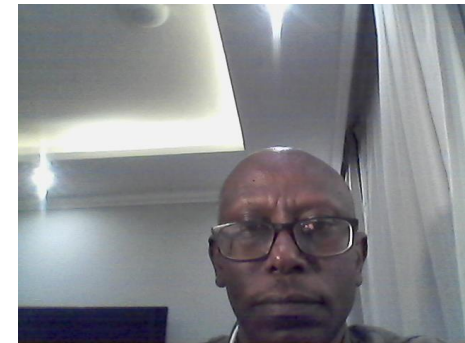
District	Varieties grown (order of importance: L to R)
Shashamene	Gudene, Bule, Nech Abeba, Agazer
Kofele	Gudene, Jalene, Nech Abeba, Bule, China
Digalu & Tijo	Gudene, Belete
Lemu & Bibilo	Gudene, Belete, Holland
Jeldu	Belete, Gudanie, Menagsha, Jalenie
Wolmera	Gudane, Belete, Jalenie
Wonchi	Gudene, Belete, Jalene
Jarso	Bubu, Gudene, Ilili Dima,
Kersa	Gudene, Chiro, Bubu, Tule
Gemechis	Tulema, Jalene, Amatie/Mokor, China
Tulo	Ilili Dima, Nech Abeba, Lange, Tulema, Jarso

Gudene and Belete, resp. were the commonest grown varieties among the districts except one district



Positive attributes of potato varieties grown by farmers

Improved varieties	Local varieties
High yield	High yield
Marketable	Marketable
Good taste	Good taste
Early maturity	Early maturity
Long shelf-life	Short dormancy
Disease resistant	Seed easily available



Seed potato sources (%) by districts

District	Source of seed (%)			
	Own saved	Seed traders	Local seed growers	Others
Shashamane	10	70	20	0
Kofale	30	70	23	0
Digalu & Tijo	38	20	55	0
Lemu & Bilbilo	97	0	3	0
Jeldu	15	0	80	5
Wolmera	35	0	50	15
Wonchi	20	0	75	10
Jarso	90	0	10	0
Kersa	60	0	40	0
Gemechis	90	0	10	0
Tulo	90	0	10	0



Methods farmers use to generating own-saved seed

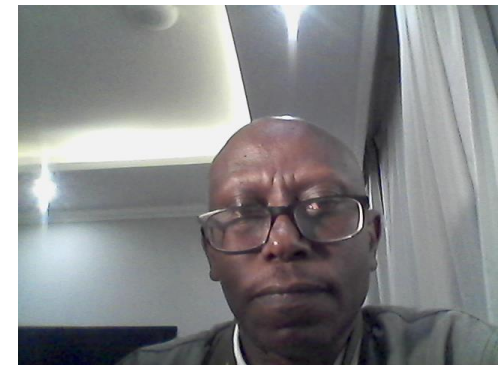
Separate potato plot for home-seed saving (Credit: **BENEFIT**)



Small plot behind homestead for seed saving

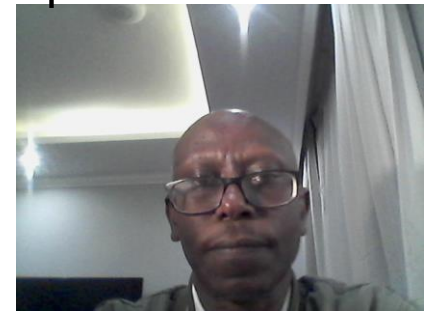


Reserve small tubers from a ware potato crop as seed at harvest



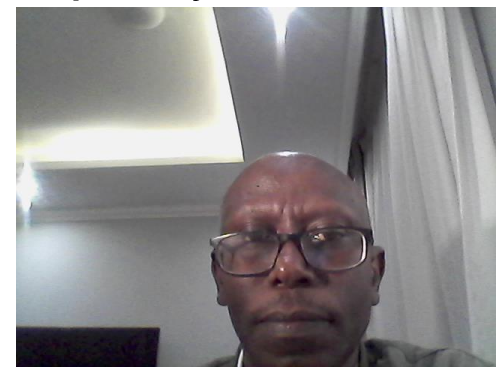
Major challenges of ware potato farmers

- Prevalence of late blight and insect pests mainly cutworms
- Limited access to a fair ware potato market (broker earn more)
- Expensive and untimely delivered fertilizer
- Scarce, low-quality, and expensive fungicides
- Shortage of cash to purchase farm inputs and lack of access to credit
- Field operations are manual, labor-intensive and difficult for women.
- Lack of technologies and skills to store both seed and ware potato
- **Insufficient quality seed of preferred potato varieties.**



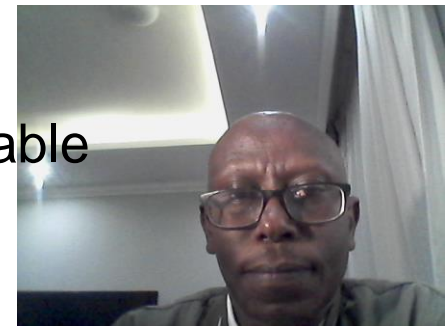
Decentralized seed multipliers (DSM) model as a solution to the seed potato bottleneck

- Decentralized seed multipliers consist of farmer seed group cooperatives and individual seed producers and together are expected to produce quality declared seed (QDS).
- Both QDS & DSM models are national strategies for solving shortage of quality seed across most crops grown in Ethiopia.
- The farmer seed group cooperatives (FSGCs) model was also adopted to enhance participation of smallholders in agricultural cash economy besides improving their access to quality seed at affordable cost



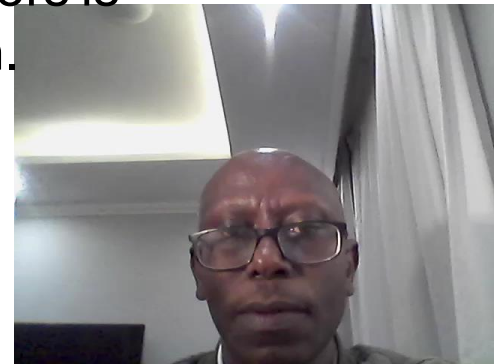
Operations of decentralized seed multipliers (DSM) to improve quality seed potato supply

- Receive foundation seed from Agriculture Research Centers for free
- Are satisfied with seed quality but not quantity
- Main potato varieties produced are Gudene and Belete
- Must have internal quality control committees as a legal requirement.
- May engage external seed regulators for quality assurance
- Operations of DSM are gender neutral
- They indicate potato seed business is generally profitable



Challenges of decentralized seed multipliers

- Late blight is prevalent but is controlled with fungicidal sprays.
- Bacterial wilt occurs in some fields and the disease has a zero-tolerance standard in seed potato certification.
- Seed producers are not able to detect latent BW infection in seed both in the field or in storage.
- Most FSGC have poor linkages with ware potato farmers and depend on agents or brokers for seed marketing.
- Foundation seed from early generation seed producers is inadequate and is a serious seed business limitation.



Focus group discussion with a farmer seed group cooperative in Wolmera district



A visit to some decentralized seed multipliers



**Individual Seed Farmer –
Woman Household Head**



Fite Wato- Farmer seed group coop - Wenchi



Individual Seed Farmer –



Why potato early generation seed (EGS) is so scarce in Oromia

- Holetta research center is the only credible source of EGS and has infrastructure and human resource capacity limitations.
- Absence or limited activity of sustainable public and private companies in EGS production. Potato EGS is left public research.
- A private tissue culture lab – Wagnos produces few plantlets and on order.
- A private seed company – Solargrow produces some certified seed potato on order and or for a few FSGCs.
- Both Holetta and WagnosTC labs are small & operate sub-optimally.
- Seed quality control is inadequate and depends on visual assessment.



Causes of low EGS production

- Limited funding and imbalances in staff specialization at Holletta ARC (e.g., lack of well-trained technicians).
- Regular power outages for tissue culture labs at Holleta and Wagons, and the automated greenhouse at Holetta.
- Limited space for indoor minituber production at Holetta and Solargrow.
- Limited clean fields for outdoor seed bulking at Holetta
- .Lack of motivation among able seed multipliers to invest in EGS production (expect it free from Holetta maybe?).



Possible roles of private seed companies to improve potato EGS availability

- Wagnos would increase TC plantlets production for Solargrow & other EGS multipliers e.g., **Oromia Seed Enterprises** to produce first generation (G1) minitubers if they can agree on the terms.
- Both Wagnos and Holetta would identify and engage multipliers willing to invest in G1 minituber production.
- Solargrow would even certified seed besides G1 minitubers and link with DSM to further bulk the stocks before it is used in ware potato production.
- Oromia Seed Enterprises has a seed potato business plan which should be systematically implemented with other actors in the chain.



Key observations in the seed value chain in Oromia based on seed system characteristics

Availability of EGS

- EGS majorly produced by public research centers is insufficient partly due inadequate support in infrastructure and human resource capacity.
- Most of the seed produced by public institutions is given out for free.
- Volumes of EGS from current private producers is not known and may be insignificant
- Current EGS producers lack adequate quality control mechanisms.
- The EGS delivery channels do not guarantee that the distributed seed is bulked & used as seed once more to meet the objectives of DMS model.
- The roles and responsibilities of public and private sector actors in EGS production and delivery need to be revisited.



Observations (Cont'd).....

Health of EGS

- Both internal and external seed quality control rules are poorly executed.
- Seed regulatory bodies are inadequately supported resulting in poor quality assurance (ill-equipped, underfunded, few specialists).

Thus: Insufficient institutional capacity for quality control results in distributing disease-infested seed leading to poor potato yields

Observations in DSMs/FSGCs

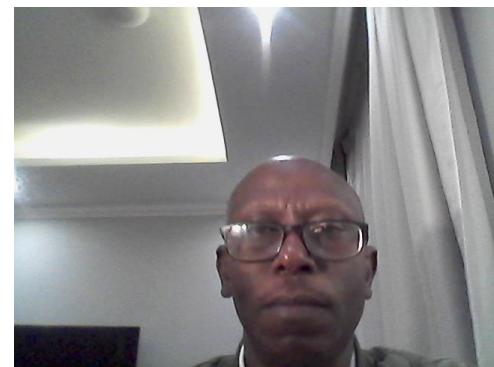
- DSM rarely renew seed stocks & they fail the certification rule of seed origin.
- Management flaws & lack of business acumen in most FSGCs.
- There is limited participation of women in most group economic activities.

Thus, inadequate human and organizational capacity result in poor availability of quality seed at farm level leading to low potato yields



Conclusions and recommendations for R4D interventions and investment opportunities

- Revisit the roles, capabilities and delivery models of public research centers to supply EGS or as sources of foundation seed.
- Invest in rapid development and release of more user-preferred varieties using participatory breeding methods to enhance variety adoption.
- Re-organize EGS production and delivery involving more and proactive private sector actors.
- Analyze and redesign the decentralized seed multipliers model to deliver ample quality seed at affordable cost to smallholders.



Conclusions and recommendations (Cont'd....)

- Conduct a needs assessment of seed regulatory bodies to design interventions for enhancing their effectiveness and efficiency.
- Undertake willingness to pay (WTP) studies for quality seed potato especially among smallholder farmers.
- Develop a seed tracking mechanism along the production chain to improve efficiency and effectiveness in seed potato supply.



Overall Recommendations

1. Consider long term and integrated investment in human and infrastructural capacity to further develop the functions of all actors in the seed potato supply chain.
2. Undertake profitability analysis of various stages of production in the seed value chain to explore the best approaches to support public & private sector actors in an integrated & sustainable way.



What did we learn in using MSFA

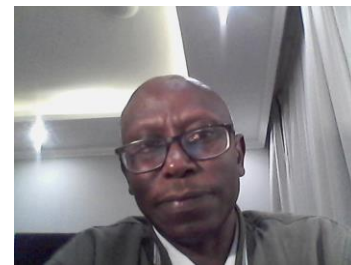
- It is a faster and participatory method for generating information that can be used in designing interventions in a seed system than other conventional approaches.
- It provides a platform for peer learning in multidisciplinary teams.
- Good way to processing qualitative data generated from story telling and conversions to identify solutions to problems in a logical way.
- Stakeholder communication and interaction is often less stressed in R&D interventions and rarely recognized as a possible source of intervention failure.
- Leant new tools, ways & methods of communication.



Acknowledgements

- All heads of zonal and district agricultural offices West Shewa, SW Shewa, Arsi, West Arsi, East Hararghe and West Hararghe.
- All heads of zonal seed and farm input regulatory bodies in the zones listed above.
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