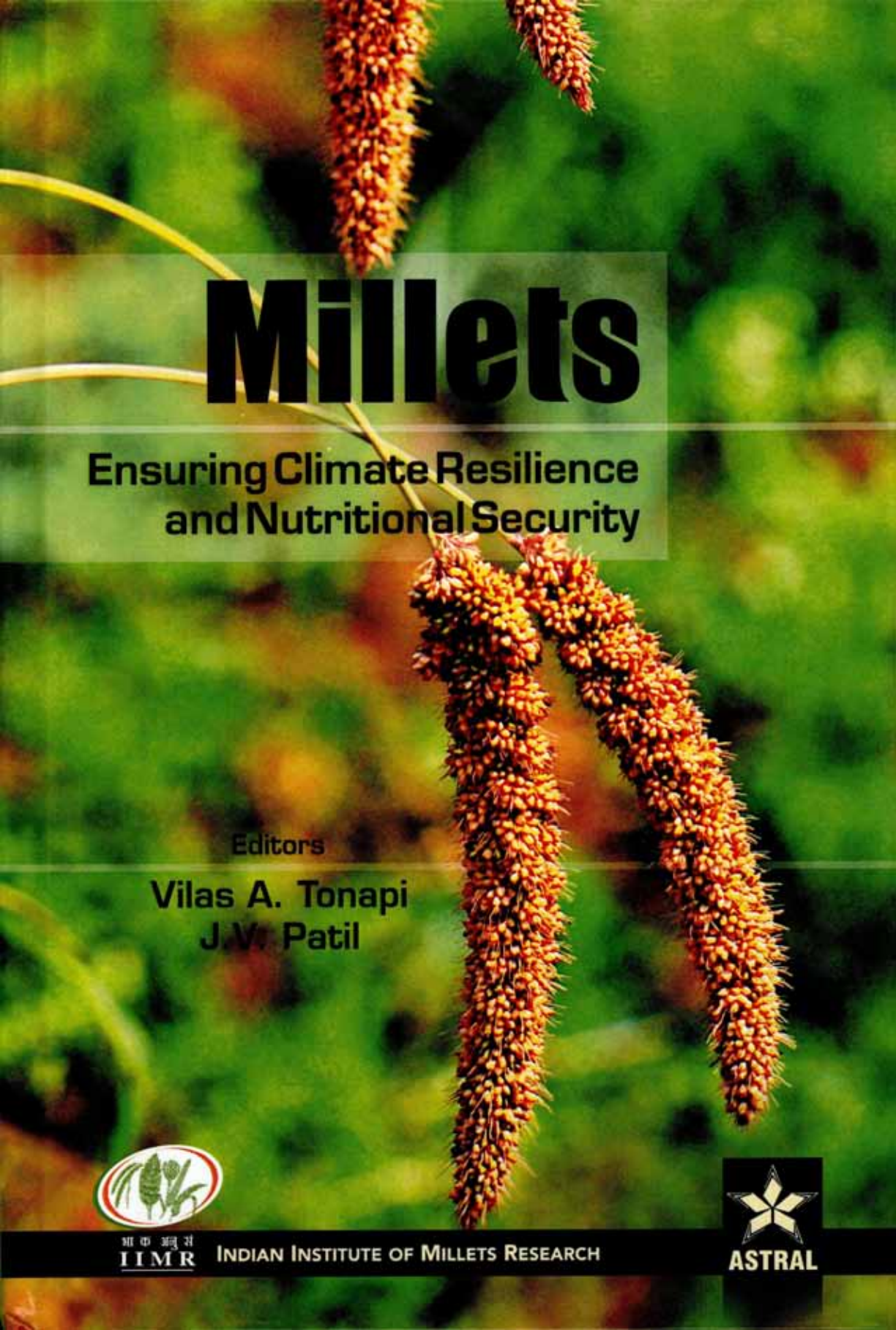
Millets
Ensuring Climate Resilience and Nutritional Security
Editors
Vilas A. Tonapi
J.V. Patil
IIMR
INDIAN INSTITUTE OF MILLETS RESEARCH
ASTRAL

Millets Ensuring Climate Resilience and Nutritional Security

Millets: Ensuring Climate Resilience and Nutritional Security presents the current status of germplasm resource management and genetic improvement of group of climate smart nutri-cereal crops called Millets encompassing Sorghum, Pearl Millet, and Small Millets comprising Finger Millet, Foxtail Millet, Kodo Millet, Proso Millet, Barnyard Millet and Little Millet. The focus is on genetic improvement, agronomy, physiology, biotic and abiotic stresses, pest and disease management, molecular marker-aided approaches for improvement of millets, nutritional and health benefits of millets, utilization pattern, creating demand through value addition, commercialization and marketing of millet products, sustaining viability of informal millet seed systems and Innovative seed delivery models. The emphasis is on improvement of millets elucidating the future road map to enhance scope of millets as "MIRACLE NUTRI-CEREALS" through value chain to ensure food, feed, fodder, biofulel, nutritional and livelihood security, including climate resilience.

Dr. Vilas A. Tonapi is with Indian Institute of Millets Research since 1989. He also headed Division of Seed Science & Technology, IARI, New Delhi. He did his post-doctoral research at the University of Queensland, Australia. His specialization includes seed industry and seed systems development, IPRs, Plant Variety Protection and seed vigour and viability. He is recipient of Seedsmen Association award for service to seed industry, Best Scientist award of DSR, J.N.TATA Endowment award and R.V. Swaminathan Gold Medal. He has to his credit 50 refereed research papers, 20 books, and has edited 5 books.

Dr. J.V. Patil is the Director of Indian Institute of Millets Research (IIMR) Hyderabad. During his 28 years research career, he has contributed in development of 10 varieties in sorghum, 8 varieties in pulses and one safflower variety. In sorghum, he introduced the concept of breeding for specific soil depths for rabi season. He is fellow of National Academy of Agricultural Sciences and is recipient of CGIAR's Baudouin Team Award, Doreen Mashler Team Award, Annasaheb Shinde Smruti Krishi Sanshodhan Gauro Puraskar and Vasantrao Naik Krishi Puraskar awards. He has more than 100 research papers and books to his credit.

ASTRAL

₹ 3995

ISBN: 978-93-5124-644-2

www.astralint.com

Part VII
Seed Systems

Millets: Ensuring Climate Resilience and Nutritional Security (2015)
Editors: **Vilas A. Tonapi and J.V. Patil**
Published by: **DAYA PUBLISHING HOUSE, NEW DELHI**

Pages **595–606**

Chapter 23

Sustaining Viability of Informal Millet Seed Systems

Ch. Ravinder Reddy[1] and Vilas A. Tonapi[2]

[1]International Crops Research Institute for Semi-Arid Tropics, (ICRISAT), Patancheru, Telangana
ICAR-Indian Institute of Millets Research (IIMR)
Rajendranagar, Hyderabad – 500 030

The main purpose of alternative seed delivery system is to address the seed availability problems of smallholder farmers. Most of the community-based seed production models/schemes are initiated because farmers are concerned about the non-availability of quality seed at planting time. Many farmers don't have access to improved varieties; and wouldn't be able to afford them even if they were. So introduction of alternative seed systems models must impact farmers' access to seeds of improved varieties at affordable cost. The quality of seed produced by community-based system or farmer seed systems is guaranteed only by its seller or village seed committee, because they are not processed and are uncertified seed. The seed so produced is low priced, and available at farmers' doorsteps at the right time, and provides access to all farmer groups in the village.

The regulatory and legal framework of national seed rules and regulations in many countries hampers the development of informal seed systems. National seed regulations are mostly based on international standards, which are often incompatible or irrelevant to the realities of farmers' seed systems. The restrictions imposed by national seed authorities on free exchange and marketing of seed, especially compulsory variety registration and seed certification, as practiced by many developed and developing countries are constraints on the efficient functioning of the formal

seed sector and on the development of alternative seed systems (Annette von Lossau 2000). On the other hand regulatory frameworks are crucial for the development of a national seed system (Tripp 2003).

The major source of seed for small-scale farmers comes from their own on-farm savings, seed exchange, borrowings and local traders. Nevertheless, farmer's community systems of seed supply are under pressure due to recurring natural calamities such as drought, crop failure, storage problems and poverty. In the drought situations farmers depend on subsidized seed supply by government agencies, which meets only 30–40 per cent seed requirement of smallholder farmers (Ravinder Reddy 2005). In order to strengthen the seed delivery system, interventions are required to strengthen informal seed supply systems, such as establishing village-based seed banks as alternative seed systems for seed security. The alternate village based seed delivery models that may enable sustainability of community seed systems in the dry land ecosystems have following objectives:

1. To improve seed availability and access to improved varieties of seed to small and resource-poor farmers
2. Build capacity of stakeholders at the community level to enhance sustainable supply of good quality seed, and timely supply at affordable price.

Alternate Village Based Seed Delivery Models

Model 1: Individual Farmer as Seed Bank

This model (Figure 1) can be developed as a local seed system for different crops. Most effectively this seed system will benefit farmers for crops that require high seed rate, which are bulky in nature, or crops that involve high transport and package costs, for example groundnut pod. This model involves training a couple of farmers in each village in seed production technology and supporting them by supplying breeder seed and technology backstopping.

The Pros and Cons of the Model

- ☆ This model can be tried even in remote areas where NGO are unwilling to take up operations.
- ☆ External finance is not required as all the costs are usually met by the farmer/seed producer.
- ☆ Effective and provides wider scope for dissemination and adoption of improved varieties through informal seed channels.
- ☆ Technical institutional services not justifiable for individual farmers.
- ☆ Farmers are still unwilling to save seed because of storage pests and other financial debts.
- ☆ Procurement of breeder seed is difficult at the farmer level once the project is completed.

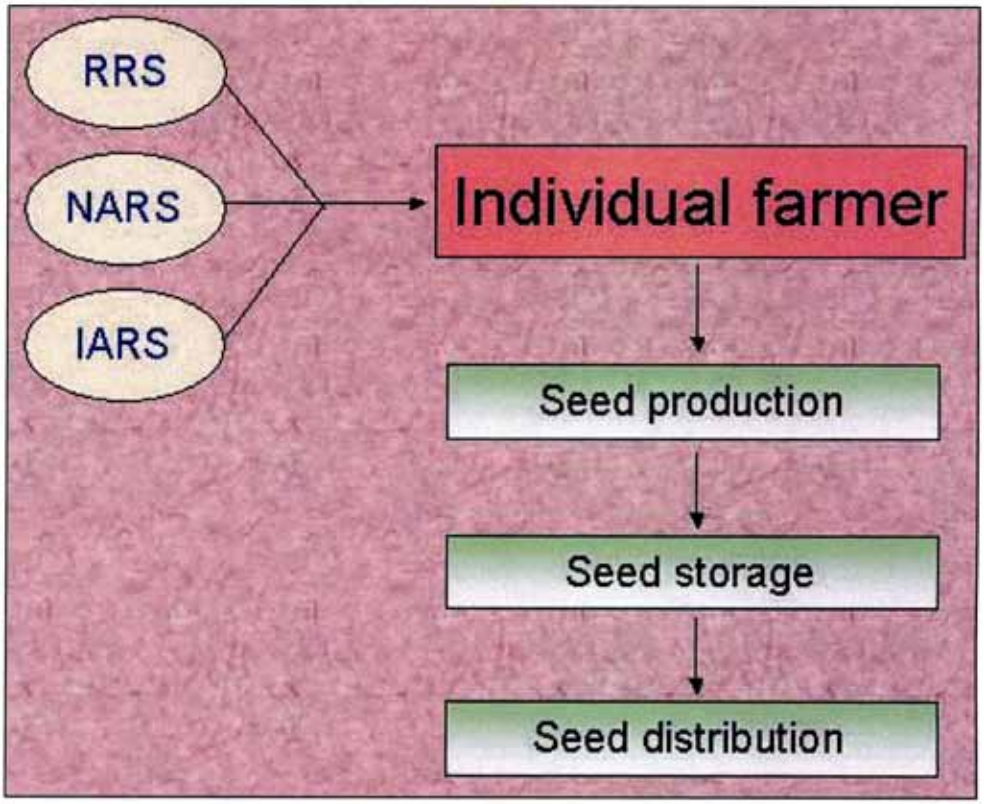

Figure 1: Model 1: Individual Farmer as Seed Bank.

- ☆ There is no control on the selling price of seed.
- ☆ There is no control on seed distribution to different communities in the village.
- ☆ Seed distribution is limited to select groups.

Model 2: Village Based Seed Banks

The concept of 'seed bank' (Figure 2), which advocates village self-sufficiency in production and distribution of quality seeds, is fast gaining ground. Seed villages or village seed banks operate with utmost transparency, mutual trust and social responsibility. Though this is not an entirely new concept, it is being promoted to reduce farmers' dependence on external inputs.

Advantages of Village Based Seed Banks

- ☆ Availability of improved varieties in sufficient quantity within the village
- ☆ Assured and timely supply of seed
- ☆ Decentralized seed production
- ☆ Availability of improved variety seed at a low price

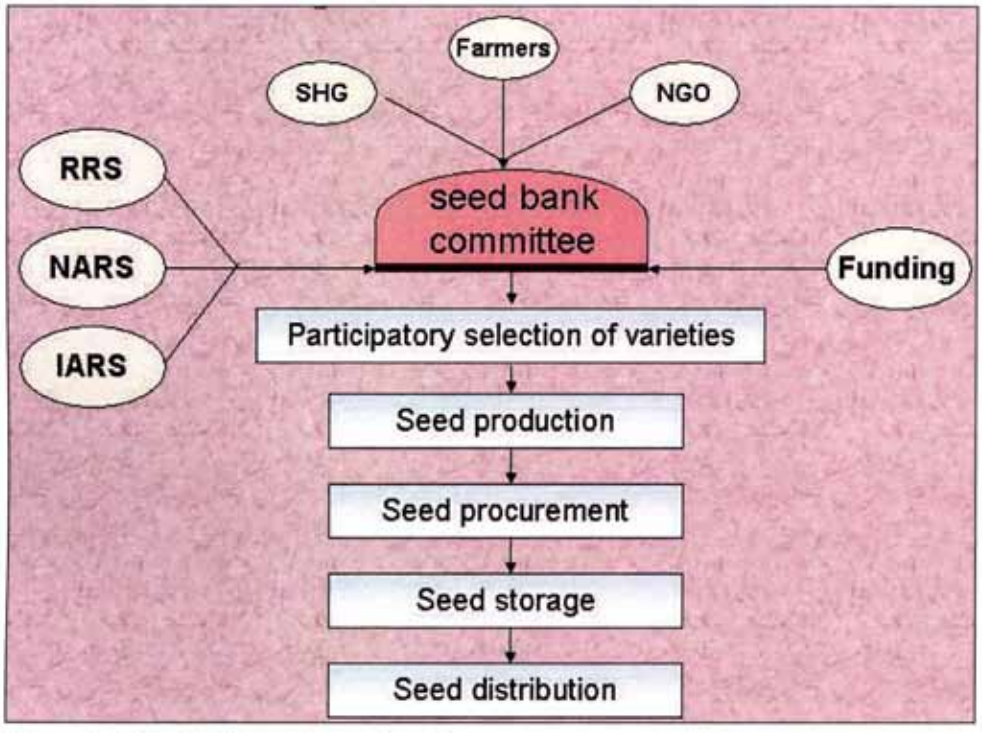

Figure 2: Model 2: Village Based Seed Banks.

- ☆ Improved seed delivery system to resource-poor farmers
- ☆ Reduced dependence on external seed sources and hence an effective measure to curb spurious seed trade
- ☆ Encourages village level trade and improves village economy
- ☆ Social responsibility of the seed production and delivery system
- ☆ A step ahead towards sustainable crop production
- ☆ Avoidance of diseases carried through seed (seed-borne pathogens) that have been produced and imported from different agro-ecoregions
- ☆ Scope for farmers' participatory varietal selection
- ☆ Availability of true-to-type varieties and healthy seed.

Constraints

- ☆ Reluctance of farmers when it comes to adopting quality seed production practices
- ☆ Additional investment for inputs in seed production
- ☆ Lack of buy-back assurance to farmers from SHGs/NGOs
- ☆ Proper seed storage facilities and management in villages

- ☆ Lack of funds with SHGs/NGOs for seed procurement, packaging, storage and transportation
- ☆ Fixing of a minimum support price for seed procurement
- ☆ Technical support for seed production and its monitoring
- ☆ Responsibility of quality control aspects and monitoring of seed production
- ☆ Regular availability, accesses, and procurement of breeder seed for seed production
- ☆ Willingness of farmers to participate in seed bank activities

Small-scale Seed Enterprises Models

Model 3: SHG-Mediated System

In this model, SHG is empowered to take up the task of seed production (Figure 3). Members, however, need to develop skills in planning and seed production techniques as well as support in terms of storage. Alternatively arrangements may be worked out with nearest market yard or state godowns to have the seed storage facility. The most critical aspect in this model is technical support and supply of breeder seed. Given the proper support, this model could provide significant benefits to farmers as it ensures the opportunity for all members and groups to share the profits of seed production. This model performs two tasks: meeting seed requirements of farmers as well as conserves a wide range of crop genetic diversity.

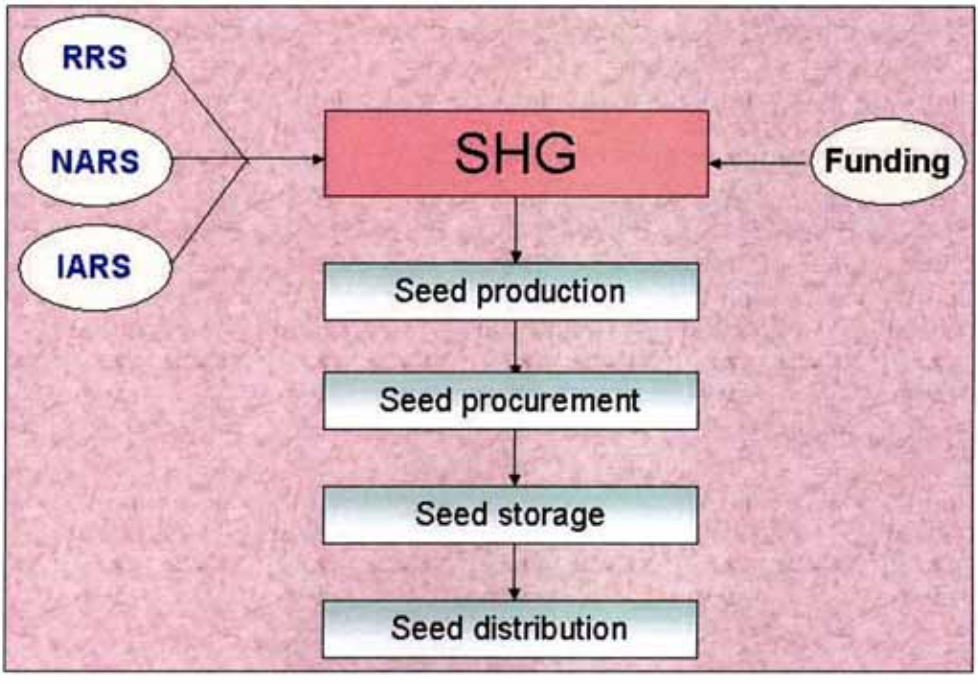

Figure 3: Model 3: SHG–Mediated System.

In most developing countries, the formal sector is far smaller than the informal seed sector. The later is the major source of planting material for smallholder farmers, contributing 80–90 per cent of the seed requirement of smallholder farmers (Monyo *et al.*, 2003; Ravinder Reddy 2004b). Strategies to improve quality of seed, accesses and availability of improved varieties, multiplication and dissemination, availability of seed on time at affordable prices to resource-poor smallholder farmers can bring about changes in the food security in developing countries. Support from state/national governments, and international organizations or any other funding agencies should be targeted at improving the efficiency of these investments by strengthening technical capabilities of SHGs, NGOs, farmer cooperatives, CBO's, KVK's and schemes to improve or develop village based seed programmes through seed multiplication, quality control and marketing activities.

Pros and Cons

- ☆ Improved availability and access to improved varieties by all groups of farmers.
- ☆ Minimum overheads.
- ☆ Seed is stored in the village.
- ☆ Seed available at reasonable price and at the right time.
- ☆ Control on fixing procurement and selling price of seed.
- ☆ Priority for farmers' preferred varieties.
- ☆ Need for institutional support for technical backstopping and supply of breeder seed.
- ☆ Fund for procurement of seed.

Model 4: NGO-Mediated System

Non-Governmental Organizations (NGOs)

In this model (Figure 4), an NGO may be given the responsibility for a cluster of villages. These organizations select and engage farmers in seed production on a contract basis and preference is given to crops and varieties that are in demand in particular area. Basically NGOs are involved in mobilizing farmers/seed producers, planning seed multiplication, training, procuring, processing and marketing seed. Similar to other models, NGOs has to depend on other institutions for procuring foundation/basic seed stocks for multiplication.

Pros and Cons

- ☆ Operates in couple of villages.
- ☆ Seed production operations in couple of villages (3-5).
- ☆ Storage of seed within the village.
- ☆ Seed distribution within the operational areas.
- ☆ Selling price can be fixed by discussions with farmers.
- ☆ Improved seed availability and access for all groups of farmers.

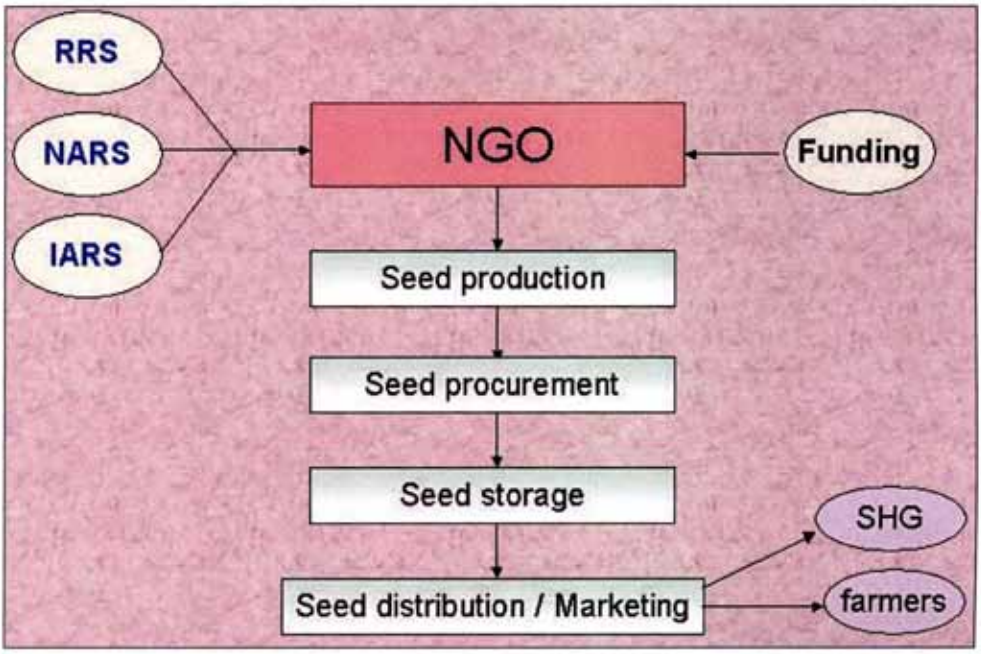

Figure 4: Model 4: NGO–Mediated System.

- ☆ Minimum overhead costs.
- ☆ Need institutional support for technical backstopping and supply of breeder seed.
- ☆ Fund required for seed procurement.

Model 5: KVK-Mediated System

In this model (Figure 5) KVK's are given the responsibility to implement the model.

Pros and Cons

- ☆ Targets, large operational area (many villages).
- ☆ Centralized production; needs large storage place (such as godowns)
- ☆ Comparatively greater overhead costs
- ☆ Involves more than one crop and variety in production
- ☆ Less scope for farmers' participation and their choice of varieties
- ☆ More inclined towards commercial seed trade
- ☆ No scope for involving farmers in fixing procurement and selling prices
- ☆ Model needs infrastructure
- ☆ Usually KVKs has fairly good technical capabilities
- ☆ Generally institution funds are available to some extent.

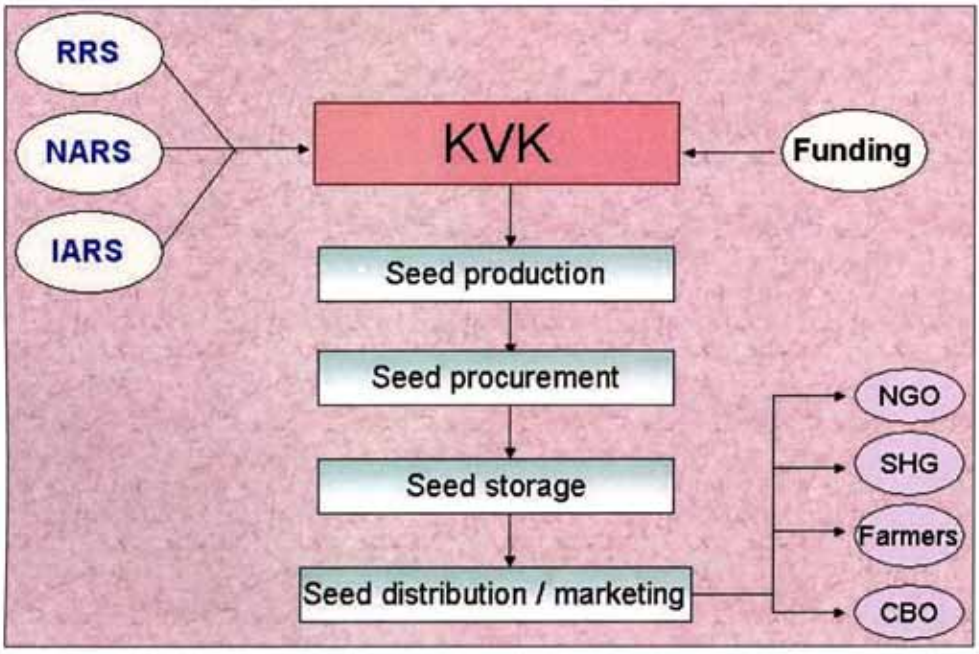

Figure 5: Model 5: KVK–Mediated System.

Each of five models tested can be harbingers of seed system sustainability upon implementation based on the environments and regions they operate. The comparative statement comparing all the five models across each component working towards seed system sustainability is given in Table 1.

Steps for Strengthening Community Seed Production, Seed Saving and Storage

1. Appropriate policies for seed production, and seed distribution, to help focus efforts of government supported initiatives on the varietal needs of resource poor farmers in particular, with attention, where necessary, on the needs of women farmers, and minor crops that are inadequately covered by the private sector.
2. Provide, and promote small-scale seed enterprises and strengthen linkages between gene banks, plant breeding organizations, seed producers, and small-scale seed production and distribution enterprises;
3. Strengthen seed quality control schemes for small scale enterprises and provide appropriate incentives, credit schemes, etc., to facilitate the emergence of seed enterprises, paying attention to the needs of the small farming sector, of women and of vulnerable or marginalized groups;
4. Provide support to and strengthen farmers' organizations in order that they can more effectively express demand for their seed requirements, paying particular attention to the needs of women and of vulnerable or marginalized groups;

Table 1: Comparitive Chart of different Seed Systems Models

Components	*Models*				
	Model 1	*Model 2*	*Model 3*	*Model 4*	*Model 5*
Organization/ community involved	Individual farmer	VBSB	SHG	NGO	KVK
Breeder seed source	Research institute or project scientist	Research institute or project scientist	Research institute or project scientist	Research institute or project scientist	Self or research institutions
Responsibility for transport of source seed	Research institute or project scientist	Research institute or project scientist	Research institute or project scientist	Research institute or project scientist	Self
Sourcing of other inputs	Farmer	Seed bank committee/ farmers	Farmers	Farmers/NGO	Farmers/KVK
Choice of crop/ variety	Farmers	Farmers	Farmers	NGO/farmer	KVK
Training in seed production	Project scientist (PS)	Farmers	Farmers	NGO	KVK
Seed production monitoring	Project scientist	PS, NGO, VSBC members	PS, SHG	PS, NGO.	PS, KVK
Seed quality assurance	Farmer	VSBC	SHG	NGO	KVK
Cleaning, packing, and transportation	Farmer	Farmers	Farmers	NGO	KVK
Marketing	Farmer	VSBC	SHG	NGO	KVK
Fixing procurement and selling price	Farmer	VSBC	SHG	NGO	KVK
Funding for seed production	Farmer	Farmers	Farmers	Farmers/NGO	Farmers/KVK

Contd...

Table 3.2–*Contd...*

Components	*Models*				
	Model 1	*Model 2*	*Model 3*	*Model 4*	*Model 5*
Funding for seed procurement	Farmer	VO/SBC	VO, self	VO, self, other org.	Self, other org.
Sustainability issues	Technical support, supply of breeder seed	Technical support, supply of breeder seed, funding, takes over of role once project completed Incentives for farmers for maintaining quality.	Incentives for farmers for maintaining quality, technical support, breeder seed supply, funding for seed procurement	Farmer produce fetch low price because there is no external quality control, certification. Supply of breeder seed, funding	Marketing, cost of seed, selection of varieties, Incentives for farmers for maintaining seed quality, certification

5. Provide training and infrastructural support to farmers in seed technology, in order to improve the physical and genetic quality of farmer saved seed.
6. Develop approaches to support small-scale, farmer level seed distribution, learning from the experiences of community and small-scale seed enterprises already underway in some countries.
7. Seed Quality of Farm Processed Seed can be as good as and often better than Certified Seed if farmers takes the first step by selecting the right variety, controlling purity with good rotation, and follow standard agronomic practices' to achieve disease and weed control. They can choose a Mobile Seed Processor that can offer the equipment, management and expertise to achieve the standard you require.

Conclusion

An effective means of improved seed distribution is farmer-to-farmer seed exchange. This may be primed to a limited extent by supplies of improved seed from public agencies, agricultural research stations and non-governmental organizations to farmers in easily accessible villages. However, such a system is very slow. To speed up the flow of adapted improved varieties to farmers, there is a need to form a network, formal and informal or integrated seed systems between community-based organizations and research institutes, public and private seed multiplication agencies, involved in various aspects of seed production. This network will identify bottlenecks in the seed production chain, and catalyze or instigate applied and adaptive research and policy changes that may be required to ensure rapid movement of new cultivars into local seed delivery system benefiting smallholder farmers small and resource poor farmers who need them. This approach will require continued interaction between the various institutions, policy makers and stakeholders.

References

Almekinders CJM, Louwaars NP and de Bruijn GH. 1994. Local seed systems and their importance for an improved seed supply in developing countries. *Euphytica*. 78:207-216.

Ball SS and Douglas JE. 1992. Designing successful farmer-managed seed systems. Winrock International Institute for Agricultural Development. *Development Studies Paper Series*. Winrock, Arlington, USA.

Cormwell E, Friis-Hansen E and Turner M. 1992. The seed sector in developing countries: A framework for performance analysis. ODI, London.

Dayakar Rao B, Tonapi VA, Hyma Jyothi S and Seetharama N. 2004. Supply and distribution of quality seed: Need for sustained approach. Paper presented at XVII Annual Conference on Agricultural Marketing, Organised by the Indian Society of Agricultural Marketing (ISAM), Acharya NG Ranga Agricultural University, Hyderabad, Andhra Pradesh, 5-7 February 2004. Abstract *in Indian Journal of Agricultural Marketing (Conference special)*. 17: 260.

Delouche, J.C. 1982. Seeds quality guidelines for the small farmer. In: Proceedings of the Conference on Improved Seed for the Small Farmer, 9-13 August, CIAT, Cali, Colombia.

Louwaars N. 1994. Seed supply systems in the tropics: International course on seed production and seed technology. Wageningen, The Netherlands: International Agricultural Center.

Monyo ES, Mgonja MA and Rohrbach DD. 2003. An analysis of seed systems development, with special reference to smallholder farmers in southern Africa: Issues and challenges. Paper presented at the workshop on Successful community based seed production strategies, co-organised by CIMMYT and ICRISAT, 3-6 August 2003, Harare, Zimbabwe.

Ravinder Reddy, Ch. 2004a. Alternative seed delivery systems – Village based seed banks. *In* ICRISAT-Asia in-house review held at ICRISAT, Patancheru, 24-26 November 2004.

Ravinder Reddy, Ch. 2004b. Seed systems in the semi-arid tropics of Andhra Pradesh. *In* Enhanced livelihoods of poor livestock keepers through increasing use of fodder, 2-3 September 2004.

Tripp R. and W. Van der Burg. 1997. "The conduct and reform of seed quality control," in R. Tripp (ed.) *New seed and old laws: regulatory reform and the diversification of national seed systems.* London: Intermediate Technology Publications. Uganda seed Project. 2000. *Annual report*. Kampala: Kawanda Agricultural Research Institute.

Tripp R. 2003. How to cultivate a commercial seed sector. Paper presented for symposium Sustainable Agriculture in the Sahel, 1-5 December 2003 Bamako, Mali.