

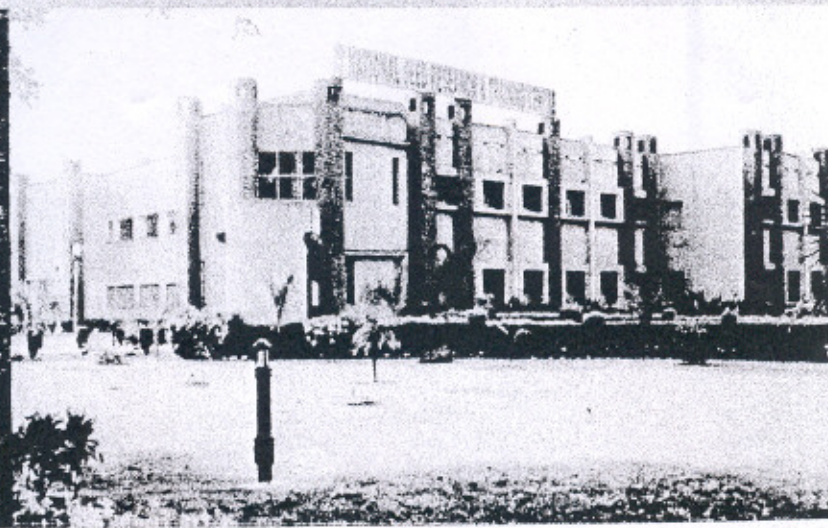
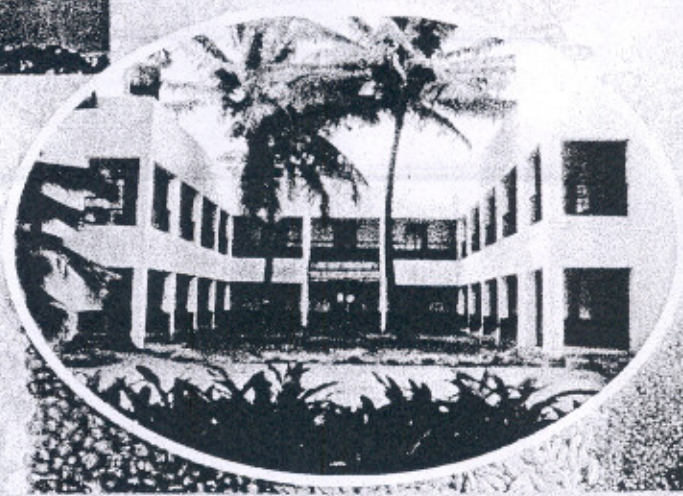
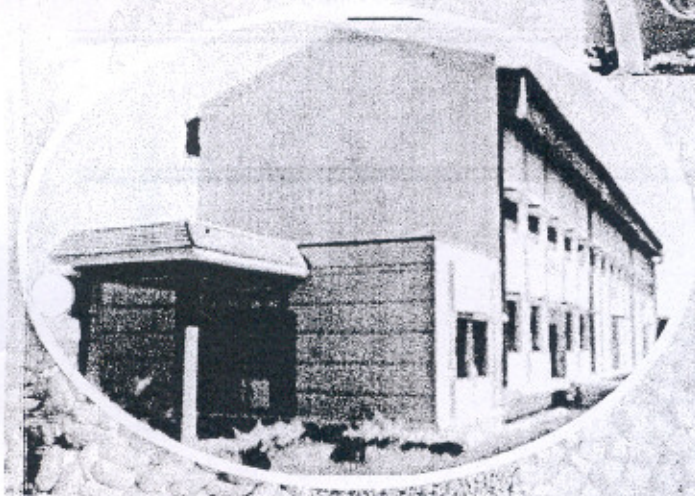


**UNIVERSITY OF AGRICULTURAL SCIENCES
BANGALORE**



**NATIONAL SEED RESEARCH AND TRAINING CENTRE
VARANASI**

**NATIONAL SEED
CONGRESS - 2008
SOUVENIR**



DEVELOPING A COMMUNITY BASED SEED SYSTEM

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ABSTRACT

A little-known, under-appreciated and pressing concern in the global supply of crop seed is a dearth of systems providing seed for crops of import mainly to poor households in developing countries. Seed for such crops cannot be supplied economically by the formal and centralized seed sector. The resulting bottleneck in seed supply primarily affects self-pollinating food-feed crops, such as Sorghum, Pearl Millet, groundnut, chickpea, Pigeonpea, black gram and green gram etc., which are served largely, if largely ineffectively by local seed provision systems. The lack of scientific knowledge of seed production, quality control and innovative interventions are the main handicaps of farmers' seed systems, which have resulted in inferior quality seed and poor outputs. This paper discusses the preliminary process for developing farmers seed system or informal seed system at village level to develop smallholders village seed bank for seed security and interventions most likely to improve seed supply by, among and to the poor. The mechanisms of creating and training seed growers' associations to promote seed production and distribution at village level are also detailed here.

Introduction

Throughout our history, farmers' informal seed systems have had a great influence on the evolution of modern agriculture, by practicing conservation of agro-biodiversity at the gene, farmer and ecosystem levels. Within this framework, women in particular have played a crucial role, as has been identified by a relatively recent analysis, in sustaining the informal seed sector, and more widely, in ensuring food security. However, informal seed systems are heavily dependent on local resources and inputs, and highly vulnerable to natural disasters and sociopolitical disruptions. Therefore, investing in innovation in order to strengthen local seed systems assumes great urgency.

The formal seed sector provides the vast majority of seed to farmers in the industrialized countries while both seed systems, formal and informal, operate in developing countries. Despite large investments in formal seed sector in developing countries over the past 30 years, 80-85% of smallholder farmers still get their seeds from informal sources. In the formal sector, which is state- or private-controlled, seed is monitored through the entire process of breeding, multiplication, processing and storage, leading to the final product. In contrast, in the informal sector, it is mainly the farmers themselves who provide each other with seed for sowing. The seed may be manually cleaned, a mixture of varieties, unprocessed, but is otherwise non-treated (Ravinder Reddy et al., 2007), which exposes the crop to the risk of seedborne diseases. Therefore, efforts to strengthen the community seed system should incorporate all aspects of modern seed activities. The process of seed production to sowing in formal and informal sectors is presented in a diagram (Fig.1) showing dimensions of seed systems.

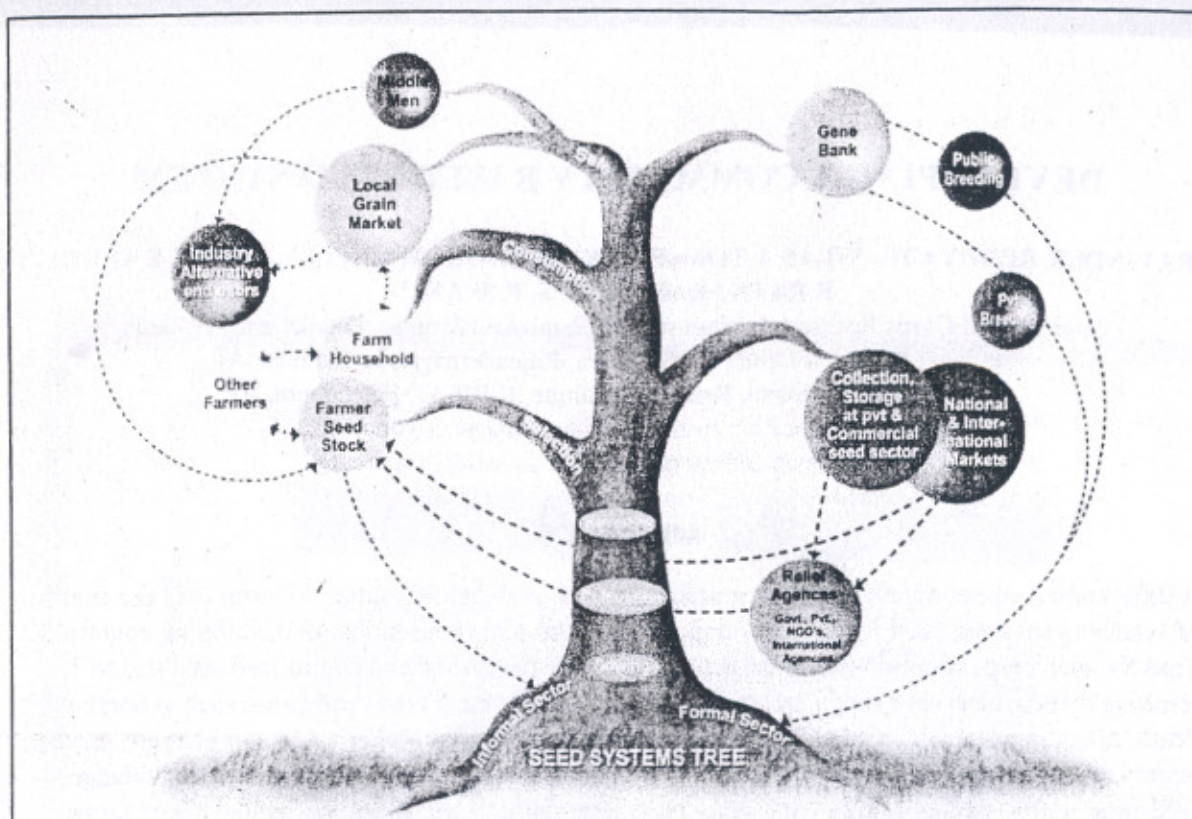


Fig.1: Dimensions of seed systems

Farmers have for centuries selected and saved seeds to grow in the next season. They learnt to cross-pollinate plants by hand or by mixing varieties within the same field to maintain and adapt their crops. Thus they assisted in the evolution of locally adapted crops. Some of these varieties may be resistant to certain pests, and others more tolerant of salinity or drought. Some varieties can be sown or harvested earlier or later in the season. Traditional crops also provide a wide range of nutrients to the diet. The seeds of traditional crops and knowledge of their growth and use are therefore important resources and should be conserved and used.

The quality of farmer-saved seed is constrained by poor harvests, inadequate on-farm storage facilities (Meena Kumari 2006, and Ravinder Reddy et al., 2007), insufficient means to multiply quality seed and poor seed distribution systems. There is thus a need to strengthen the local capacity to produce, store and distribute seed of many crop varieties, including some landraces/farmers' varieties, which are useful in diverse and evolving farming systems.

Steps for Strengthening Community Seed Production, Saving and Storage

- (a) Appropriate policies for seed production and distribution are needed to help focus government-supported initiatives on the varietal needs of resource-poor farmers with particular attention to the needs of women farmers, and to minor and food-feed crops that are inadequately covered by the private sector.
- (b) Promote small-scale seed enterprises and strengthen linkages between gene banks, plant breeding organizations, seed producers and small-scale seed production and distribution enterprises.
- (d) 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.

- (c) Support and strengthen farmers' organizations in order that they can more effectively express their seed requirements, paying particular attention to the needs of women and of vulnerable or marginalized groups.
- (d) Provide training and infrastructural support to farmers in seed technology in order to improve the physical and genetic quality of farmer-saved seed.
- (e) Develop approaches to support small-scale, farmer-level seed distribution, learning from the experiences of community and small-scale seed enterprises already in operation in some countries.
- (f) Seed quality of farm-processed seed can be as good as and often better than certified seed if farmers take 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 required.

Seed Quality Guidelines for Farmers

a. Seed production

- A seed is likely to give rise to a plant that has characteristics similar to its parent plants, unless the parents come from F1 hybrid seeds. Therefore, seeds should be selected from strong and healthy plants.
- It is very important to remove non-healthy or diseased plants from the field as soon as they are seen. Plants with non-desirable characteristics should be removed from the field before they flower and pollinate other plants, but after making sure that there is a diversity of characteristics in the field.
- If a farmer wants to develop or introduce specific characteristics in a plant, he can do so by controlling the pollination of plants chosen for seed production. To combine desirable characteristics, the farmer can transfer the pollen from a chosen plant to fertilize another chosen plant. For plants such as maize, which are usually wind-pollinated, the male flower should be shaken over the female flower to transfer the pollen.
- If plants are being cross-pollinated for particular characteristics, the farmer must prevent the pollination of the chosen plants by pollen from plants with other characteristics. This can be done by isolating the plants as prescribed.
- Seeds must be dried to the prescribed moisture level before storing them to improve their storage life. Moisture in the seed may encourage mold, bacteria or other pests and diseases which may affect seed viability.
- On the other hand, seeds should not be dried too much or too rapidly as they may crack or lose their ability to germinate. They can be dried in the morning sun or in partial shade, but should not be exposed to strong sunlight.
- To dry seeds, spread them out thinly on paper, cloth, flat basket or plate in a warm place off the ground. They should not be dried on metal as it may become too hot. Turn over the seed several times a day to ensure even drying. When the seeds do not feel damp or stick together, they are likely to be ready for storage.
- Any seeds that are immature, broken, diseased or pest-infested should be taken out. Stones, dirt and seeds from other plants should also be removed.
- Winnowing can remove smaller contaminants such as dust, weed seeds and dry leaves. To winnow the seeds, place them in a large flat container and toss them into the air when there is a gentle wind, then catch them in the container. The light contaminants will be blown away by the wind.

b. Seed certification

- To encourage decentralized seed production, the "truthfully labeled" designation could be used as an alternative to the existing system of centralized public certification. In this case, no field inspection is made, producers are wholly responsible for seed quality, and are required to describe certain quality aspects on the label (Tripp and van der Burg 1997). However, under such a system there would be a need to develop enforcement mechanisms that might operate by involving individuals (possibly extension agents) who have been trained by the public certification agency in field inspections for artisan quality seed, or by shifting the responsibility for quality control to an autonomous or local public institution, including seed certification agencies. In both cases, producers should pay for the field inspection services.

c. Seed storage

- Seeds must be stored in a way that prevents them from being attacked by pests or diseases, and that maintains their quality. Some seeds can be stored for a long time without losing their germination rate, and others for only a few months. This depends on the type of seed, the moisture content of the seed and the storage conditions. Good storage conditions for seeds are: Low moisture, low temperature, low light, protection against rodents, protection against insect pests and diseases.
- High temperature can encourage biological activity in seeds and shorten their storage life, particularly if there is any moisture in the seeds. Bright light can also be damaging to stored seeds. Seed containers should be kept in a cool area and out of direct sunlight.
- To keep rodents away, seeds should be stored in a hygienic area. The floor should be swept so there are no scraps of food that may attract rodents. Seed containers should be well-sealed and if possible kept off the ground so that rodents cannot get in. Sometimes seeds are stored in specially built huts that are raised off the ground.
- Storage weevils, fungi and bacteria can infest seeds in storage. Seeds should be free of such pests before storing them. Weevils, fungi and bacteria multiply in warm and moist conditions. To prevent this from happening, the seeds should be kept dry and cool. Appropriate pesticides/substances may be mixed with the seeds to help prevent pests and diseases. Mixing the seeds with clean, dry sand and filling the container will prevent weevils moving around.
- The quality of the seeds affects how well they will store and their ability to germinate and grow well in the field. Testing the seed before storage ensures that only good quality seeds are stored. A germination test gives an idea of the proportion of plants that are likely to grow from a certain quantity of seed, and will show how many seeds must be sown in order to obtain the desired number of plants. Use between 10 and 100 seeds for the germination test, depending on how many seeds there are.
- To test the germination rate, place the seeds some distance apart on a clean damp cloth or paper towel. For large seeds it is better to use sterilized soil. Soil can be sterilized by pouring boiling water over it to kill germs. The seeds should be placed somewhere warm, but out of direct sunlight. Keep the seeds damp, but not too wet, by sprinkling with water or covering with a clean damp cloth or paper towel.
- If none of the seeds has germinated, it may be necessary to leave them for more time, keeping them warm and damp. If most of the seeds have germinated and have healthy-looking roots and shoots, the rest of the seeds from that harvest should be viable and suitable for storage and sowing. If less than half of the seeds have germinated, or if many of them are non-healthy, the rest of the harvest are probably also non-healthy with a low germination rate. The farmer may decide not to store these seeds. If seed are in short supply, these seeds may still be stored and sown, but a note should be made that they are not good quality seeds. It may be useful to test the quality of seeds before storage, and to test home-saved seeds and seeds that have been bought or exchanged, before sowing them.

Community Seed Program

The response from farmers to development initiatives varies from one place to another. Some of the factors motivating them as seed growers include a good harvest and increased income from the sale of seed. A poor harvest in the first season can discourage them and lead to them giving up.

While some farmers do become self-reliant within a few seasons, it takes a minimum of five years to develop a sustainable community seed program. The first three years should focus on capacity building such as technical training in seed production, business skills, group dynamics, leadership and getting farmers to understand the seed production process (Ravinder Reddy et al 2007). The next two years should concentrate on exit strategies or the final handing over of the management of seed production to the community. Some of the important activities during this last stage include taking farmers on orientation visits to places such as research stations and gene banks (for seed sources) and the State Seed Certification Agencies (SSCAs). This will acquaint the farmers with seed production and certification procedures and expenses. In addition, seed producers should visit seed companies and other service providers (eg., NGOs, KVKs) has potential market outlets. A study visit to other, more experienced seed growers' associations would be of benefit to new seed growers.

The Model

A basic model for developing a community seed program detailed below must have universality in developing community seed systems in the semi-arid tropics. The basic objective of the this program operates at village level, with the farmers participation in seed production, harvesting and storage with in the village, involving low or minimum quality parameters on mutual trust among the farmers. The seed produced with an aim to distribute among the farmers of the village or couple of villages. A model developed for a specific area/village/region (Almekinders et al., 1994; Cormwell 1990; Lewis and Mulwani 1996; Rohrbach et al 2002; Ravinder Reddy and Wani 2007;) may not yield the same result elsewhere because of the variation in the willingness of the stakeholders, the crops and varieties grown, climatic conditions, socioeconomic and perhaps biotic factors.

a). *Reconnaissance Survey*

After identifying the areas of operation, the nongovernmental organization (NGO) or project implementing agency (PIA) should carry out a reconnaissance survey of seed needs assessment (SNA) (Ravinder Reddy et al. 2006). This is a series of participatory dialogues to engage a community in a diagnosis of the problems relating to seed and to secure the community's commitment to develop and act on its own solutions. The SNA will also identify knowledge gaps that can be corrected during training. The SNA should assist communities in developing an action plan on what needs to be done, while remembering that the role of the NGO is only to facilitate this process.

b). *Participatory Selection of Crops/Varieties*

It is for the communities to identify the crops and varieties to be multiplied. There is a tendency for farmers to select only improved varieties at the expense of important local varieties. Facilitators should check this tendency. Farmers should be encouraged to select a good mix of crop types (crop diversity). Locally adapted varieties would be ideal in the first year. This tends to increase the chances of success since farmers already have adequate experience growing them. The NGO should be proactive in promoting farmers' participation in the selection of varieties/crops for a particular area/region/village (Sreenath Dixit et al., 2005).

c). Selection of Seed Growers

Once the crops for multiplication have been identified through farmers' participatory selection, the community can select individuals who will be the seed growers. Since food legumes are known to be conserved and multiplied mostly by women, it is only appropriate and advantageous that seed production of such crops be done by them. To help farmers carefully select their local seed growers, the NGOs can help facilitate a process developing criteria for selecting seed growers. Some suggested criteria are

- He/she should be resident of the village.
- Inclination for basic agriculture and willingness for innovations
- Should be a farmer with land holding.
- Willing to attend training programs without fail.
- He/she should be friendly in nature and approachable to others.
- Inclination to put in sincere efforts.
- Must be willing to work in a team.
- Experienced in growing one or more of the crops intended for multiplication.
- Must be honest and willing to repay seed loans.

Having such a set of criteria reduces bias and helps farmers to choose the seed growers correctly. Experience has shown that where an NGO decides to interpose and select the seed growers, other farmers have had to secure seed for them instead.

d). Capacity Building

After seed growers have been identified, technical training should follow. The seed growers are trained in basic seed production techniques including rules and regulations and seed certification methods, seed health management and seed storage management. Training is enhanced when followed by an educational tour to areas where similar programs exist. This is farmer-to-farmer learning. Farmers must be trained in business skills and some basic group dynamics and leadership.

As with all farmer training, the trainer should be conversant with principles of adult learning and facilitation skills. Training can be conducted by competent extension officers so long as they fully understand the basic seed production standards and the Seeds Act. For such innovation projects a consortium approach has yielded good results (Ravinder Reddy 2006)

e). Procurement of Basic Seed and Distribution

The NGO or farmers need to secure basic seed (foundation seed) for their seed production activities (Ravinder Reddy et al. 2006). Basic seed can be difficult to secure. Therefore, a proper seed source has to be found much before the start of the season. Where poor weather has affected the growing season, it would be imperative to arrange seed for the following season. It is advisable to subcontract breeders recognized by government or research organizations to produce basic seed in specified quantities. Contact arrangements may be worked out for a specific period to ensure timely supply of basic seed.

In the absence of basic seed, a seed grower can plant certified seed, but only for one season. Thereafter farmers must secure basic seed for producing quality seed for long-term benefits.

f). Formation of Seed Growers Association

Some seed growers would certainly prefer to work as individuals but in seed growing, forming an association has the following advantages:

- Registration is cheaper for a group than for individuals. Self-help groups can take up this activity right away without any registration.
- It is cost-effective to work as a team when procuring basic seed and selling seed: There is the benefit of bulk buying and selling.
- Group contributions can be used for paying for activities such as crop inspections, seed sampling and testing and inputs for seed production.
- During the early years of seed growing the team is important for providing mutual support, encouragement and a collective voice.
- However, for farmers to work effectively as a group, needs assessment can determine whether they need to be trained in group dynamics, leadership, record keeping, conflict management and business skills.
- The seed growers association would be required, in the longer term, to mobilize funds to sustain their seed growing activities.
- Farmers associations will develop social and human capital in the village

g). Seed Marketing

The success of a community seed project lies in the ability of the seed growers to sell their produce. Some farmers have used field days, weekly village markets, and village local market days as a way of advertising available seed to fellow farmers. Others have used public meetings and ceremonies in their villages to sell seed. Seed growers should be innovative in adopting ideas that are workable within their rural setup. They, however, should be careful not to price their seed beyond the local farmers' willingness to pay (Ravinder Reddy et al., 2006).

Wherever possible, help establish a credit scheme such as a revolving fund. This will enable community-based organizations to buy up seed from seed growers which will then generate new loans for resource-poor farmers. Some farmers do loan seed to other farmers, to be repaid later in the form of kind (grain), labor or livestock. Marketing of seed produced by village farmers for village seed bank, has a inbuilt strategy to sell their produce through linkage network of VSBC (Village Seed Bank Committee) with CBOs (Community based Organizations) within the village and as well as to other villages through their Self Help Groups (SHGs).

After selling off their produce, farmers should be encouraged to save some of the income for purchasing new seed and covering other overheads in the next growing season.

Many development projects have used community-level seed production as the starting point for commercial seed development. The results have been disappointing with little commercial sustainability. The reasons for this lack of success are two fold: a lack of attention to transaction costs (for making contracts for source breeder seed, funding for procurement of seed and ensuring quality control and obtaining information) and a lack of experience and resources for marketing. Community-level seed projects need more appropriate goals to be successful, such as testing and disseminating new varieties, developing farmers' participatory experimentation and capacities, and bridging better links between farmers and researchers.

Interventions Needed

It is clear that there are various formal and informal approaches to seed supply. In fact what is encountered is usually a complex mix of the two in varying proportions. The alternatives to promote the

most suitable blend, so as to make the best quality seeds available to the farmer at the right time and at the right price. In such a perspective, the components of the seed supply system would emerge as neither necessarily complementary nor supplementary in relation of one to the other-although it may sometimes be so. Various components in the chosen mix would assume equal importance in approach but not in their relative contribution toward seed supply. Further, no components may probably exist as mutually exclusive; several alternatives may exist and function together. Therefore, the following interventions and future strategies need to be considered to strengthen alternative seed systems:

- Implementing Farmer seed self-reliance programs through community or village seed bank program or 'Beej Swavlamban Yojana' facilitating decentralized seed production and distribution system
- Developing contractual agreements with farmers to grow seed and establishment of parastatal seed cooperatives.
- Improving supplies of seed for forages, medicinal plants, flowers and underused crops that could benefit resource-poor farmers.
- Promoting community-based evaluation, characterization and multiplication of "at-risk" varieties. Collection and characterization of indigenous grain varieties and establishment of in situ seed conservation centres to reduce the risk of local varieties disappearing.
- Building capacity of self-help groups to facilitate community seed banks and provide incentives for farmers to grow indigenous varieties and seed conservation efforts.
- Facilitating community-devised and generated marketing and credit support systems.
- Introduction of controlled conditions to effectively produce nuclei seed; facilities for seed storage, processing, and packaging and establishment of public-private sector partnerships for seed distribution.
- Practicing of Farmer participatory varietal selection, seed production and monitoring. On-farm demonstration trials, on-station seed selection, and distribution of seed to private suppliers.
- Continual identification of opportunities for mutual learning by farmers and scientists to help improve the effectiveness of seed supply to local communities.
- Designing, developing and testing site specific alternative seed system models for improving and sustaining local seed supply based on geographic and ethnic as well as administrative boundaries.
- Taking into consideration and utilizing aspects of the lesser known traditional seed management systems

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