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## **Mali Seed Sector Development Plan**

### **Initiative to End Hunger in Africa: Agricultural Policy Development Program**

#### **Executive Summary**

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# Executive Summary

## Introduction and context

The objective of this study is to identify interventions that are likely to be productive components of a possible USAID seed-sector intervention in Mali.

Despite a good history of varietal development of millet, sorghum, maize, rice and cowpeas, most Malian farmers retain their own seed or exchange with nearby farmers: few use improved, high-yielding varieties or certified seed. This is especially true of those growing traditional crops: millet, sorghum, cowpeas, groundnut and upland rice. The low fraction using improved seed undoubtedly leads to significantly lower agricultural production, and thus lower farm incomes than would otherwise be possible.

However, several efforts are underway to improve crop varieties, and make them more available to Mali's farmers. Breeding done in the international private sector, at the international centers of the Consultative Group for International Agricultural Research (CGIAR), in Mali's national programs, and by private companies and individuals is expected to provide a steady pace of improvements in crop varieties for the foreseeable future. The challenges will be to effectively develop these scientific and technological advances within the Malian context and to ensure their adoption by the country's farmers.

The *Institut d'Economie Rurale* (IER) provides new varieties for a range of crops. Recently it has taken the role of producing and selling foundation or basic seed to the National Seed Service (NSS). In turn, NSS organizes production of first generation seed (R1) of improved varieties and uses trained farmers to further multiply, attempting national coverage. NSS oversees the operation and buys R1 seed. The independent National Seed Laboratory certifies the seed before it is sold. NSS sells R1 seed to village seed production associations who produce second-generation seed (R2). The National Seed Laboratory also certifies R2 seed. In the past, the volume and diversity of improved seed made available to farmers through this mechanism has fallen far short of demand. However, NSS has completely changed in the last three years. From a pure government operation with its own farms, staff and equipment, but with almost no operating money, it has become a coordinating agency for village seed production associations (VSPAs), leading them to produce for national needs through the Seed Sector Support Project (SSSP), financed by the African Development Bank (ABD). SSSP plans to produce a large volume of seed and keep production costs low. It remains to be seen if the proposed 7,150 tonnes of certified seed proposed for sale in 2009 can be realized.

## Some problems

SSSP is described as a privatization plan, but the VSPAs are poorly placed to fill a commercial role, with each association privately producing and distributing seed and without involvement by large-scale Malian businessmen. Under SSSP, the supply chain for improved seed will need an orchestrated combination of efforts by farmers, farmers' groups, VSPAs, IER, ICRISAT, NGOs, DNAMR (the Rural Support Directorate of the Ministry of Agriculture, Livestock and Fisheries

(MALF)) and the private sector to ensure that farmers continue to receive improved seed and the necessary accompanying information. In some cases, farmers' associations may eventually find seed distribution a profit-making operation but experience in other parts of Africa indicates that this outcome will not be frequent.

The generation and flow of information about the performance of different varieties remains a government function, with the flow of information back and forth between the farmers and the IER forced to pass through divisions of MALF.

In the absence of plant variety protection (PVP, intellectual property laws for new plant varieties) or varietal exclusivity, private companies have little incentive to collect information about the performance of new varieties. Local vegetable seed breeders need PVP laws if a private sector is to develop. In addition, cotton is important in Mali and the possibility of international cooperation with commercial cotton-seed companies should generate substantial benefits. While a great deal of inertia is expected to slow the adoption of PVP laws, the World Trade Organization's requirement for a PVP law provides a motivating factor.

DNAMR is responsible for testing varieties at its 52 local branches and feeding information to and from IER. Within DNAMR, two divisions are involved with seed. One is responsible for extension and supports the information exchange with IER; the other is responsible for support of agricultural input supply and works with the NSS.

Contradictory laws governing seed have been drafted with little input from farmer groups, professional associations, private seed growers or the recently formed seed-importer associations. Neither of the two organizations set up to co-ordinate the National Seed Plan – the National Seed Council and the National Seed Variety Committee – has farmer or private-sector representation. The National Seed Council meets too infrequently to fulfill its role of planning the level of R1 seed needed to meet a recommended seed-variety renewal period of three years. The National Seed Variety Committee meets, but has not kept the national seed variety catalogue up to date. The seed laws do not provide for "truth in labeling" except through certification, so seed information is not available in informal village-level seed trade.

Vegetable farmers and those growing maize and irrigated rice use more improved seed than those growing traditional crops. Traders import vegetable seeds, usually from Europe but there is also seed production in Senegal and some in Côte d'Ivoire. In addition, traders import some seed from other countries in West Africa. Imported seed is subject to sanitary and phytosanitary control as it enters Mali. There is a lack of information on private-sector participation – by importers, producers and distributors – in the seed industry. However, Malian farmers can benefit from imported high-quality, internationally certified seed, sometimes immediately or, more usually, after local testing and adaptive trials. In addition, some French seed companies in joint ventures with Malian partners carry out adaptive trials of seeds in Mali to develop commercial vegetable seed tailored to the West African market. Such collaboration benefits Malian farmers, as well as other farmers throughout West Africa. These companies are usually representatives of the major global US and French vegetable seed companies. Malian farmers could also benefit from improved availability of public-sector vegetable varieties, created by IER, and the African Vegetable Network coordinated by ICRISAT and AVRDC.

Traditional farmers know little about the range of seed available. The National Seed Service plans to use the *Observatoire des marchés agricoles* to add a seed-market information report to its current service. A nexus of private-sector promotion would benefit from contributions from an agricultural input suppliers association, chambers of agriculture, trading networks and NGOs. The resulting seed market network should have links to operators in neighboring countries that already produce seed for peanuts, maize, beans and forage crops.

It is possible that SSSP will organize sufficient support for seed multiplication by producer groups, including those organized by NGOs. There exists scope for productive donor support and NGO support for on-farm testing activities oriented to the design of appropriate packages of seed, fertilizer and water-retention technologies, for the whole range of cereal, legume and vegetable crops.

The progress in varietal selection in the last 30 years has not been as great as it might have been. One major reason for the relatively slow progress has been weak linkage between research and the farmer-customer. Much has been done to improve the responsiveness of research organizations to the needs of the small scale farmer, but some inherent difficulties remain. The private sector does not currently find seed multiplication for these crops profitable, and when it does start, it will not generally be oriented to the job of varietal selection and on-farm testing until exclusive varieties become both possible and available.

There is a need for a sustainable means to distribute new varieties. The village seed production associations, even lead by the NSS, will find it difficult to commercialize large volumes of seed because profit margins are small, and yet the improved seeds offer significant yield gains – of the order of 15 to 25 percent – particularly in combination with other inputs. However, it is likely that currently existing agricultural input traders will enter into the seed business with some success. As production volumes organized by the SSSP increase, a major opportunity should occur to assist in the development of companies with marketing and distribution capabilities that may be more able to aid in the planning and creation of demand than the VSPAs.

A core challenge to the design of effective interventions in the seed sector in Mali stems from the differences in the approaches that are appropriate for the cash economy and those that are appropriate for the subsistence economy. The corresponding opportunity is that effective use of improved seed may shift the dividing line between the cash and subsistence economies, and improve the productivity and stability of both.

Where farmers can produce varietal seed, there is also a division between markets where the economic asymmetries will keep seed markets from operating effectively and those where quality factors can induce farmers to purchase seed.

For the purposes of discussion, the seed market can be divided into the following sub-sectors:

- High-value crops with seeds that are difficult to reproduce: vegetables, hybrid maize, hybrid sorghum and hybrid millet.
- Crops that are used in the cash economy and which have seeds for which quality is difficult to achieve or maintain: varietal cotton and varietal peanuts.
- Crops that are used by those in the cash economy and have seeds that are relatively easy to reproduce: varietal maize.

- Crops that are used by those outside the cash economy and which are relatively easy to reproduce: millet and sorghum.
- Disaster relief.

Different approaches are proposed for different categories.

## **Potential interventions in the Malian seed sector**

### **Regulatory environment**

Three regulatory elements to promote are the development of truthfully-labeled seed, PVP law and variety registration.

To broaden the market for quality seed, government should encourage “truthfully-labeled seed”, in addition to formally certified seed. In the absence of certification, truthfully-labeled seed would carry a label providing basic information, such as the name of the producer, the weight of seed, the germination rate, when the seed was tested, physical purity, etc., with serious penalties for fraudulent labeling. Truthfully-labeled seed would encourage trade in improved varieties of seed beyond the cash economy and where the certification system cost would be a restriction to the distribution of seed through informal channels.

The benefits of exclusivity in variety development and variety testing need to be communicated frequently and with conviction. In addition, some positive impact might be made through the creative use of existing law.

While the National Variety Committee (CNV) is accelerating approvals, they should take steps to make sure that news and information about varietal performance and registration is widely distributed. In addition, linkages to the corresponding regional catalogue must also be assured. Those conducting registration trials should be rewarded for the quality of their work and the number of good varieties that are used by farmers, regardless of origin.

### **Public goods (IER and DNMAR)**

In the absence of PVP laws and a varietal exclusivity policy in the distribution of new varieties from publicly-funded research, there will be a need for public support of on-farm testing and of the distribution of the information acquired to researchers, seed distributors and to farmers to reduce transaction costs in the acquisition and refinement of new technology. This can be achieved through development of a variety information database to synthesize available information and subsidies for on-farm testing by private seed-supply companies as they come into existence.

Given the long-term planning horizon for investments in research and limits to government resources, foreign assistance will continue to be both productive and necessary in the area of public plant-breeding. Potential means of support include building linkages with existing plant-breeding programs (such as those of ICRISAT and ILRI), evaluation of research performance, and the development of facilities and equipment to support efficient and adequate production of foundation seed.

On-farm testing systems need public support and DNAMR does not have adequate resources to do the job of linking IER with farmers and assuring adequate communication in both directions. Support is needed for the cost of local testing, transportation, communication, convening meetings and the preparation of documents. The seed activities of two of DNAMR's divisions could be combined to feed VSPAs with better information on new varieties to allow them to anticipate demand. Alternatively, DNAMR could move its variety testing and seed-related activities to NSS, thereby bringing all of the seed activities together under a single management structure, thus feeding demand and performance information could be back to IER, and allowing performance information to be used in new production plans. At village level, if seed laws change to allow for quality-declared seed, it becomes worthwhile to train VSPAs in the production of higher-quality, labeled seed. This type of support would help spread new varieties faster and potentially improve the quality of the seed of traditional varieties available in the villages.

## **Support business development**

SSSP should result in a significantly developed seed supply over the next few years. One sign of success will be supply-demand imbalances. The moment will then have arrived to support the development of commercial seed businesses that will sustainably develop the sector. Support would likely take the form of technical training, business training, forging links to international organizations, linking to sources of equipment and technology, financing operating funds and investment, and developing a seed price information system. From among the traditional field crops, it is likely that rice, maize, peanuts, and cowpeas will make the transition to commercial status, in that order. Hybrid varieties of sorghum and millet may eventually become commercial, but are expected to remain of modest importance for some time. This study identifies specific likely entrants into the seed business. The large vegetable seed companies would not require support for vegetable seed trade operations but potential interventions might support the development of commercial businesses for non-vegetable crops (including forage crops), as well as the entry of small local private seed companies in the vegetable seed business. In addition, there is already a need to build a local seed trade association, affiliated with the African Seed Trade Association, to promote changes in government legislation and regulations that respond to commercial needs.

Some village seed production associations can be transformed into private seed companies. Those that emerge with market orientation and good organizational skills, they should be given the same opportunity for training and support that may be available to new commercial companies under the potential interventions listed above. In addition, the interest shown by the Association of Professional Farmers' Organizations in on-farm testing and support for village level seed production should be encouraged.

## **Introduction of new varieties**

Launches of new varieties will involve on-farm testing and demonstrations performed by the research organizations and MALF's local agricultural development agents. NGOs will also be involved, but the ability of these organizations to adequately cover the launch of a new variety requires support.

For sorghum and millet seed, even though tradition and economics work against the development of significant markets, there is an advantage in introducing new varieties. Free market approaches will

not maximize the potential value of the varieties to Malian society, so three different kinds of subsidized programs should be considered: small-packet programs, coupon systems and lending programs. Small packet programs allow farmers to try new varieties at low cost. A coupon program would follow a small packet program. It would allow organizations promoting new varieties to sell subsidized coupons for the purchase of seed from a range of certified seed sellers, public and private. Certain seed would be promoted but farmers would be free to redeem the coupons for any seed from any dealer acceptable to the managing agency, thus encouraging the development of seed trade in areas where it would not otherwise exist. A coupon system could be used to promote truth-in-labeling or quality declared seed, which would help spread varieties by allowing local farmers to sell to neighboring villages without violating seed laws. Publicity thus accomplished, existing local microfinance associations could receive funds to make loans specifically for seed and only seed. Promotion of demand for forage seed is likely to follow the same pattern.

In contrast, while vegetable seed will generally move through the private sector, the commercial sector will not want to promote some species, such as cassava and potatoes. For these crops, producer associations may need help in finding customers for their starts, tubers or cuttings. Support should focus on crops where commercial involvement is least likely.

The coupon system can also function as an effective emergency seed-delivery mechanism. Coupons would be free; recipients would be chosen based on need. In emergency situations outside the normal cash economy, a coupon system could be combined with seed fairs. Further, microfinance seed-loan programs can operate in emergency situations without dramatically changing program administration. (The need for interchange of seed in emergencies is another reason for relaxation of the seed laws.)

### **Strengthening demand for new varieties**

Direct and long-term support for the use of new sorghum and millet varieties and other species where commercial success is unlikely can increase the public good through more efficient grain production and wider adoption of new varieties. It has a favorable environmental impact by increasing the amount of land that can be left fallow. This in turn can decrease the pressure on fragile ecosystems and biodiversity.

Opportunities for synergies to boost returns from the SSSP program include support for: compliance with PVP principles through payment of royalties of developers of varieties, even before the passage of a PVP; judicious selection of VSPAs; NSS pricing that reflects market realities in order to encourage private participation in the market for seed; training of farmer-growers in the areas where those companies wish to produce; existing seed-production companies and individuals; sufficient floating-rice seed-production capacity; and development of fruit-tree reproductive stock.

### **Biotechnology**

There exist opportunities to put biotechnology to work to increase productivity in Mali's agricultural sector. The development of the capability to use biotechnology at IER should be supported, particularly the development of staff familiar with the potential of the technology and the safety issues, as well as regulatory capacity within the MALF and the Ministry of Health. Beyond regulatory approval, there are issues of technology ownership that can usefully be addressed for existing

biotechnology. In some cases the owners may have decided that they have no interest in the Malian market and may be willing to donate their interest. When that is the case and a Malian or regional research organization has already identified the technology as of significant, facilitation of approval for its introduction to Mali would be useful, as would the regulatory evaluation of selected biotechnology.

In addition, Bt cotton can be expected to reduce the amount of insecticide treatment necessary in Mali. Given the labor-intensive nature of Malian cotton production, a reduction in insecticide use would likely represent a major improvement in farmer safety, as well as environmental safety. Mali should be willing to negotiate a royalty with Monsanto, the owner of Bt cotton technology. In order to start the process, the government will require support in order to approve and undertake field trials that will establish the added value. The fiber products are not eaten and should be of minimal concern to the Ministry of Health, where food safety might be evaluated. Almost no Bt protein or DNA appears in the oil after it has been refined, so the oil would also be of minimal concern. Significant amounts of the Bt protein and DNA do appear in cotton seed cake, and have been found to be substantially equivalent to normal cotton seed cake for use in animal feed.

## **West African regional context**

Regional seed movement can stabilize supplies, reduce cost and increase the range of varieties available to the customer. Regionalization of the seed industry will allow for higher returns to research investment, lower costs of production, lower costs of holding inventory, stable supply, better variety testing, and a reduction in the phytosanitary and treatment restrictions to trade. Regionalization of seed trade is already happening in the vegetable seed sector. Although current regulations may not be entirely favorable, support of regional information about seed prices, demand and availability can help the sector become more efficient.

Harmonization of seed laws is proceeding with respect to phytosanitary, certification and registration regulations. A CILSS-INSAH initiative is relatively advanced: they have drafted regional compromise standards for certification, phytosanitary laws and for registration, as well as a combined catalogue of registered varieties. There is mutual agreement that there is no need for phytosanitary restrictions for shipment of seeds among the CILSS countries. A separate ECOWAS initiative should receive continued support to enable full regional harmonization. However, regional harmonization is ignoring uncertified, quality-declared seed and PVP law. These are important omissions, which should be rectified. Success in some of the regional harmonization issues might make West Africa more attractive to outside seed businesses. Mali could offer such firms incentives to target the West African market.

Accumulation of information about donor-funded projects similar to Mali's SSSP program, sharing information on best practices, and generating contacts for seed sales to resolve shortages and surpluses all hold out hope for productive information exchange.

The proposals for harmonization have not addressed biotechnology, though it can be best addressed at a regional level if there is a West African consensus. If there is general support for biotechnology in the region a regional approval mechanism for the evaluation of agricultural biotechnology would be very efficient.

## Recommendations

Detailed discussion in chapter 8 leads to specific recommendations for the actions that USAID Mali could effectively take to promote the seed sector:

- 1) Encouragement to NSS to change its seed pricing policy to reflect market realities at planting time and thus allow a clear profit for commercial seed production.
- 2) Support of the expansion of the commercial seed sector with loans for equipment and operation, and training for technical and business staff.
- 3) Support for the distribution of new sorghum and millet varieties and the expansion of commercial seed business into sorghum and millet areas.
- 4) Distribution of very small packets of new varieties in specific sorghum and millet-growing areas to which they are adapted and sold in local stores, at the rate of one year per new variety.
- 5) Sponsorship and subsidies for a coupon system allowing farmers to purchase subsidized coupons and redeem them for seed, encouraging commercial seed companies to expand into the area.
- 6) Financing seed loans through local micro-finance organizations (*caisses villageoises*).
- 7) Support for miscellaneous projects at NSS:
  - a) women's associations producing vegetable seed
  - b) upgrading the 60 ha floating-rice seed-production facility at Mopti (at an approximate cost of \$400,000), if USAID proceeds with significant number of controlled flooding irrigation projects requiring floating rice.
- 8) Funding the purchase of cold-room facilities, foundation-seed operations and foundation-seed equipment at IER.
- 9) Financing an on-farm testing program either at DNAMR or AOPP.
- 10) Support to Malian regulatory changes favoring quality-declared seed, PVP, and evaluation of biotechnology, possibly accompanied by appropriate training.
- 11) Building forage seed needs into livestock development programs with forage research, including winter crops.
- 12) Donor coordination and coordination with the owners of biotechnology for freedom to operate.

The following table summarizes the relative benefits, costs and risks of these actions:

Project cost	Level of Benefits		
	Low	Medium	High
Low	7a. Women's vegetable seed (L)	4. Small packet distribution (L)	1. Change NSS pricing (H)
Medium		10. Regulatory changes (M) 11. Forage seed (M)	8. IER foundation seed (L) 12. Donor coordination (M)
High		7b Floating rice (M)	2 & 3. Commercial support (H) 5. Coupon program (L) 6. <i>Caisse villageoise</i> funds (H) 9. On-farm testing (L)

Note: Associated risk level: low (L), medium (M), high (H)