Timor-Leste's Efforts to Achieve Maize Seed Security Using 'Community Seed Production'

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ABSTRACT. Timor-Leste's national seed demands average of 750 tons of maize seed (assuming about 75,000 ha of maize are planted annually and seed replacement rate is 33%). In 2011 Timor-Leste could produce only 32 tons (4% of requirement) of quality seeds of '*Sele*', a high-yielding open pollinated maize variety (international name – LYDMR from CIMMYT India) recommended by the Ministry of Agriculture & Fisheries (MAF). The remaining seed gap is met by farmers' saved seed of low-yielding local varieties and by imports with the associated problems of cost, suitability and timely delivery. To enable and empower community groups to locally produce, store and market quality seeds , an ACIAR & AusAID-assisted MAF program (*Seeds of Life Phase 3*, 2011-2016) introduced 'community seed production' in the 2011-12 cropping season. A total of 320 maize seed producer groups were supported by MAF-SoL with seed production training of MAF and NGO extension staff and 5 kg of certified *Sele* seed per group, sufficient to plant a 2,000 m^2 seed plot. In the initial year of implementation 289 groups (90%) produced an average of 159 kg of quality *Sele* seed (totaling 46 tons) and 31 groups (10%) suffered total crop failure due to grazing animals. This locally-produced seed stored in an airtight 200 liter steel drums is sufficient to meet the seed requirement of all group members as well as extra for local barter or sale. Community seed production is a cost-effective, sustainable method of achieving local seed security. With consistent planning and implementation in each village, sub-district and district Timor-Leste could achieve local seed security, a necessary prerequisite to local food security.

Keywords: Timor-Leste, community seed production, community group, seed security, food security

Introduction

Timor-Leste is progressing towards a better future. Despite the global recession it is one of the fastest growing economies in Asia. The Government has undertaken various programs to raise the productivity of agriculture and to lessen the country's dependence on imports of food and seed. While these programs are producing results, a large number of people in Timor-Leste continue to suffer periodic food shortages in the lean season (MAF 2010).

Maize is the main staple crop grown by 88% of farming households in Timor-Leste (NSD and UNFPA 2011). Moreover, this crop is grown by the poor, majority living on marginal lands, rain-fed uplands, hills and mountains. Various factors contribute to low agriculture production such as low soil fertility, lack of fertilizer use, low level of mechanization and inadequate support for post-harvest storage. However, insufficient availability of high yielding improved variety seeds is considered a critical factor.

Experiences of the Seeds of Life Program within the Ministry of Agriculture and Fisheries (MAF) indicated that there is significant yield advantage of MAF-released crop varieties over local varieties under farmer management practices. According to the Seeds of Life Research Report 2011, the yield advantage of the MAF recommended open pollinated '*Sele*' maize variety (international name – LYDMR from CIMMYT India) is 47% higher than the traditional maize varieties (average result from 1,091 on farm demonstrations trials over 5 years 2006-2010). This potential to increase maize production is dependent on the availability at planting time of quality seeds of improved variety.

To service its approximately 75,000 ha of maize cultivation, Timor-Leste's annual maize seed requirement is 750 ton of quality seed per year (assuming 33% seed replacement rate). In 2010-11, the quality seed supply from the MAF was 4% (i.e. 32 ton) of the total requirement. This indicates the very limited outreach of improved maize seed and the large annual gap between annual seed requirement and supply. This seed gap is largely met through the use

of low quality seeds saved by farmers from their previous year's harvest and partly from seed imports.

When seeds are imported from abroad, there are concerns about the suitability of such seeds as they have not been tested in Timor-Leste's diverse agro-ecological conditions. There have been problems with imported seeds in the past. Imported seeds often result in late delivery to the farmers due to difficulty of timely distribution from the national capital to the district offices and then on to the distant Suco (lowest administrative unit of local administration) and Aldeias (Suco is further divided into 3-10 Aldeias) is always a challenge. Moreover, it is necessary to distribute seed just before the rainy season when road conditions are poor and deteriorating, particularly in remote areas. The imported seeds are also expensive (average of US$3.50/kg) hence most farmers cannot afford to purchase them so they are distributed through MAF Extension Staff to farmers as free goods. Since MAF has limited funds to procure seeds of maize and rice it cannot afford to buy the quantities the nation requires. Moreover, purchasing maize seeds every year from abroad is not sustainable.

This paper documents the efforts and experiences of Timor-Leste's Ministry of Agriculture & Fisheries to achieve maize seed security using community seed production. The evidence presented and discussed here reflects experience of the Ministry and the Seeds of Life (hereafter MAF-SoL) for the period from February 2011 to October 2012.

What is Community Seed Production?

Community Seed Production is defined as a decentralized production, storage and marketing of seeds by organized groups of farmers operating close to their homes as community groups or farmers associations. At the initial stage, the groups or associations receive training on seed production, storage and marketing from extension staff of MAF or NGOs. As experience develops these groups and associations continue seed production activities on their own with little or no extension support from MAF or NGOs. The groups/associations follow basic seed production procedures and produce a quality seed for use by group members and sell or barter any surplus to others in the local community. Community seed production is a community owned, community controlled and community managed approach to local quality seed production and storage (Kunwar and Guterres 2010).

Can Timor-Leste Meet Its Demand for Quality Seed Relying on Seed Certification Scheme Only?

Timor-Leste requires 750 ton of maize seed annually to meet the national demand for quality seeds. The supply of MAF-released seed of improved maize variety was 32 tons in 2011 and 89 tons (composed of 43 tons from "certified seed" seed production and 46 tons from organized community seed production) in 2012. Despite almost tripling in one year this total production of quality maize seed is still well below the nation's total maize seed requirement.

"Certified" seed production is defined as the production, storage and distribution of seeds under conditions of stringent MAF-SoL quality control procedures. This approach involves a contract agreement between MAF-SoL and specialized seed growers before the planting season and multiple supervision and inspection visits by government seed technicians during the growing season and at harvest. Trained MAF-SoL staff inspect the crop at least 4 times during the growing season and select cobs at harvest using a buy-back guaranteed price for the seed produced provided it meets seed production standards. When all seed production and quality control criteria are fulfilled by the seed growers and seeds are procured by MAF they are then taken to seed processing centers for further drying cleaning, grading, storage and subsequent packing, labeling and distribution as certified seed.

Table 1. Estimated annual cost to produce 33% of Timor-Leste's total maize seed requirement.

Crop	Amount seed required at 33% replacement rate (t)	Total area required to produce seed ha)*	# Growers required @0.6 ha land/ grower	US$/kg	Total cost of supplying national seed requirement (US$)
Maize	750	750	1,250	$1.00*	750,000
Maize	750	750	1,250	$2.00**	1,500,000

Note: * cost of contract growers producing one kilo seed; ** total cost of one kilo of certified seed including cost of processing, storage and transport to district headquarters

Table 1 below shows the cost of seed production for maize to meet the total national seed requirement of 750 tons a year, the last column providing two scenarios depending on the cost of seed production. The first uses a cost of US$1.00/kg or the cost incurred by contract growers in simply producing each kilogram of quality seed. This cost does not include processing, storage and transport which totals another US$1.00/kg. The second scenario uses this total cost at US$ 2.00/kg including cost of production plus processing, storage and transportation to the district headquarters.

Timor-Leste incurs a cost of least US$1.5 million annually to service its national maize seed requirement, a large expense for a small nation. Other issues must also be considered if certified seed production and supply are alone used to meet the annual maize seed requirement of Timor-Leste. These include the following:

Development of Specialized Seed Growers

From Table 1 it is evident that Timor-Leste requires at least 1,250 individual seed growers with at least 4-5 years of experience in quality seed production. Developing such professional seed growers poses a challenge in terms of cost, capacity building and in providing the buy back guarantee for the seeds they produce.

The Cost for Seed Processing Facilities

The real cost of producing seeds is high. In addition to the US$1.5 million annual cost for source seed production there is also infrastructure and equipment procurement, operation and maintenance costs required to support seed processing, testing and storage as well as training and supervision of staff and farmers.

Transportation, Storage and Handling of Seeds

There is also an issue of seed transportation from the production centers to the processing centers in seed warehouses and then distributing the seed out again to farming families living in distant villages and hamlets. This will long remain a challenge considering the poor transport network, unreliable transport facilities and the very poor roads in mountainous rural areas, particularly during the rainy season.

The cost of producing certified seed is certainly higher than producing “truthfully labeled” seed. Since majority of subsistence farming families in Timor-Leste have low purchasing power, even if “certified” quality seed were available for sale in the market, farmers could not afford to purchase them.

Financial Implication of Seed if Distributed Free

If MAF decide to distribute free seed to farmers, it has to spend about US$1.5 million a year to support the national maize crop. Similarly, if MAF were to cover the cost for producing and distributing seeds of other staple crops such as rice, peanuts, cassava and planting materials of improved varieties of cassava and sweet potato, the total cost would be prohibitively high. Moreover, distribution of free seeds to farming families tends to nurture a culture of dependency. MAF policy is to encourage farmers to become more commercial by reducing subsidies on agriculture inputs and distribution of free seeds is not sustainable.

Producing only certified seed is not only costly but also difficult to implement from the logistic and management perspective whereas the production of quality seeds through organized community-based seed producer groups using decentralized production, storage and distribution is an effective alternative. Community seed production not only ensures a secure supply of quality seeds, is locally available to farming families at planting time, it also improves farm family autonomy and independence.

Community Seed Production: A New Approach To Seed Security

To address maize seed insecurity in Timor-Leste the Ministry of Agriculture & Fisheries with support from the Australian Government included community seed production as a component in the 3rd phase of the Seeds of Life program. Seeds of Life (SoL) is a program within MAF funded collaboratively by MAF and the Australian Government through the Australian Agency for International Development (AusAID) and the Australian Centre for International Agricultural Research (ACIAR). The Centre for Legumes in Mediterranean Agriculture (CLIMA) within the University Western Australia (UWA) is commissioned to coordinate the Australian funded activities.

The SoL3 program currently operates in 11 of the 13 districts including 45 sub-districts, 135 Sucos, and 680 community seed producer groups (CSPGs) with support from the MAF-SoL extension program. Another 400 groups

are facilitated by collaborating international development NGOs (iNGOs) such as CARE, World Vision, Mercy Corps, Hivos, CRS and USC-Canada. The program not only supports maize seed production by community groups, it also supports seed production of other major food grains such as rice and peanuts as well as plots of improved varieties of cassava, and sweet potato to supply cuttings for vegetative propagation that are purposefully established in the dry season.

MAF-SoL Experience of Community Seed Production in 2011/12 Cropping Season

With technical and advisory support from Seeds of Life, MAF's National Directorate of Support for Agricultural and Community Development implemented maize community seed production in 7 districts in 2011/12. In addition, SoL also collaborated with a number of international development NGOs including CARE, Hivos, Mercy Corps and World Vision to implement community seed production in their target districts. Together MAF and NGOs mobilised a total of 320 groups (Table 2) to engage in community seed production using the improved yellow corn *Sele* variety of maize.

In the villages where MAF-SoL launches community seed production Suco Socialization Workshops are held to inform local authorities at district, Suco and Aldeia levels about the program, its objectives and activities involved and to avoid any confusion as to what MAF-SoL does and does not support.

SoL provides technical training on seed production and distribution to MAF extension staff and NGOs at the district and Suco level which is divided into two parts. The first involves training on selection of interested farmers' group, the seed production plot and initial crop production including land preparation, crop isolation, planting, weeding and pest control. The second part includes training in seed production topics such as rogueing, harvesting, cob selection, drying, cleaning, storage, distribution and marketing of seeds. The initial training is undertaken 2-3 weeks before the planting season and the second before the maize crop is likely to flower. The purpose of the trainings is to provide a limited amount of relevant information at a specific time so as to improve retention of messages that are immediately applicable, so information on seed storage is not provided at the time of seed planting.

Table 2. Number of community groups involved in maize seed production in 2011/12.

Districts producing '*Sele*' Maize Seed	# Groups with MAF/SoL	# of Groups with NGOs	Total # Groups
1. Aileu	21	18	39
2. Ainaro	20	28	48
3. Baucau	10	12	22
4. Bobonaro	12	32	44
5. Liquica	10	50	60
6. Manufahi	16	23	39
7. Viqueque	10	-	10
8. Lautem	-	16	16
9. Ermera	-	42	42
Total	99	221	320

Community seed production is facilitated in each district through Suco Extension Officers (SEO) of MAF who are assigned to work in one Suco. When SEO were first recruited in late 2008 each was required to form a minimum of four groups. Currently, most SEOs handle between 6 to 8 groups per Suco. To avoid loading each SEO with additional work burden each SEO is requested to support only 4 community seed production groups per Suco. This also enables each seed producer group to have a likely market for their seeds in that Suco.

Conceptual framework of Community Seed Production

MAF-SoL plans to be supporting 1,000 groups by its completion at the end of 2015. Each group will be producing marketable surplus of seeds of one of the five major crops recommended by MAF. During the initial year of SoL3 some 726 seed producer groups were facilitated by MAF and NGOs. 320 of these were growing *Sele* variety of maize. Each participating group was composed of an average of 15 members including a Chairperson, Secretary and Treasurer. Each group was provided 5 kg certified *Sele* seed to plant a carefully selected and cultivated 2,000 m^2 seed plot identified by the group members. Periodic supervision and monitoring is provided by field extension staff and also from MAF/SoL district and national seed production coordinators. MAF/SoL provides a simple seed production orientation and conceptual framework which includes the following:

Seed Requirement and Supply by the Group

Average farm size of farming household in Timor-Leste is 0.8 ha (CARE 2008), including the home garden with some taro, cassava, seasonal vegetables and sweet potato. Maize is cultivated on about 0.6 ha. Extension Staff of MAF and NGOs train each community group. Each group is required to assess their total need for seeds of the improved variety. In Timor-Leste the total maize production

area for a group of 15 members is around 9 ha. If each member opts to plant *Sele* maize the following season on one third of their available area, each member requires 5 kg of seed, sufficient to plant 0.2 ha and total seed requirement of the group is about 75 kg. Considering seed required for replanting, seed to be returned to Extension Officer of MAF and NGOs (using a seed revolving scheme) and seed required to continue seed production on the community group's seed production plot as well as seed required for barter or sale in local communities, each group needs to produce around 180 kg of maize seed each year. This seed requirement may increase in succeeding years if members of the group expands the total area cultivated with the improved maize variety.

MAF/SoL has the following recommendations to the Community Seed Production Groups as the basis for seed production in the first year. However, in the second year, the groups can increase or decrease their seed production area depending upon group need for seed and group plan for seed sales in their local community. A summary of MAF/SoL methodology for community seed production is as follows:

Start small, **evaluate the seed need and scale up** if seed production experience is positive. Provide 5 kg seed (at 25 kg/ha) to the seed group, enough for a 2,000 m^2 plot. Assuming the productivity of local maize is about 1.1 ton/ha and a 40% higher yield from improved *Sele*, an average yield of around 300 kg can be expected from a 2,000 m^2. However, not all this harvest can be used for seed. After seed selection from healthy cobs and from the central portion of each cob, normally about 60% of the total production is selected as good quality seed, i.e. around 180 kg of seed. This is sufficient for individual group members to use next season to plant their subsistence crop, for the community seed plot and for barter or sale in their local community.

In 2011/12MAF-SoL initiated community seed production with 40 groups/districts. After review of that initial experience the number of seed groups has expanded to 80/districts in 2012/13. Next year (2013/14) each District Agriculture Office plans to scale up to 100 community seed production groups or more so that all Sucos have access to quality seeds of improved varieties of different crops from community seed groups and farmer associations.

Do not distribute seed for free: Seed should not be given unconditionally to the community seed production groups but provided as a revolving scheme. In their initial year the MAF extension staff provide 5 kg of certified seed to the group at the time of planting. If the group achieve average production the following planting season they return the same quantity of seed to the extension staff from their own stock of seed. In the interim it is the group's responsibility to store the seed safely with their seed in the same container. If the first year's production of seed is well above average because of a good season, the group is required to return double the quantity (i.e. 10 kg of seed) to the extension staff. The extension staff distributes this seed to the new groups in the same Suco to improve their food production which have already had an opportunity to become acquainted with the new improved variety and have confidence in growing the improved maize variety.

Follow a basic seed production procedure: To get good quality seed, good agricultural practice must be followed. Seeds should be planted 2 seeds per hole (rather than usual local practice of 3-4 seeds per hole) and a minimum of two weedings is essential. The seed production plot must be properly isolated from other local corn crops using one of the four isolation techniques: (i) distance, (ii) different planting time, (iii) growing the same improved variety around the seed production plot, and (iv) using natural barriers such as another type of crop, a river, tall live fencing, forests, etc. Rogueing must also be done to remove diseased plants and off-types. Harvest should be done at the correct stage when seeds have formed a black layer. Seeds should be selected from healthy and big cobs and only from the central portion of each selected cob.

Provide essential support to the Seed production Group for production, processing, storage and marketing: MAF-SoL provides minimum production support to community seed groups in the form of: (i) certified seeds, training and extension publications; (ii) processing in the form of tarpaulin, manual corn shellers, (iii) storage in the form of air-tight 200 liter metal containers, and (iv) marketing by linking with potential buyers and traders. However, MAF-SoL does not give any guarantee to purchase group seed. The group is solely responsible for marketing their surplus seeds.

Results and Discussion

Promising Result by Community Seed Groups

In 2011/12, SoL supported 320 maize seed production groups through MAF extension services (99 groups) and NGOs (221 groups). Nearly 46 tons of maize seeds (self-declared quality seeds) were produced from 289 groups, an average of 159 kg/group (Table 3). Adding this result to the 43 ton of source seed produced by MAF-SoL's Formal

Seed Production, Component 2 (i.e. the certified seed produced by contract growers under close MAF-SoL supervision, procurement, processing and storage) the total production of quality *Sele* seed is 89 ton, a 178% increase in the national seed supply compared to the 32 ton produced the previous year. In 2012/13 the combination of source seed and community seed will supply nearly 12% of the total national maize seed requirement, compared with only 4% the previous year.

Not All Groups are Successful

Of the 320 community seed groups mobilized for seed production in 2011/12 by MAF extension officers and NGO field staff, 10% (31 groups) suffered crop failure, mostly due to damage by free grazing animals, a few by flash floods and landslides.

Quality Seed Has a Value

In the initial year 2011/12 of the total 289 successful seed growing groups, 34 groups were able to market their seeds to NGOs and communities at attractive prices, this included 11 groups that came together to form three different farmers' associations. In 2011/12, those groups and associations, supported by MAF/SoL only produced marketable surplus *Sele* seeds of 6,578 kg which was sold to NGOs and other communities for a total income of US$ 9,544. All the seed marketed by these groups were sold at US$1.50/kg with the exception of 323 kg seeds that was sold at US$0.5/kg just after the harvest. The good price received by the community seed groups and farmer associations is an indicator of the value farmers now place on good quality seed.

Table 3. Number of community seed groups with successful result in 2011/12 crop season.

Districts producing '*Sele*' Maize Seed	Groups involved in maize seed production	Groups with crop failure	Successful seed production groups	Total Seed Produced by Groups (kg)	Average seed produced per Group (kg)
Aileu	39	3	36	3,805	106
Ainaro	48	5	43	10,173	237
Baucau	22	2	20	4,483	224
Bobonaro	44	5	39	6,570	168
Liquica	60	5	55	7,039	128
Manufahi	39	2	37	5,475	138
Viqueque	10	5	5	1500	300
Lautem	16	0	16	3,880	243
Ermera	42	4	38	2,915	77
Total/Average	320	31	289	45,840	159

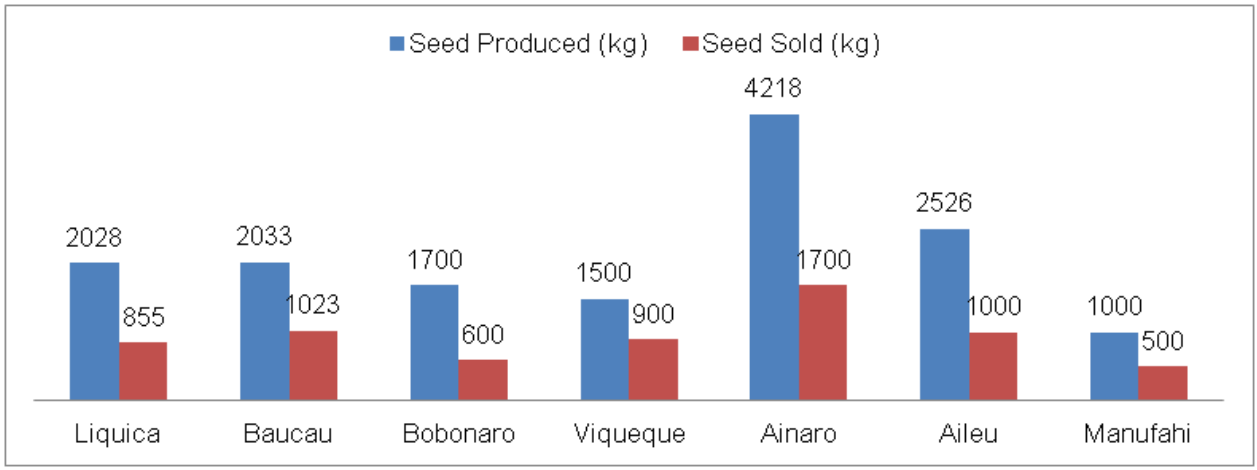

Figure 1. Status of maize seed produced & sold in districts by MAF-SoL assisted groups, 2012.

Not All Seed Groups are Interested in Commercial Seed Production

The experience of the Seeds of Life program indicates that not all seed groups are interested and have potential to produce seed for commercial purposes. Approximately 5-10% of groups have shown interest to move from subsistence seed groups to farmers' associations. In an association, three or more groups unite for collective planning, production, storage, marketing and profit sharing.

Conclusion

The initial year and a half's experience with implementing MAF-SoL's Informal Seed Production (Component 3) indicates that community-based seed production is a cost-effective, sustainable method of rapidly expanding subsistence farmers' access to high yielding staple crop varieties and greatly improving their seed security. Community seed production is a decentralized seed production system which is owned and managed by the community seed groups. With consistent planning and implementation, each village, sub-district and district in Timor-Leste could achieve local seed security, a necessary prerequisite to local food security.

Recommendations

1) Community seed groups and farmer associations are very interested in producing quality seeds for their own use and in selling any excess, provided there is demand for seeds in local market. They are concerned that free seed distribution by MAF, NGOs and religious organizations will negatively impact their seed market. In order to encourage seed production at local level, MAF should start setting aside funds to purchase seed locally from district-registered seed groups and associations. The funds and amount of seed procured locally should increase each year as community seed production expands. This will increase the morale and motivation of all seed producers and enable import substitution with significant savings to Government.
2) Long term capacity building support is required for all new and upcoming farmers' associations. In future it is suggested to develop the institutional and technical capacity of these farmers' associations so they produce a marketable surplus of high quality seeds using source seeds from MAF-SoL and sell their seed directly as "truthfully labeled" seed from their associations or through private seed traders.
3) A system of registration of seed producing farmers' associations using agreed criteria should be established by MAF District Offices and purchase of seed should be made only through the registered seed groups and associations selling "truthfully labeled" seed. Seed quality control being established within MAF with SoL support will provide seed quality assurance.
4) A seed balance sheet should be introduced at national and district level. Each MAF District Office should annually prepare a seed balance sheet for their district in a participatory manner with the involvement of MAF, local authorities and NGOs and implement a plan to meet the district seed requirements. The district should plan the ways to meet the seed requirements of the district.
5) A practice of sharing of experience and learning should be established between MAF and NGOs to review and refine community seed production.

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