

# Characterisation of farmer groups successfully multiplying and disseminating seed in Timor-Leste

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## Abstract

Past studies have shown that a promising method of scaling up new technologies in developing countries is through a community-based approach. This paper explores the characteristics of successful community and commercial seed production groups in multiplying and disseminating seed in Timor-Leste. Farmer groups successfully multiplying seed for commercial purposes (commercial seed producers) and at the local level (community seed production groups) showed similar characteristics. Both groups possessed a capacity to manage their operation well with good involvement of their members. Leadership was important, a gender balance within the groups preferable, and good attendance of meetings highly desirable. In the case of the commercial groups selling their seed, trustworthy financial management was also an important characteristic along with them possessing good networking skills so that they linked well with government, other authorities and potential markets. The success of the community and commercial seed producers in meeting their goals was measured in the quality and quantity of seed produced and marketed. In the case of the commercial seed producers, sufficient seed was produced in 2014–15 to replace 75% of the nation's seed importation requirements.

## Introduction

An effective distribution system is an essential element of all successful national seed systems. It is especially important in developing countries, where improving the availability (time, place, quality and quantity) of high yielding crop varieties reduces the nations' dependency on external sources. Establishing such systems requires concerted action by many actors, particularly in isolated areas where poor infrastructure restricts transport and communication. In such regions, there is potential for collective farmer action to promote timely access to seed at affordable prices (Tiwari et al. 2009). The involvement of farmers and farmer groups will often strengthen the link between technology development and transfer (David 2004).

The Ministry of Agriculture and Fisheries (MAF) in Timor-Leste has, over recent years, developed a national seed system for released varieties which is greatly dependent on community action. This has involved: (i) establishment of a seed department to strengthen the public functions of seed quality control and varietal registration; (ii) supporting commercial seed producers to produce and trade seed; and (iii) strengthening community seed production groups to produce good quality seed for group members and the surrounding community.

## Seed sources and seed multiplication

Improving seed security is a high priority for the MAF in Timor-Leste. Over the past 15 years, MAF's research program has identified improved varieties of the major food crops which are high yielding and preferred by the farming community. The new maize varieties, for example, have a 50% yield advantage over locally grown landraces and are popular with farmers for their good eating qualities.

Pure seed of maize, rice, peanuts and other food crops is generated in small quantities by the National Directorate of Research, Statistics and Geographic Information, but multiplying and distributing sufficient seed at the farmer level is a challenge. The amount of seed produced under the formal system is limited and expensive.

Farmers in Timor-Leste traditionally obtain their seed through informal seed channels. If short of seed, they generally approach their social networks, including relatives, neighbours, friends and members of farmer groups, for supplies. Seed exchange, bartering, borrowing, lending and gifting are common within this system (SoL 2007). However, there is little access to quality seed of high yielding varieties. To address this, a new approach in Timor-Leste is to support these traditional channels through community seed production groups, and assist them in multiplying high yielding seed and other technology dissemination within the farming community. Understanding what constitutes a successful group will help in the formation of such groups, and will ultimately help to effectively plan and develop a better seed system in Timor-Leste.

### Community-based systems for seed multiplication and dissemination

The pace at which quality seed is disseminated via traditional, formal seed multiplication and distribution systems in developing countries is limited (Jones et al. 2001), but community participation has been shown to enhance the process (Lacoste et al. 2012). Community-based seed production enterprises also contribute to market stability and rural development sustainability (Borges et al. 2009), and help develop the socio-cultural diversity of farming communities, promoting cooperation between farmers (Pautasso et al. 2013).

With this background knowledge, the MAF in Timor-Leste developed their national seed system by strengthening community seed multiplication and extension. The concept was that pure seed of MAF-released varieties would be multiplied under the highly regulated government system for distribution to commercial seed producers (CSPs), who would in turn multiply the seed in sufficient quantities for further multiplication by community seed production groups (CSPGs) for use by farmers. The establishment of this informal system commenced in 2011, and by the 2014–15 cropping season 54 CSPs and 1,135 CSPGs were successfully harvesting and distributing seed. The formation of these groups was particularly important for the multiplication of maize, which is an open pollinated variety requiring multiplication in isolation from other maize varieties to maintain purity. Varieties of five crops released by the MAF were multiplied by CSPGs during this period: maize (varieties of Sele and Noi Mutin), rice (Nakroma), peanut (Utamua), cassava (Ailuka 1, Ailuka 2 and Ailuka 4) and sweetpotato (Hohrae 1, Hohrae 2 and Hohrae 3).

The main objective of the CSPGs is to multiply commercial seed into sufficient quantities for use by group members and their families. Any surplus is usually gifted or bartered with other village members but in some cases is sold to members of the surrounding community. The more successful the CSPGs are at producing good quality seed, the more opportunity they have of meeting their own requirements and having sufficient to barter.

### Community seed production groups for seed multiplication and dissemination

A group or collective action approach has proven to be an effective way to empower farmers in accessing new technologies, particularly seed (Anandajayasekera et al. 2008). Groups more successfully utilise resources such as labour, knowledge and extension services than individuals (Lopes et al. 2015). It is also the experience of extension services that working with seed production groups ensures greater inclusiveness of the rural poor in innovation development. Community based seed production is also cost effective compared with the formal seed multiplication system (Kunwar et al. 2016).

For seed dissemination to be successful, farmers need access to sufficient seed of a desired variety at the right time. A study in Timor-Leste just after seed distribution in 2014 found that 58% of surveyed farmers had access to seed from CSPGs in a timely manner, while 42% received seed in time from other channels (SoL 2015). Forty-four per cent of the farmers preferred the seed from the CSPGs, while 18% of the participants stated that agricultural shops were the most efficient channels for seed distribution. Seventeen per cent of farmers accessed seed from both CSPGs and CSPs, while 15% of participants preferred buying seed from CSPs. These results indicate that both CSPs and CSPGs play a crucial role in the technology transfer process in Timor-Leste. The main reason farmers liked their supply channel was because it was located near their farm (61%), they trusted the seed supply (49%), and access to their seed supply also provided opportunities for training (5%). Only 5% of farmers considered price to be a factor.

### Characteristics of successful community seed production groups

Only CSPGs providing farmers with sufficient quantities of good quality seed were considered to be successful, and these successful groups possessed a certain set of characters which made them that way.

In a study by Lopes et al. (2015), CSPGs which successfully multiplied and disseminated seed had quality leadership, had a high degree of trust within the group, and the group had good management structure and a respected decision-making process. Successful groups also had a good gender balance and held regular meetings. Other demographic characteristics such as group size and education of members, especially the leader, were also important.

These characteristics were correlated against amount of seed disseminated to group members and the surrounding community. Meeting frequency ( $r = 0.69$ ), leadership quality ( $r = 0.57$ ), the level of group trust ( $r = 0.51$ ) and the group management structure ( $r = 0.41$ ) were particularly correlated with the amount of seed disseminated (Figure 1).

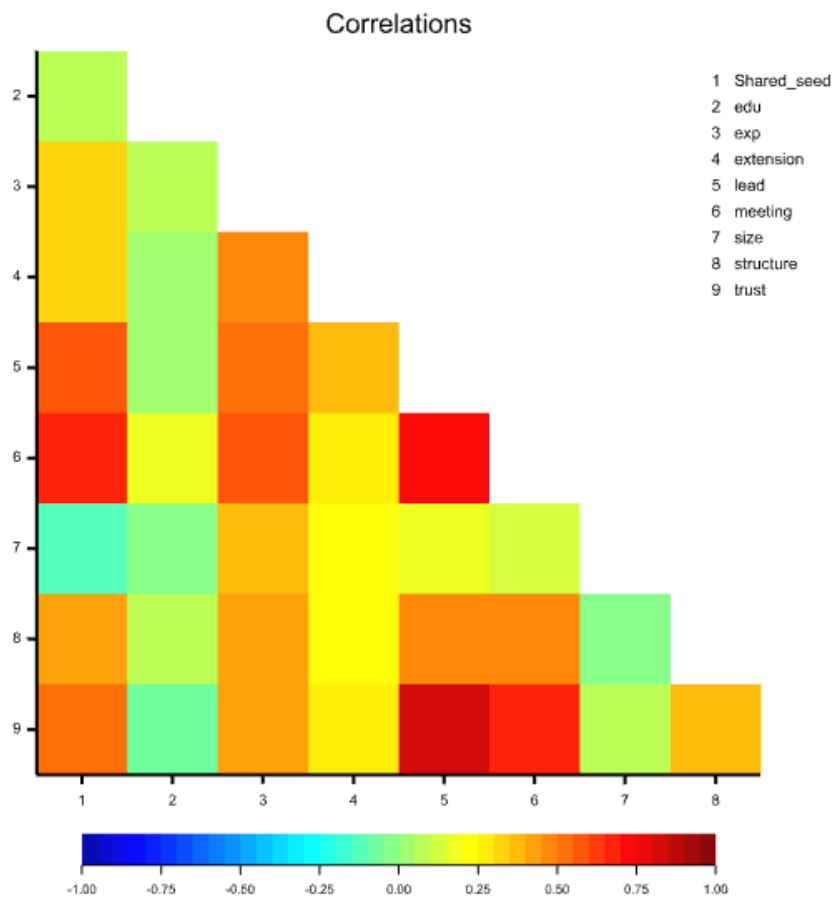


Figure 1. Heat diagram of correlation coefficients between all pairs of group characteristics and the quantity of shared seed. The correlation coefficient at  $P < 0.01$  is  $r = 0.46$  ( $df = 28$ ). (Source: Lopes et al. 2015.)

With increased meeting frequency, group members are able to discuss their ideas more regularly and problems can be addressed (Lopes et al. 2015). According to Anandajayasekeram et al. (2008), the holding of regular meetings also promotes transparency and accountability and encourages group members to participate in the decision-making process thereby promoting group cohesiveness.

Good leadership is also clearly important, with the leader willing to defend the groups' decisions. This concept is supported by Das (2012) who considers that one of the objectives is to create a positive expectation that may motivate the group to achieve their goals. Promoting collective confidence is important. Each member's needs should be taken into account, but in some cases it may be necessary for the group leader to insist that members comply with the group decision.

Trust plays an essential role within the seed groups, as well as within the local community, because seed quality often has to be taken on trust (Lewis and Mulvany 1997). It is believed that a high level of trust has a positive impact within an organisation in general and within a cooperative organisation in particular (Hansen et al. 2002). When a democratic environment is established, the group objective is more likely to be achieved. Place et al. (2004) described the level of trust as being a measure of the group's ability to design and implement new ideas. This statement supports the idea

that bonding social capital, in the form of trust, is critical and more valued than the formation of groups with different skill mixes (Place et al. 2004).

Achieving a good gender balance within the group helps the development of sustainable agricultural practices. Sanginga et al. (2001) maintain that it is a particularly important component in the establishment of effective mechanisms for resource-poor farmers. Women account for 43% of the global agriculture labour force (SOFA Team and Doss 2011). It is well documented that women farmers have a greater ability for seed selection and maintenance than men (Lewis and Mulvaney 1997). Seed production and seed exchange programs are often led by women (Maharjan et al. 2011). Participation of women has a positive effect on group dynamics and often leads to achieving group goals. In some situations it is perceived that, if men do not achieve the group expectations quickly they are likely to leave the group, whereas women have more patience and greater staying power (Abaru et al. 2006).

Cohesiveness is an essential characteristic for sustainability of the group, and plays an important role in the group achieving its objectives. A cohesive group is one in which members respect one another and all have the desire and commitment to remain a part of the group (Dyaram and Kamalanabhan 2005; Hansen et al. 2002; Klein and Mulvey 1995). Group cohesion aligns with a high degree of motivation, morale and management skills (Das 2012; Hansen et al. 2002).

Understanding group dynamics is important for understanding group cohesiveness (Oerlemans and Assouline 2004). Differences in overall expectations, expected benefits and expected commitment often lead to declining group cohesion. Das (2012) noted that homogeneity is one of the factors which contribute to groups cohesiveness, because it enables group activity selection common to many members. Cohesiveness can depend on initial group formation, for example groups formed under their own initiative can be highly cohesive compared to groups formed through external intervention.

The level of education of members often contributes to group performance. Bartham and Chitemi (2009) found, in a study on marketing, that groups achieving no improvement were those with a low level of literacy (primary education only), while groups achieving improvement had members with 7 years or more of schooling. It was inferred that groups with higher education levels are able to absorb more knowledge and apply it to succeed in reaching the groups' goals. It was presumed that education is the basis of knowledge accumulation in all sectors. However, education is not the only demographic characteristic to predict a successful group. Farmers who are illiterate or have little education but have past experience with group activities can also make significant contributions to successfully achieving group objectives. This is the case in Timor-Leste where the level of education in the rural areas is poor. Leadership experience was found to be more valuable than academic achievement (Lopes et al. 2015).

## Characteristics of successful commercial seed producers

Commercial seed producers are groups of MAF-registered farmers who multiply high quality seed for commercial purposes. They multiply government-certified seed in coordination with the MAF Seed Department to ensure that the product is of sufficient high quality for trade. Being farmer groups, successful CSPs should possess similar characteristics to successful CSPGs. They should hold regular meetings, have good leadership, have a high degree of trust within the group and with their customers, have a well-structured management style and be gender inclusive. CSPs also have the added responsibilities of handling money and storing larger volumes of grain or planting material for sale to distant markets.

In a recent study (SoL 2016), many of the characteristics of successful CSPs were indeed similar to those of successful CSPGs plus the extra financial and networking responsibilities. It was determined that the most successful CSPs have the following characteristics:

- Institutional capacity including solidarity amongst members, a good gender balance and a collective decision-making process;
- A robust management style including a strong and democratic leader and active members who manage group assets well;
- High technical capacity with members following good agriculture practices and not overly dependent on the *suco* extension officer (SEO) for support;
- The financial capacity to collect funds for investment, record expenses and properly administer income;
- Networking capacity including linkages with the SEO, local authorities and other agencies.

## CSPs and CSPGs in Timor-Leste

In 2014, the CSPs produced a total of 83 tonnes of maize, rice and peanut seed (Table 1). This high quality seed was distributed to CSPGs for further multiplication or sold on to NGOs and other agencies requiring high quality seed. Seed from the CSPGs was distributed amongst their own members. The number of CSPs more than doubled between 2013–14 and 2014–15 and their total production in 2014–15 was sufficient to sell to the MAF and replace 75% of the seed importation requirement and still provide quality seed to the CSPGs.

CSPGs were initially established in 2011–12. During that year, of the 240 CSPGs, 213 CSPGs were able to grow maize, rice and peanuts and 185 of the 213 CSPGs successfully harvested seed (a failure rate of 13%). After three years of experience, 1,207 CSPGs existed in 2014–15 and 1,135 harvested seed (failure rate reduced to 9%).

A small number of CSPs (31) was established to multiply certified seed in the 2013–14 season, of which 26 harvested seed (a 16% failure rate). These CSPs received considerable training during the year and new CSPs were also established. Emphasis was placed on groups possessing the characteristics mentioned above. The numbers of CSPs increased dramatically over one year to 58 and success rate was high, with 54 harvesting and selling high quality seed (the others either did not plant or faced harvest failure), and also producing higher amounts of seed. The CSPs in 2014–15 increased seed production to an average of 4.87 tonnes of maize seed compared with 2.45 tonnes in 2013–14. The MAF will register in the future only those CSPs which have the characters of success, and training will be provided to CSPGs to improve their performance and that of the PSCs even further.

Table 1. Seed multiplied by CSPGs and CSPs in 2013–14 and 2014–15.

Year	Crop	CSPGs		CSPs	
		Number	Seed multiplied (t)	Number	Seed multiplied (t)
2014–15	Maize	670	104	38	185
	Rice	185	75	15	110
	Peanuts	280	13	13	10
Total		1135	192	55*	305
2013–14	Maize	520	96	20	49
	Rice	178	71	4	33
	Peanuts	257	18	2	1
Total		955	185	19*	83

\* Some CSPs produced seed of more than one type of crop, hence the numbers of CSPs growing each crop do not add up to the totals.

Overall, the community-based approach has proven to be an effective channel for technology transfer in Timor-Leste. Seed multiplication and distribution is managed by the community-led system, with quality control regulated by the government.

## Conclusions

The community-based seed multiplication system in Timor-Leste has proven to be low cost compared with the formal regulated system. The quality of seed multiplied by the CSPs is trusted by farmers who are prepared to pay for quality seed of improved varieties for multiplication by CSPGs. In turn, seed from this source is easily disseminated through sale, gifting, lending or bartering. The most successful groups in terms of multiplying sufficient quantities of seed had good leadership which stimulated a high degree of trust within the group and with the group's product. These groups also had a good management structure with a gender balance and a respected decision-making process. Such groups held meetings more regularly than groups disseminating less seed. Despite some groups being less successful than others at multiplying and distributing seed, the CSPGs in Timor-Leste produced sufficient seed for their own needs and their neighbours in 2015. CSPs also produced 185 tonnes of high yielding maize seed (Sele and Noi mutin), 110 tonnes of rice and 10 tonnes of peanut for sale in 2015. CSPs have a similar structure to CSPGs and their success is highly dependent on maintaining trust in their seed which is sold at a high premium to grain.

## References

- Abaru M.B., Nyakuni A. and Shone G. 2006. Strengthening farmers organizations: the experiences of RELMA and ULAMP. Working Paper. Nairobi: World Agroforestry Centre.
- Anandajayasekeram P., Puskur R., Workneh S. and Hoekstra D. 2008. Concepts and practices in agricultural extension in developing countries. A source book. Washington, DC: IFPRI (International Food Policy Research Institute); and Nairobi, Kenya: ILRI (International Livestock Research Institute).
- Bartham J. and Chitemi C. 2009. Collective action initiative to improve marketing performance: lessons from farmer groups in Tanzania. *Food Policy* 34, 53–59.
- Borges L.F., Ferreira A.R., Da Silva D., Williams R., Andersen R., Dalley A. et al. 2009. Improving food security through agricultural research and development in Timor-Leste: a country emerging from conflict. *Food Security* 1(4), 403–412.
- Das S. 2012. Quality and performance of some selected self-help group in Assam. *Asian Journal of Research in Business Economics and Management* 2, 4.
- David S. 2004. Farmer seed enterprises: a sustainable approach to seed delivery. *Agriculture and Human Values* 21, 387–397.
- Dyaram L. and Kamalanabhan T. 2005. Unearthed: the other side of group cohesiveness. *Journal of Social Science* 10, 185–190.
- Hansen M.H., Morrow J.L. and Batista J.C. 2002 The impact of trust on cooperative membership retention, performance, and satisfaction: an exploratory study. *International Food and Agribusiness Management Review* 5, 41–59.
- Jones R.B., Audi P.A.R. and Tripp R. 2001. The role of informal seed systems in disseminating modern varieties, the example of pigeon pea from a semi-arid area of Kenya. Nairobi, Kenya: ICRISAT.



Klein H.J. and Mulvey P.W. 1995. Two investigations of the relationships among group goals, goal commitment, cohesion, and performance. *Organizational Behaviour and Human Decision Processes* 6, 44–53.

Kunwar B., Dalton J., Hornay L., and Nesbitt H. Seed multiplication and distribution in developing countries: What is the best option for Timor-Leste? 2016. In these proceedings.

Lacoste M.E., Williams R.L., Erskine W., Nesbitt H.J., Pereira L. and Marcal A. 2012. Varietal diffusion in marginal seed systems: participatory trials initiate change in East Timor. *Journal of Crop Improvement: Innovations in Practice, Theory and Research*, 26(4), 468–488.

Lewis V. and Mulvany P.M. 1997. A typology of community seed banks. London: Natural Resources Institute, University of Greenwich.

Lopes M., Nesbitt. H., Spyckerelle L., Pauli N., Clifton J. and Erskine W. 2015. Harnessing social capital for maize seed diffusion in Timor-Leste. *Agronomy for Sustainable Development* 35, 847–855.

Maharjan S.K., Gurung A.R. and Sthapit B.R. 2011. Enhancing on-farm conservation of Agro-biodiversity through community seed bank: an experience of Western Nepal. *Journal of Agriculture and Environment* 12, 132–139.

Oerlemans N. and Assouline G. 2004. Enhancing farmers' networking strategies for sustainable development. *Journal of Cleaner Production* 12, 469–478.

Pautasso M., Aistara G., Barnaud A., Caillon S., Clouvel P., Oliver T.C. et al. 2013. Seed exchange networks for agro biodiversity conservation. *Agronomy for Sustainable Development* 33, 151–175.

Place F., Kariuki G., Wangila J., Kristjanson P., Makauki A. and Ndubi J. 2004. Assessing the factors underlying differences in achievements of farmer groups: methodological issues and empirical findings from the highlands of central Kenya. *Agricultural Systems* 82, 257–272.

Sanginga P.C., Lilja N. and Tumwine J. 2001. Assessing the quality of participation in farmers' research groups in the Highlands of Kabale Uganda. CGIAR Systemwide Program on Participatory Research and Gender Analysis, Working Document No. 19.

SOFA (State of Food and Agriculture) Team and Doss C. 2011. The role of women in agriculture. ESA Working Paper 11-02. Rome: Agricultural Development Economics Division, FAO (Food and Agricultural Organisation of the United Nations).

SOL (Seeds of Life) 2007. Patterns of food consumption among subsistence farmers in four districts of East Timor. Program report. Dili, East Timor: Ministry of Agriculture and Fisheries.

SOL (Seeds of Life) 2015. Effectiveness of seed supply system; a comparative study on different channels for seed dissemination of high yielding food crop varieties in Timor-Leste. Dili, East Timor: Ministry of Agriculture and Fisheries.

SOL (Seeds of Life) 2016. Capacity assessment on commercial seed producers in Timor-Leste. Program report. Dili, East Timor: Ministry of Agriculture and Fisheries.

Tiwari T.P., Ferrara G., Urrea C., Katual R.B., Koirala K.B., Prasad R.C. et al. 2009. Rapid gain in yield and adoption of new maize varieties for complex hillside environments through farmers' participation. II. Scaling-up the adoption through community-based seed production (CBSP). *Field Crops Research* 111, 144–151.