Net Journal of Agricultural Science
Vol. 5(2), pp. 71-78, June 2017
ISSN: 2315-9766
Full Length Research Paper

Money matters for subsistence farmers: Provision of a low-rate credit scheme by a local bank allowed mungbean farmers to adopt improved cultivation practices

F. L. Benu[1]* and I. W. Mudita[1, 2]

[1]Faculty of Agriculture, Nusa Cendana University, Jl. Adisucipto, Penfui, Kupang, East Nusa Tenggara, Indonesia.
[2]The Northern Institute, Charles Darwin University, Darwin, NT, Australia.

Accepted 2 June, 2017

ABSTRACT

Small-scale subsistence farming characterised by production used mainly for household consumption dominates agricultural landscapes of Eastern Indonesia, including those in East Nusa Tenggara Province. The central and local governments have strived to modernise this agricultural practice through various programmes of agricultural intensification, but the efforts are so far not yet so successful. This research was carried out using an alternative approach, instead of just introducing improved technology packages as mostly done so far. The results indicated that through collaboration with international, national, and local institutions, mungbean production can be improved from less than to more than 1 tonne/ha allowing the participating households to generate a profitability of about USD 700/ha. What is more striking, the participating households sold on an average of 74.5% of their mungbean yield for cash, indicating that bringing access to credit close to farmers may trigger a shift to more commercial farming practices.

Keywords: Subsistence farming, improved cultivation practices, technology packages, access to credit.

*Corresponding author. E-mail: benufred@yahoo.com.

INTRODUCTION

Subsistence farming still dominates agricultural production in Eastern Indonesia, especially in the province of East Nusa Tenggara (ENT) (Ataupah, 1992; Benu and Mudita, 2011), despite a long history of government efforts to introduce improved cultivation practices through various programmes of agricultural intensification throughout Indonesia (Potter, 2001; Sudaryanto and Rusastra, 2006). In many part of the province, swidden agriculture is still prevalent even until today, mainly to cultivate various crops with the primary objective to produce food for household consumption. Mungbean (*Vigna radiate* (L.) R. Wilczek) is also cultivated in a similar way, in addition to cultivation in the dry rice field during the dry season when the supply of irrigation water is limited (Therik, 1999). In such farming practice, farmers harvest their crop mainly for their stomach and only if there is a surplus they will think of selling their produce in the local markets.

Mungbean is fairly well adapted to dryland soils (Georgis et al., 2010), which gives it a competitive advantage in drought-prone areas such as ENT where the rainy season is very short and followed by a prolonged dry season (up to 9 months) (Boer and Subiah, 2005). It has good potential for double cropping after maize in the swidden cultivation or after rice in unirrigated rice fields. In many part of the province, and in West Timor in particular, local cultivars have formed a long history of traditional cultivation to provide the basis for local food security (Kieft, 2014). Such local cultivars have advantages of being adaptive to drought and to competition from other crops in an intercropping system, especially for West Timor region that in the past was dubbed as an underdeveloped region (Ormeling, 1955). However, its production potential is low so that to improve

production, in addition to recommend use of fertilizers, the government also introduce improved high yielding cultivars.

Like most legumes, mungbean are relatively high in protein, around 25% of the seed by weight, despite trace of anti-nutrition (Mubarak, 2005). Mubarak (2005) also found that the amino acid profile of mungbean, similar to other beans, was complementary to cereal grains such as maize, sorghum, and millet, the traditional staple food in certain areas of ENT. As such, the government of many developing countries put in much effort in mungbean intensification to improve both the nutrition and the income of their local communities, especially those living in drought-prone regions who often experience food insecurity problems (Fox, 1999). However, in responding to such efforts, local farmers follow the recommendations of experts usually during the execution of the programme and mostly abandon it soon afterward (Chirwa, 2011). The reason sound classic, that is, subsistence farmers in drylands do not have enough money to pay for production inputs (Wahyunto and Shofiyati, 2012). In addition, agricultural extension is also a problem because of underfunding and lack of expertise (Nuraini et al. 2015). Research is therefore needed to find an appropriate solution of this problem at the local level.

This study was carried out to find options and scenarios to overcome the problem of access of subsistence farmers to extension services and credit. This was carried out by seeking an institutional partner to guide farmers to improve their cultivation practices and by approaching local commercial banks to provide low-rate credit schemes. The study was also carried out to evaluate the production performance of the locally existing and then introduces mungbean cultivation practices both in terms of production and economic aspects.

MATERIALS AND METHODS

Research design

This research consisted of two phases, namely the trial and evaluation phase carried in 2015 and the implementation phase carried out in 2016. In conducting these two research phases, a mixed method research approach was adopted using a sequential mixed model design (Tashakkori and Teddlie, 2003). Both the trial and implementation phase involved an approach of collaborative and participatory research (Bergold and Thomas, 2012; Hoffmann et al., 2006). Here collaborative and participatory research was used as an umbrella term for a school of approaches that share a core philosophy of inclusivity and of recognising the value of engaging in the research process (rather than including only as subjects of the research) those who are intended to be the beneficiaries, users, and stakeholders of the research (Cargo and Mercer, 2008).

Research phases and design

The trial and evaluation phase was carried out in the former Belu District, in 2015, by planting a number of local and introduced mungbean cultivars in various cropping patterns, including improved intercropping, improved monocropping– low cost, and improved monocropping– existing (Figure 1). The improved intercropping consisted of planting the local ‘Fore Belu’ and introduced ‘Vima’ mungbean cultivars, each intercropped with maize and receiving N, P, and K fertilizer applications according to the government recommendation. The improved monocropping – low cost was carried out by planting introduced ‘Murai’, ‘Sriti’, and ‘Vima’ mungbean cultivars each receiving N, P, and K fertilizer applications according to the government recommendation. The improved monocropping– existing was similar with the improved monocropping – low cost except that it did not receive fertilizer application. This trial and evaluation phase was funded by ACIAR involving collaboration with the Queensland Department of Employment, Economic Development and Innovation (DEEDI) and the Queensland Alliance for Agriculture and Food Innovation (QAAFI) in Australia to provide technical expertise.

An evaluation survey was carried out involving 40 sample households selected at random in each sample village. The sample villages were selected purposively by taking four villages, each representing the mungbean production centres in the district. In this survey, questions were asked about inputs in use, yield, production use, marketing if any, market price, etc. During the survey, informal discussion was also curried out with each interviewee to obtain information about problems faced in cultivating mungbean and to seek if action was taken to overcome the problem or a proposal is made to the government to provide the necessary help.

The implementation was carried out in Oebola Village in Kupang District in May to August 2016 as a follow up of the result of informal discussion carried out during the trial study. Prior to the implementation, collaboration was sought from commercial banks to provide low-rate credit and from research institutions and universities to provide the much needed technology and extension services. Participation from farmers at the local levels was sought by conducting site visits to potential villages. The trial involved 25 farmers, each planted 1 hectare of mungbean cultivar ‘Sriti’ in improved monocropping– low cost.

Data analysis

The resulting trial data were subject to descriptive analysis to calculate the average of mungbean yield per hectare. The survey data were first subject to gross margin analysis to compare the relative profitability of the various existing and introduced cropping systems through the trial (Ahmad et al., 1993). Descriptive statistics were employed to compare the resulting gross margin data and thematic analysis to elucidate relevant themes or topics emerging from transcripts of the informal discussion (Guest et al., 2012; Wilcox, 2016). Results from qualitative analysis were used to provide a richer interpretation to the results of quantitative analysis (Onwuegbuzie and Teddlie, 2003).

RESULTS

Mungbean cultivation and production

Mungbean was found cultivated in the rainy season mainly as an intercrop to the main crop maize in the swidden cultivation system. Mungbean was also found planted as a monocrop in the rain-fed rice field during the dry season, but intercropping with vegetable crops and other annual crop was also common. Although the local government has urged farmers to plant improved

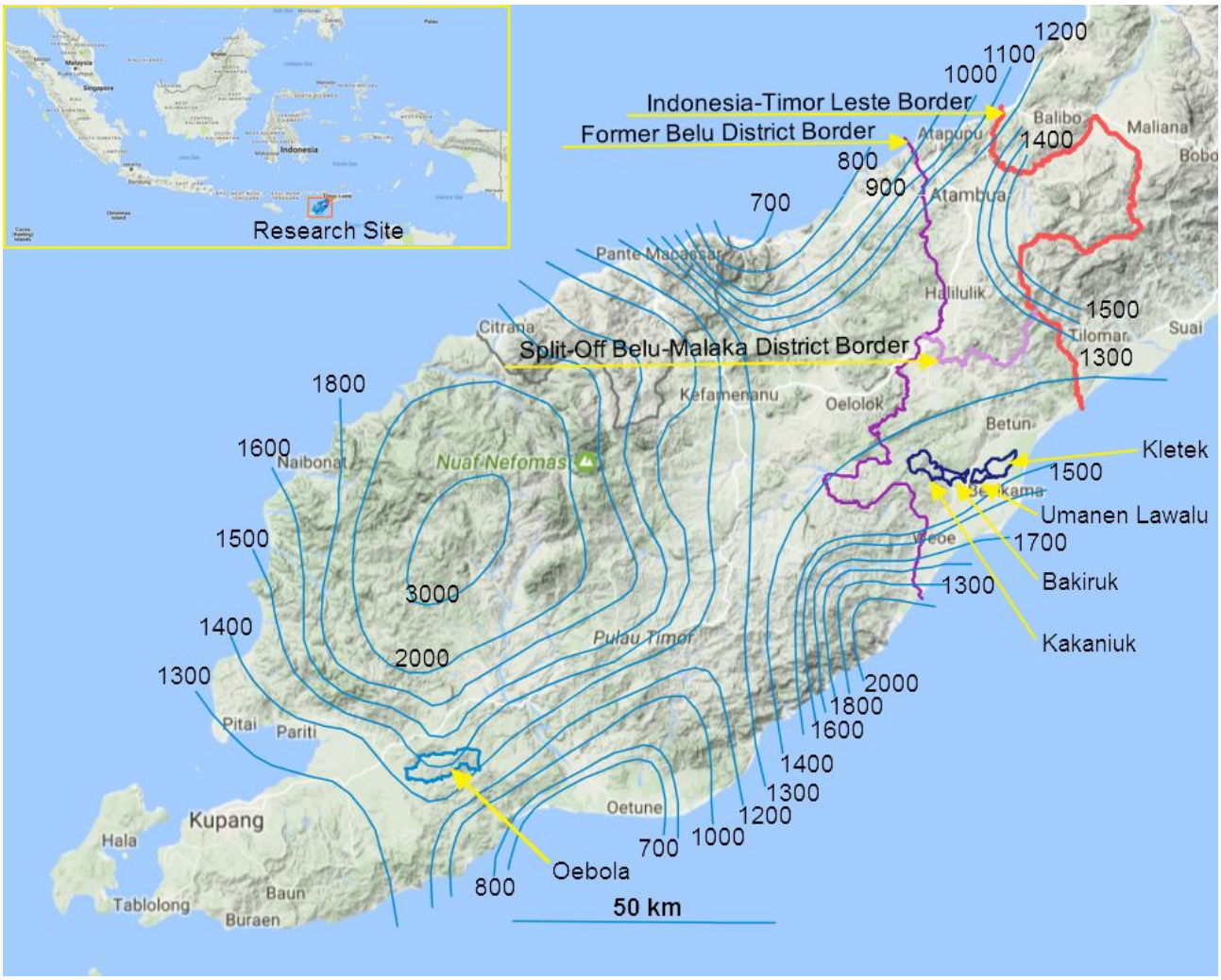

Figure 1. Research site in the Former Belu District, East Nusa Tenggara Province, Indonesia. The district has been recently split into two and after the split, the research site was located in the split-off district of Malaka. The map shows the location of the trial and evaluation phase in four sample villages (Bakiruk, Kakaniuk, Kletek, and Umanen Lawalu) and the location of the implementation phase in one village (Oebola). Lines with figures indicate isohyet (mm of rainfall per year). Source: RePPProT (1989) mapped on Google Earth (2017).

cultivars, local farmers remained planting the local cultivar 'Fore Belu' simply because they used seeds kept from the previous year harvest instead of purchasing. Owing to its drought hardiness, this local cultivar has been designated a national cultivar (Ministry of Agriculture of the Republic of Indonesia, 2005).

Belu District is the main mungbean production centre in West Timor. In this district, mungbean has been cultivated by local farmers for centuries and a local cultivar 'Fore Belu' has evolved out of such long practices (Therik, 1999). According to BPS Kabupaten Belu (2015), in 2015 mungbean was grown there on 23,000 ha with an average yield of only 0.8 tonnes/ha. These yield figures are slightly higher than the national average of 0.7 tonnes/ha according to the result of a scoping study, but significantly lower than that achieved in Australia of up to 1.0 t/ha.

Trial performances

Mungbean production

ACIAR provided technical assistance in the form of low-cost technology packages consisting of improved seeds, fertilizers, and pesticides for the trial study at the first phase of the research. The cultivars were planted in three planting systems, namely the existing monocropping, the low-cost intercropping, and the intercropping. The mungbean cultivars included in the three cropping systems were the local cultivar 'Fore Belu' and the improved cultivars 'Murai', 'Sriti', and 'Vima'. Fertilizers included N, P, and K that were applied according to the national recommendation of Balitkabi (2005) and pesticides were applied only when a destructive pest or disease were found damaging the crop. Mungbean

Table 1. Mungbean production (kg/ha) from the trial and evaluation survey carried out in Belu District in 2015.

Cropping pattern	Yield (kg/ha ± standard deviation)				
	Mungbean	Rice	Maize	Peanut	Sorghum
Existing cropping patterns practiced by households not involved in the trial					
Cropping pattern 1[a]	-	2,380.8 ± 3.64	-	-	-
Cropping pattern 2[b]	-	-	1,598.90 ± 2.57	74.66 ± 1.17	108.77 ± 1.50
Cropping pattern 3[c]	346.26 ± 2.25	-	769.81 ± 2.50	-	-
Improved cropping patterns practiced by households involved in the trial, not including mungbean yield from outside of trial plots					
Improved Intercropping Trial					
Vima	942.30 ± 2.77	-	-	-	-
Local 'Fore Belu'	841.50 ± 2.64	-	-	-	-
Improved Monocropping Trial – Low cost					
Vima	1,234.00 ± 3.13	-	-	-	-
Murai	1,111.00 ± 3.02	-	-	-	-
Sriti	1,230.00 ± 2.90	-	-	-	-
Improved Monocropping Trial – Existing					
Vima	641.00 ± 2.98	-	-	-	-
Murai	709.00 ± 2.75	-	-	-	-
Sriti	1,182.00 ± 3.01	-	-	-	-

Notes:
a: Wetland rice, practiced during the rainy season and during the dry season only on areas with built irrigation infrastructure.
b: Maize 1 + Peanut + Sorghum + Cassava (November – March), practiced as part of swidden agriculture.
c: Maize 2 + Mungbean 'Fore Belu' (May – August), practiced after the wetland rice cultivation when a rice field area was no longer receiving irrigation
-: Not applicable.
Source: Analysis of field data (2015).

production per hectare resulting from the trial and evaluation survey carried out in Belu District in 2015 is depicted in Table 1.

Table 1 shows that the low-cost improved monocropping produces the highest yield per hectare, with mungbean cultivar 'Vima' produces the highest yield among the three improved cultivars. This cultivar also produces a higher yield than the local cultivar 'Fore Belu' under the improved intercropping. Mungbean cultivar 'Sriti' also produces a high yield under the existing improved monocropping. The result indicates that except for 'Sriti', the two other improved cultivars, 'Vima' and 'Murai', require a high inputs of technology such as fertilizer, pesticide, herbicide, etc. to produce a high yield.

Gross margin analysis

The result of gross margin analysis of mungbean production from the trial and evaluation survey carried out in Belu District in 2016 is presented in Table 2.

Gross margin analysis of mungbean production from the trial and evaluation survey carried out in Belu District in 2016 shows that wetland rice cropping generated a gross margin of about USD281.51/ha. However, rice was allocated almost exclusively for daily consumption. The cropping pattern 2 (maize 1 + peanut + sorghum + cassava) provided the lowest household revenue (only AU $98.19/ha). This was mainly caused by the price of maize, the main crop in this cropping pattern, which was low at the farm gate. The price of maize reached its peak of about USD 0.38/kg only during the period of food scarcity during the transition from the dry season to the rainy season. The percentage of maize yield sold for cash was relatively low because in the region, maize was second in terms of its importance as staple food. In contrast, 87% of mungbean yield and 44% of the yield of other crops (maize, sorghum and peanut) were sold for cash. In addition to being high in yield percentage, the role of mungbean as an important source of cash income was also given by the fact that almost all sample households obtain cash from selling mungbean. Thus the higher gross margin of the cropping pattern 3 (maize + mungbean)than of the cropping pattern 2 was due mainly of the contribution of mungbean.

In the improved cropping patterns, mungbean cultivar 'Sriti' produced a high gross margin from the existing improved monocropping. Mungbean cultivar 'Vima' and 'Murai' also produced a high yield, but only by using low cost technology and not by improving the existing

Table 2. Calculated gross margins of mungbean production from the trial and evaluation survey carried out in Belu District in 2016.

Cropping pattern[a]	Total revenue[b]	Total variable cost[b]	Gross margin[b]
Existing cropping patterns practiced by households not involved in the trial			
Cropping Pattern 1[a]	595.20	313.69	281.51
Cropping Pattern 2[b]	390.29	292.10	98.19
Cropping Pattern 3[c]	303.27	135.06	168.21
Improved cropping patterns practiced by households involved in the trial, not including mungbean yield from outside of trial plots			
Improved Intercropping Trial[d]			
Vima	588.94	536.47	52.47
Local Belu	525.94	477.92	48.02
Improved Monocropping Trial – Low cost			
Vima	771.25	437.67	333.58
Murai	694.38	437.67	256.70
Sriti	768.75	437.67	331.08
Improved Monocropping Trial – Existing			
Vima	400.63	358.55	42.08
Murai	443.13	358.55	84.58
Sriti	738.75	358.55	380.20

Notes: a: Cropping patterns as in Table 1; b: In USD, based on price at farm gate. Source: Analysis of field data (2016).

monoculture technology. The result indicated that the two other cultivars 'Vima' and 'Murai' required a higher inputs of technology such as fertilizer, pesticide, herbicide, etc., than required by the cultivar 'Sriti' to produce a high quantity of yield. Each of the three mungbean improved cultivars provided a high gross margin under the low-cost improved monocropping, that is, USD256.70, 331.08, and 333.58 per hectare, respectively, despite the high total variable cost spent for this technology package. On the contrary, under the existing monocropping, only mungbean cultivar 'Sriti' provided a high gross margin. Of the yield produced by each household, only 15.7% was used for household consumption. The percentage of yield sold for cash reached a staggering high percentage of 74.5%, while the remaining 9.8% for social purposes (e.g. religious festivity celebrations, contribution to church, etc.).

Implementation performances

Seeking for collaboration and participation in the implementation phase of this research was a lengthy and complicated process. After a lengthy consultation in the process of seeking collaboration and participation, a Memorandum of Understanding (MoU) was signed by all involved parties. The MoU stipulated that Bank NTT agreed to provide a special credit (micro credit) of an amount of USD 7,000 with 22% per year flat rate of interest for 5 months to each participating farmer. It should be noted that Bank NTT also has some other credit schemes, namely the commercial and the working capital credits, each with a per year flat rate of interest ranging 12 to 14%. At the same time, AIAT Naibonat and NCU agreed to provide expertise to support the farmers in the implementation of the technology package. This collaboration allowed the participating farmers to have access to capital for purchasing the necessary farming inputs and at the same time to receive technical assistance to improve their farming skills (Figure 2). Accessibility to credit and extension services is indeed still an important constrain to agricultural development in most developing countries (Poliquit, 2006; Zewdie, 2015). After a series of intensive discussion, a number of 25 farmers from Oebola Village, Kupang District, finally agreed to voluntarily participate in the scheme.

In the implementation phase, a total production of1,0 tonnes/ha and at the price at the farm gate of about USD 1.5/kg generated a profitability of about USD 700/ha for the participating farmers in Oebola Village. This yield attained under the collaboration with Bank NTT to deliver a low-rate credit to the participating households to purchase the necessary low-cost technology inputs was higher than that obtained by using the same technology in the previous year trial in Belu District. The high yield obtained in this implementation phase involved intensive on-site farmer facilitation provided by AIAT Naibonat and NCU that was absent in the previous year trial.

DISCUSSION

This research has shown that with delivery of appropriate

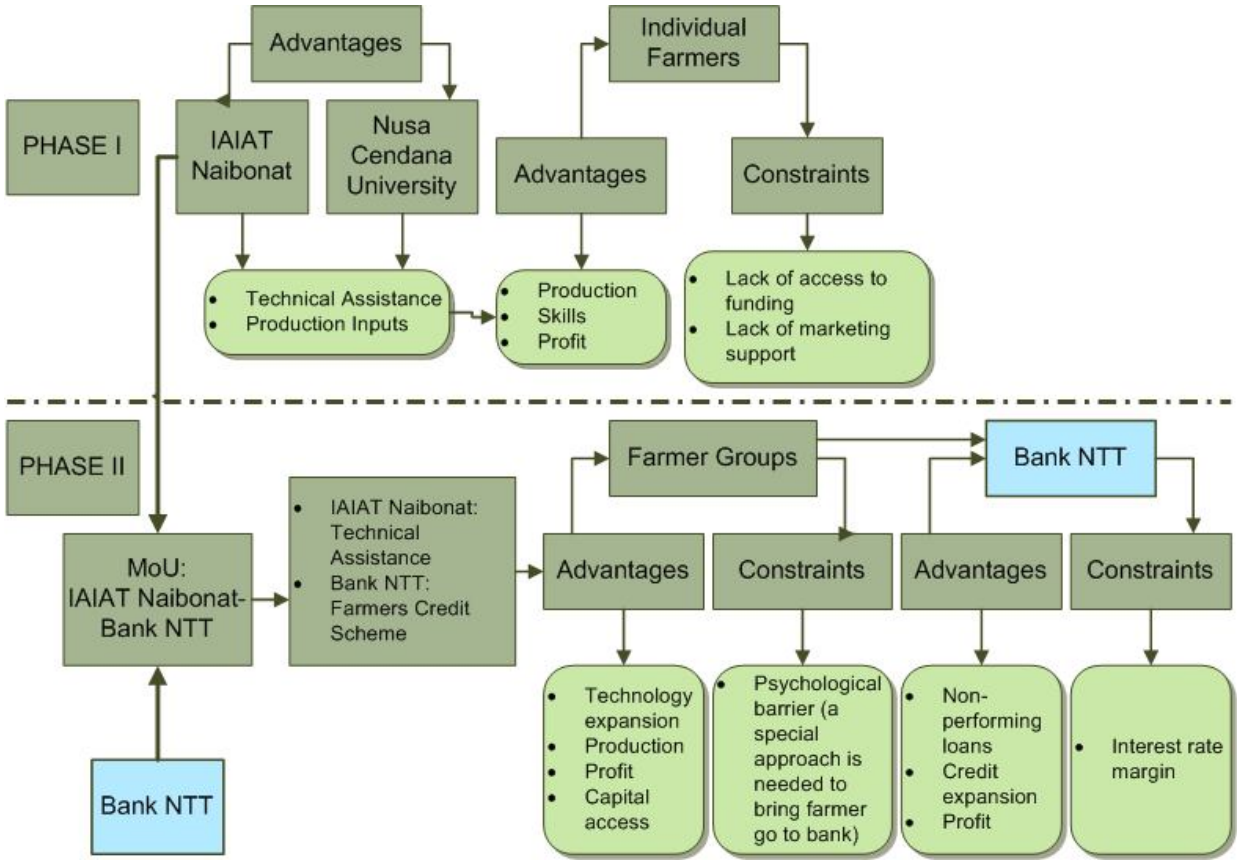

Figure 2. Schematic diagram of the collaborative research carried out at the Phase 2 in Bola Village, Kupang District, in 2016.

technology packages, mungbean production under the marginal dryland condition can be increased above the average attained yield. It confirmed the results of research in other dryland areas that has shown that improved mungbean cultivar can produce high yield, as long as an appropriate technology is in use in its cultivation (Mbeyagala et al., 2016; Okweche et al., 2013; Rizviet al., 2012). Application of N and P fertilizers at an appropriate rate has also shown to increase mungbean yield in the dryland of Australia (Lester et al., 2010).

However, it has to be noted that the trial was carried out in the year of normal rainfall for the region (1,500 to 1,600 mm of annual rainfall, Figure 1). In case that the drought indeed take place, the local cultivars may survive better than the improved cultivars unless the improved cultivars were specifically developed to withstand drought, which is not the case for those used in the trial. Mungbean cultivation can be very sensitive to both drought and water logging, resulting in a large decline in its productivity (Bourgault, 2009; Kumar et al., 2013). This has to be seriously taken into account by policy makers in introducing new, higher cost technologies, considering the erratic nature of the region's climate. Nevertheless, the yield increased achieved in this research is significant, considering that farmers involved in the implementation phase consisted of mainly those who depend on swidden cultivation for their livelihoods.

The results of the gross margin analysis indicate that the income of the participating households in this research is determined by at least four factors. The first factor is use of high-input technologies consisting of land preparation, seeds of improved mungbean cultivars, fertilizers, pesticides, etc. The second factor is planting time at the transition from the rainy to dry season when soil moisture is at its best to facilitate fertilizer absorption. The third factor is the availability of a large number of working capital for planting, harvesting, and transporting the harvest yield. The last factor is the price of the yield at the farm gate. The first factor is particularly important for obtaining a good harvest from improved cultivars (Ahmad et al., 2003), but the second factor allows both the existing and the improved cultivars to avoid drought or waterlogging (Thangave et al., 2011). The third and fourth factors are related to amount of the variable cost that directly determine the gross margin of mungbean cultivation (Benu et al., 2013).

The emphasis of this research is not only to involve parties in a research project, but more importantly, also to

make the collaborating and participating parties understand the process and the goal of collaboration and participation, especially when such collaboration and participation was sought by “outsiders” of a community still strongly adherence of traditional values (Minkler, 2004). This collaboration and participation, as shown in this research, benefit not only the participating farmers, but also the collaborating institutions (Benu et al., 2017). Bank NTT has been involved in the provision of credit to the agriculture sector since 2007, but the scheme has not been very successful because of lack of expertise to address technical and business skills of most of its clients (Bank NTT, 2015). This collaboration is a win−win solution for the bank as well as the farmers, as it reduces the credit risk for the bank. As a follow up of this research, Bank NTT had spent roughly USD 20,000 in 2012 to provide low-rate credit to farmers willing to cultivate mungbean based on the technology package introduced by ACIAR.

The large percentage of mungbean yield sold for cash is striking, considering that farmers participating in this research are mostly subsistence farmers that are supposed to engaging in agriculture primarily for household consumption purposes. This result is in contrary to the results of previous research that conclude that subsistence farmers in the region used their yields mostly for that purpose (Ataupah, 1992; Therik, 1999). The high percentage of mungbean yield sold for cash may indicate that subsistence farmers of West Timor have become more exposed to market economy as a result of development progress of the region. It could also be attributed to abundance of the major crops (maize and/or rice) in the research year. However, it is still too early to interpret this result as a shift of farming orientation from subsistence to market-oriented farming. The high percentage may be sold for a number of consumptive purposes. Further research is needed to shed light into this much debated issue.

Conclusions

This research has shown that a collaborative and participatory approach involving research institutions, universities, and financial institutions can be used to address the two main problems faced by subsistence farmers, that is, limited access to capital and a lack of technical skills. This approach provides a win-win solution for each party involved. For the participating farmers, the low-rate credit provided by the collaborating bank enables them to purchase the necessary farming input needed to increase production. For the bank, this collaborative and participatory approach provides a solution to its limited technical agricultural expertise to deliver a successful credit scheme with a high rate of non-performing loan. For the participating research institution and university, this approach provides an alternative research funding, allowing them to shift from a dependent to gradually become a entrepreneurship-oriented institution.

ACKNOWLEDGEMENT

The authors would like to thank ACIAR, Australia, for their partial funding and Bank NTT, IAIT Naibonat, and NCU, Indonesia, for their financial support to and collaboration in this research. However, the view expressed in this article is our own and does not necessary reflect that of the funding agency nor of the collaborating institutions.

REFERENCES

Ahmad B, Hussain Z, Longmire J, **1993**. Farm Management Handbook. Published in collaboration with the Economic and Policy Analysis Project (Chemonics International Consulting Division, Washington D.C), ASSP/USAID under the provision of USAID contract No. 391-0492-C-OO-0831, Washington, DC.

Ahmad R, Ikraam M, Ullah E, Mahmood A, **2003**. Influence of different fertilizer levels on the growth and productivity of three mungbean cultivars. Int J Agric Biol, 5: 335–338.

Ataupah H, **1992**. Ekologi, Persebaran Penduduk, dan Pengelompokan Orang Meto di Timor Barat (Ecology, Distribution, and the Grouping of Meto People in West Timor). Unpublished Ph.D. Thesis, University of Indonesia, Jakarta.

Balitkabi, **2005**. Teknologi produksi kacang-kacangan dan umbi-umbian (Production Technologies for Grain Legumed and Root Crops). Balai Penelitian Tanaman Kacang-kacangan dan Umbi-umbian, Agency for Agricyltural Research and Development, the Ministry of Agriculture, Jakarta.

Bank NTT, **2015**. Delivering Profitable Growth to Empower a Regional Economic Potential. Annual Report, Bank NTT, Kupang.

Benu F, Rachaputi RCN, Douglas C, **2013**. The economic performance and management practices of mungbean production system in Belu, West Timor. Presented at ACIAR Conference in Gold Coast, Australia.

Benu FL, **Mudita** IW, **2011**. Revisitasi Lahan Kering: Diskusi Ringan Seputar Lahan Kering dan Pertanian Lahan Kering (Revisiting Dryland: Light Discussion around Drylands and Dryland Agriculture). JP II Publishing House, Jakarta.

Benu FL, Rachaputi R, Mudita IW, **2017**. New Agronomic practices for an old crop: Transforming subsistence farmers through a collaborative project involving governments, universities, and financial institutions. Poster presented at the 2nd Agriculture and Climate Change Conference held in Sitges (near Barcelona), Spain, on 26-28 March 2017.

Bergold J, **Thomas** S, **2012**. Participatory research methods: A methodological approach in motion. Forum: Qualitative Social Research 13(1): online. http://www.qualitative-research.net/index.php/fqs/article/view/1801/3334 (Accessed on 17 April 2017).

Boer R, **Subiah** AR, **2005**. Agricultural Drought in Indonesia. In: Monitoring and Predicting Agricultural Drought: A Global Study. Boken VK, Cracknell AP, Heathcoat RL (Eds.). Oxford University Press, Oxford, pp. 330-346.

Bourgault M, **2009**. Legume production in semi-arid areas: Comparative Study of the Physiology of Drought Tolerance in Common Bean (*Phaseolus vulgaris* L.) and Mungbean (*Vigna radiata* (L.) Wilczek). Unpublished PhD Thesis in Plant Science, Plant Science Department, Faculty of Agricultural and Environmental Science of McGill University, Montreal.

BPS Kabupaten Belu, **2015**. Belu dalam Angka 2015 (Belu in Figures 2015). Belu District Office of the Central Agency of Statistics, Atambua.

Cargo M, **Mercer** SL, **2008**. The value and challenges of participatory research: Strengthening its practice. Ann Review Public Health, 29:

325-350.

Chirwa EW, **2011**. Adoption of fertiliser and hybrid seeds by smallholder maize farmers in Southern Malawi. Development Southern Africa 22(1): online. http://dx.doi.org/10.1080/03768350500044065 (Accessed 15 April 2017).

Fox JJ, **1999**. Drawing from the past to prepare for the future: responding to the challenges of food security in East Timor. In: Fire and Sustainable Agricultural and Forestry Development in Eastern Indonesia and Northern Australia. Proceedings of an international workshop held at Northern Territory University, Darwin, Australia, 13–15 April 1999. Russell-Smith J, Hill G, Djoeroemana, S, Myers, B (Eds.). Australian Centre for International Agricultural Research, Canberra. pp. 105-114.

Georgis K, Dejene A, Malo M, **2010**. Agricultural based Livelihood Systems in Drylands in the Context of Climate Change Inventory of Adaptation Practices and Technologies of Ethiopia. Environmental and Natural Resources Working Paper No. 38, FAO, Rome. http://www.fao.org/docrep/014/i1786e/i1786e00.pdf (Acesssed on 20 April 2017).

Guest G, MacQueen KM, Namey EE, **2012**. Apprried Thematic Analysis. SAGE Publication, Inc, Los Angeles.

Hoffmann V, Probst K, Christinck A, **2006**. Farmers and researchers: How can collaborative advantages be created in participatory research and technology development? Agric Human Values, 24: 355–368.

Kieft J, **2014**. Indigenous cultivar development in food crops strategies on Timor: their relevance for in situ bio diversity conservation and food security. Working Paper presented CARE International in Indonesia, Field office East Kalimantan, Pontianak, Indonesia. http://www.irgsc.org/NTT-Academia/timor/Food-security-paper-01.pdf (Accessed on 18 April 2017).

Kumar P, Pal M, Joshi R, Sairam, RK, **2013**. Yield, growth and physiological responses of mung bean [*Vigna radiata* (L.) Wilczek] genotypes to waterlogging at vegetative stage. Physiol Mol Biol Plants, 19(2): 209–220.

Lester DW, Birch CJ, Dowling CW, **2010**. Fertiliser N and P application on two Vertosols in north-eastern Australia. 3. Grain N uptake and yield by crop/fallow combination, and cumulative grain N removal and fertiliser N recovery in grain. Crop Pasture Sci, 61: 24–31.

Mbeyagala EK, Amayo R, Obuo JEP, **2016**. Adaptation of introduced mungbean genotypes in Uganda. Afr Crop Sci J, 24(2): 155-166.

Ministry of Agriculture of the Republic of Indonesia, **2005**. Keputusan Menteri Pertanian No. 66/Kpts/SR.120/3/2005 Tanggal 15 Maret 2005 tentang Pelepasan Kacang Hijau Lokal Belu sebagai varietas unggul dengan nama 'Fore Belu' (Decree of the Ministry of Agriculture No. 66/Kpts/SR.120/3/2005 dated 15 March 2005 concerning the Release of the Belu Mungbean Local Cultivar under the name of 'Fore Belu'.Ministry of Agriculture of the Republic of Indonesia, Jakarta.

Minkler M, **2004**. Ethical challenges for the “outside” researcher in community-based participatory research. Health Educ Behav, 31(6): 684-697.

Mubarak AE, **2005**. Nutritional composition and anti nutritional factors of mungbean seeds (*Phaseolus aureus*) as affected by some home traditional processes. Food Chem, 89: 489–495.

Nuraini A, Yuwariah Y, Rochayat Y, **2015**. Pengembangan produkti pertanian lahan kering dengan sistem Low External Input Sustainable Agriculture (LEISA) di Desa Cibodas dan Mandalagiri, Kecamatan Leuwisari, Kabupaten Tasikmalaya (Development of dryland agricultural production using Low External Input Sustainable Agriculture (LEISA) Sistem in the villages of Cibodas dan Mandalagiri, Leuwisari Sub-district, Tasikmalaya District). Dharmakarya: Jurnal Aplikasi Ipteks untuk Masyarakat, 4(2): 113-118

Okweche S, Idokoa, Avavb T-R, **2013**. Yield evaluation of some cultivars of mungbean (*Vigna radiata* (L.) Wilczek) in Southern Guinea savanna location of Nigeria. Int J Plant Anim Environ Sci, 3(3): 85-88.

Onwuegbuzie AJ, **Teddlie** C, **2003**. A framework for analyzing data in mixed methods research. In: Handbook of mixed methods in social & behavioral research. A. Tashakkori & C. Teddlie (Eds.), Sage Publications, Thousand Oaks, pp. 351-383.

Ormeling F, **1955**. The Timor Problem: A Geographical Interpretation of an Underdeveloped Island. J.B. Wolters, Djakarta & Groningen.

Poliquit LY, **2006**. Accessibility to Rural Credit Among Small Farmers in the Philippines, Master Thesis in Rural Development, Institute of Natural Resources, Massey University, Palmerston North, New Zealand.

Potter L, **2001**. Agricultural intensification in Indonesia: Outside pressures and indigenous strategies. Asia Pacific Viewpoint, 42(2/3): 305-324.

RePPProT (**1989**). Regional Physical Planning Project for Transmigration: Review of Phase I Results Maluku and Nusa Tenggara (Vol. 1, Main Report). Jakarta: Government of the Republic of Indonesia, Ministry of Transmigration, Directorate General of Settlement Preparation, Land Resources Department ODNRI and ODA.

Rizvi R, Sharma R, Srinivas T, Manan A, Osmanzai A, Siddiqui S, Wadan K, Hakimi N, Rahmani A, **2012**. Comparative evaluation of local and improved crop cultivars through farmers’ participation on resource-poor farms in Afghanistan. Acta Agronomica Hungarica, 60, 1.

Sudaryanto T, **Rusastra** IW, **2006**. Kebijakan strategis usaha pertanian dalam rangka peningkatan produksi dan pengentasan kemiskinan (Strategic farming policies in an effort to increase production and poverty alleviation). Jurnal Litbang Pertanian, 25(4): 115-122.

Tashakkori A, **Teddlie** C, **2003**. The past and future of mixed methods research: From data triangulation to mixed model designs. In Handbook of Mixed Methods in Social and Behavioral Research A. Tashakkori & C. Teddlie (Eds.), SAGE Publications, Thousan Oaks, pp. 671-702.

Thangave P, Anandan A, Eswaran R, **2011**. AMMI analysis to comprehend genotype-by-environment (G × E) interactions in rainfed grown mungbean (*Vigna radiata* L.). Aust J Crop Sci, 5(13): 1767-1775.

Therik T, **1999**. The role of fire in swidden cultivation: a Timor case study, In: Fire and Sustainable Agricultural and Forestry Development in Eastern Indonesia and Northern Australia. Proceedings of an international workshop held at Northern Territory University, Darwin, Australia, 13–15 April 1999. Russell-Smith J, Hill G, Djoeroemana, S, Myers B (Eds). Australian Centre for International Agricultural Research, Canberra. pp. 77-79.

Wahyunto, **Shofiyati** R, **2012**. Wilayah Potensi Lahan Kering Untuk Mendukung Pemenuhan Kebutuhan Pangan Di Indonesia (Dryland potential areas to support food security in Indonesia). In: Proespek Pertanian Lahan Kering dalam Mendukung Ketahanan Pangan (The Propect of Dryland Agriculture in Supporting Food Security). No ed. Jakarta: Agency for Agricultural Research and Development, Ministry of Agriculture of the Republic of Indonesia.pp. 297-315.

Wilcox RR, **2016**. Understanding and Applying Basic Statistical Methods Using R. John Wiley & Sons, Inc., New York.

Zewdie TD, **2015**. Access to Credit and the Impact of Credit constraints on Agricultural Productivity in Ethiopia: Evidence from Selected Zones of Rural Amhara. Unpublished Masters Thesis in Economic Policy Analysis, School of Graduate Studies, Addis Ababa University, Addis Ababa, Ethiopia.

Citation: Benu FL, Mudita IW, 2017. Money matters for subsistence farmers: Provision of a low-rate credit scheme by a local bank allowed mungbean farmers to adopt improved cultivation practices. Net J Agric Sci, 5(2): 71-78.