STAKEHOLDER BRIEF

ACIAR Cassava Value Chain and Livelihood Program

Sustainable Cassava Development in Son La

Summary

Cassava is one of the main crops and main income sources for farmers in Son La Province, especially for poor farmers. The recent expansion of cassava production areas has contributed to the development of a cassava processing industry within the province and has created jobs for many people involved in the transport, processing and trading of cassava and cassava based products. However, cassava and cassava farming system has not been paid adequate attention by policymakers and cassava growers often do not have access to knowledge and improved technologies including sustainable cassava cultivation and management and soil fertility management. Therefore, cassava often has a low yield and economic value and is still often viewed as a crop that results in serious soil degradation.

Taking this context into consideration, the project AGB/2012/078 "*Developing value chain linkages to improve smallholder cassava production system in Vietnam and Indonesia"* has conducted research for development activities in Son La from 2016 to 2020 aiming to promote sustainable development of cassava, with improved soil fertility, yield increases and increased profitability for farmers as well as other actors involved in the cassava value chain in Son La.

This stakeholder brief is designed to briefly present some research results of the project and provide some recommendations for a sustainable cassava production system in Son La province. The targets of this brief are cassava stakeholders, including the Ministry of Agricultural and Rural Development, Ministry of Trade, Ministry of Science and Technology, authorities of Son La Province at all levels, the extension system of Son La province, donors, research institutions and cassava processing industries.

Rationale

Son La has the biggest cassava production area in the North of Vietnam. The total area of cassava production in the province in 2018 was more than 34,000ha with production of more than 400,000 tons of fresh roots. Initially, cassava was grown for food, but it has since become a main commercial cash crop. Income generated from cassava production is still a main income source for poor farming households

(accounting for 28.44% of the total population of Son La province in 2017)[1]. Over the past 10 years, as the cassava production area has expanded, the cassava processing industry of the province has also grown.

The cassava farming system faces many challenges including limited access to improved varieties and the presence of soil erosion. The existing cassava varieties don't meet the requirements of the starch processing industry and the fields on which cassava is planted are often steep, degraded and have poor fertility. In addition, traditional farming techniques (including slash & burn) contribute even further to soil degradation and erosion. Low and unstable yields bring low profits for growers.

Cassava is one of the main crops of Son La province according to the Decision No. 1347/QĐ-UBND issued on June 12th 2018 by the People's Committee of Son La province. The province aims to have total cassava production of 620,000 tons of fresh roots from 40,000 ha of production land by; (i) mobilizing new improved varieties that can be resistant to pests and disease while still giving high fresh root yields and good starch content levels; (ii) improving adoption of sustainable cultivation practices on sloping lands for soil protection; and (iii) applying advanced technology in processing for maximizing starch extraction and environmental protection.

AGB/078/2012 has conducted agronomic research activities and value chain analyses to assist in sustainable cassava development and giving support to the provincial authorities in achieving the targets and improving profits for cassava growers and other value chain actors.

Key Problems to be Addressed

- Soil erosion and soil degradation have negative impacts on cassava yields that results in low economic returns, especially in Son La where cassava fields are usually steep and cassava growers have no experience of sustainable soil management practices.
- Emergence of pests and diseases and the risk that these will spread to the North West and Son La. This is of particular concern related to Cassava Mosaic Disease and Cassava Witches Broom Disease.
- Limited investment in cassava research and development from both the public and private sectors; In the past, cassava has not been considered a priority crop which could be covered by the activities of the government extension system.
- In the opinion of many administrative officers and researchers, cassava is still considered to be a "soil exploiting" crop. This perception causes challenges in formulating strategic planning of cassava production for commercialization.
- There are not a wide range of varieties planted in the province. There are only two main varieties (KM94 and Red La Tre) existing in the commercial production areas of Son La, and these both have limited potential yield. The limited diversity of varieties heightens the instability of the of the production system and the risk of harvest losses in case of natural disasters or disease outbreak.
- A cassava planting material distribution system which can provide good and disease free planting materials is not yet available. Planting materials are currently selected, reserved and exchanged by farmers themselves. In general farmers lack knowledge about planting material management and this increases the risks of disease transmission within the province and from outside the province.
- Cassava farmers do not know how to place cassava cuttings properly, how to apply fertilizer and use right fertilizer. Most farmers use limited a limited quantity of fertilizer for cassava, about 50kg NPK/ha (NPK 5:10:3). In addition, farmers generally only apply fertiliser at planting time.

[1] https://www.most.gov.vn/vn/tin-tuc/14419/son-la-dat-ket-qua-cao-trong-thuc-hien-nghi-quyet-trung-uong-7-khoa-x-ve-nong-nghiep--nong-dan--nong-thon.aspx

Key Research Results

In general, yields and profits generated from cassava production depend on many factors including variety used, density, type and quantity of fertilisers and when and how the fertilisers are applied, as well as the underlying soil fertility. Usually cassava can provide higher yields and profits when planted in flat fields where soil is fertile and has been previously planted with legumes. Yield performance and profits will be less if cassava has been planted for many consecutive years in steep fields with low soil fertility.

Varieties

- Repeated evaluation of varieties over three years 2017-2019 showed that two new improved varieties (13Sa05 and BK) can give good growth and higher yields in comparison to the two existing common varieties (KM94 and Red La Tre). The two new improved varieties have relatively high starch content levels (29% - 30%). In terms of plant architecture, the new varieties have a short plant type which can be more resilient in steep land and strong winds. They have many roots but the short plant type make harvesting easier.

- These two new varieties also respond better to fertilizers than the commonly planted varieties of KM94 and Red La Tre. Under the same conditions of soil (flat and fertile or steep and infertile) and without infestation of pests and disease and the same dose of fertilizer[2], BK and Sa1305 can give yields between 18 tons/ha to 32 tons/ha which is between 14%-17% higher than that of KM94 and Red La Tre.

- However these two varieties are more susceptible to pests and disease than KM94 and Red La Tre. It is observed that many plants of BK and 13Sa05 were infected with Witches Broom Disease and Pink Mealybug in 2018 leading to significant yield losses. At the same time, KM94 and Red La Tre were found to be healthy. In addition, it is harder to reserve BK and 13Sa05 stems for planting material in the following season (the stems can be reserved for less than 2.5 months). These two new varieties also have a lower germination rate under drought conditions than either KM94 or Red La Tre.

Fertilizer and density

- Fertilizer application either with 300 kg/ha NPK (5-10-3), or 40N/10P/40K, (equivalent to 87 kg urea + 142 kg triple superphosphate + 80 kg KCL), or 60N/15P/60K, (equivalent to 130 kg Urea + 213 kg triple superphosphate + 120 kg KCL) has shown to result in an increase in yield and economic value from 10% to 50% in comparison with not applying any fertilizer.

- With the same financial investment for fertilizer, using single fertilizers of urea, triple superphosphate and KCL gives higher yield and better returns on investment than using composite NPK fertilizer.

- Using single fertilizers on KM94 (separate urea, triple superphosphate and potassium fertilizers) at the level of 40N/10P/40K, and applying three times including one basal and two top dressing applications gave the highest returns and allowed the yield of fresh root to reach 20 tons/ha which is proximate to its potential yield of 25-30tons/ha. With the same fertilizer application methods but with a higher fertilizer dose of 60N/15P/60K, KM94 can give higher yields and higher gross revenues but returns to labour are less than for the dose of 40N/10P/40K.

- Slow release fertilizer pellets are not suitable for cassava planting on sloping land in Son La because of the steepness of the land and the fact that the soil does not have sufficient moisture for the pellets to release nutrients to plants while the risk that pellets will be washed away during heavy rain is quite high.

- Increasing the fertilizer dose combined with the correct spacing can increase cassava yield and returns. The correct density for fertilizer of 60N/15P/60K on KM94 is 12,500 plants per ha (1m x 0.8m). It is not efficient if density and fertiliser dose are increased past this point as yield

[2] 40N/10P/60K equivalent to 87kg Urea + 142kg triple superphosphate + 80 kg KCL or 60N/15P/60K equivalent to 130kg Urea + 213 kg triple superphosphate and 120kg KCL

performance and return on investments do not increase, due to higher costs for planting materials and labour for management.

Soil management technology

- The research results show that intercropping cassava with either legumes or establishment of contour lines by grass strips or cassava stems does not have any negative impacts on cassava yields. Impacts on soil conservation made from intercropping or contour strips depends on how steep the fields are. After three years of experiments, it is observed that soil quality is improved (more moisture and organic matter) in the fields with less steep slopes. The impact on soil quality is not significant in fields with steep slopes.

- Intercropping with legumes (cowpeas and peanuts) can generate extra income for farmers. Under good management and with harvesting taking place at the right time, cowpeas can give from 200-300 dry pods per hectare and peanuts can provide from 300-400kg fresh nuts per hectare. However, farmers are not interested in adopting either of these intercrops, as management of peste and disease and harvesting of intercrops requires a lot of labour inputs. Most cassava fields are far away from the farmers homes and intercrops are harvested during the rainy season – meaning that there are challenges for travelling to the fields and also the rain has negative impacts on the quality of cowpeas and peanuts.

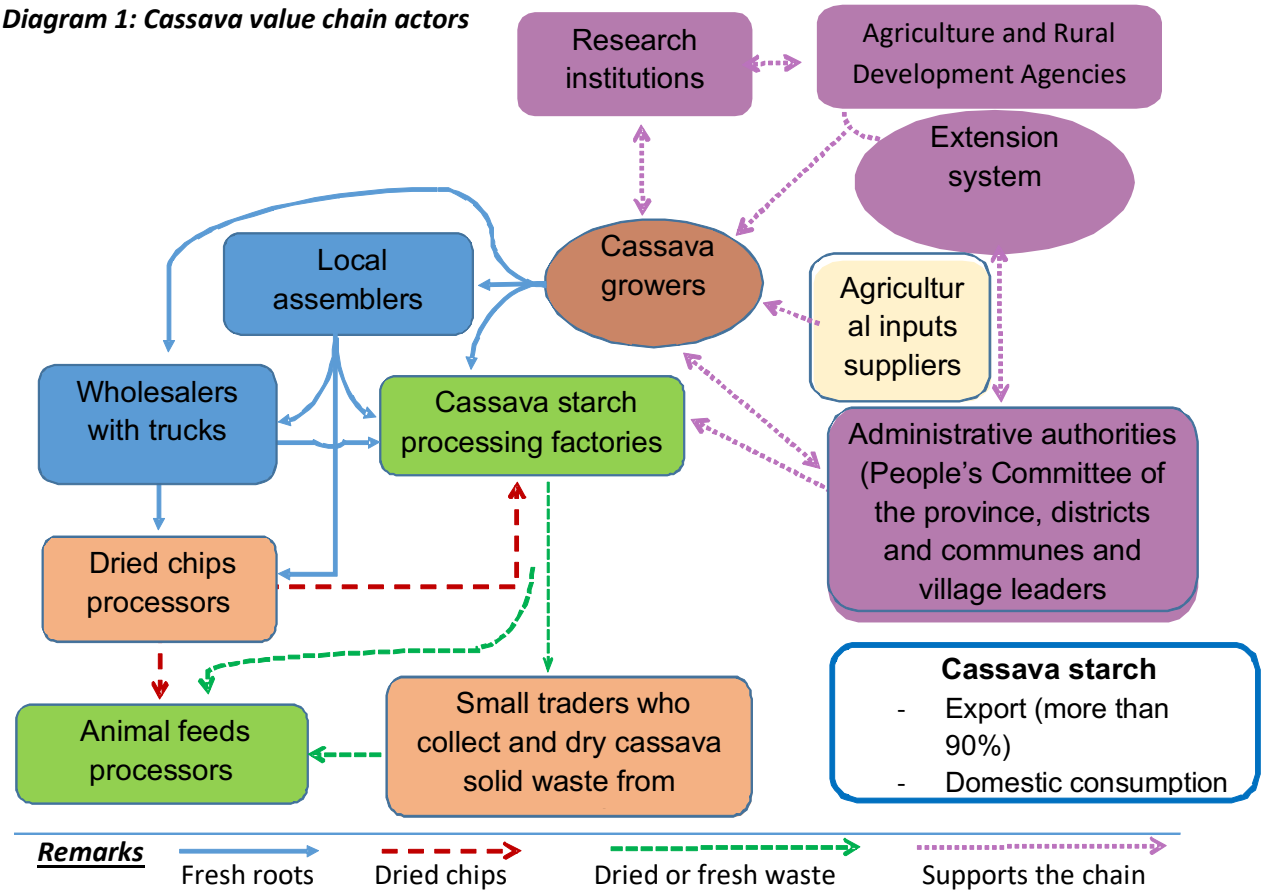
- Establishment of contour lines using cassava stems with distance of 8-10m between each contour line is relatively easy and doesn't incur any significant financial costs. Not much labour is needed for establishment and annual maintenance of these contour lines. Farmers are interested in this technology and have expanded the adoption beyond the project.

- Establishment of contour lines with grass strips with distance of 8-10m between each contour line can give about 5 tons of forages per hectare per year for animals. However, getting grass seeds and planting, harvesting and management of the strips requires a lot of labour. When the cassava fields are far away from the farmers home, cut and carrying of forages for feed for animals kept near the home is not practical. This is the main constraint that prevents farmers adopting this technique more widely.

Linkages and collaboration amongst actors along the cassava value chain

- Cassava value chain analysis identified that the chain is complex and comprises a variety of actors including direct actors and business services providers (diagram 1).

Diagram 1: Cassava value chain actors



- Research results show that actors along the chain have not had close linkages, especially between direct actors. There have not been any research projects focusing on the sustainable development of cassava value chain. Up to now, training of farmers on sustainable cassava cultivation practices and improved technology have not been available and provided to farmers. Investment from extension services for cassava is limited because cassava is not a priority crop of the provincial government. The government has prioritised rice, coffee, maize and fruit trees within Son La.
- The private sector lacks an incentive to promote and deliver improved cassava cultivation and management techniques as starch processors are currently able to access sufficient fresh roots for processing, with almost no competition. The starch factories currently have no to develop exclusive raw material production zones or undertake contract farming to ensure supply.
- Some factories are willing to give support to farmers in improving cultivation practices and are interested in the introduction of technologies that would allow a longer cassava harvesting and processing season than is currently the case in Son La. However, this support would also need involvement from the public sector to support and facilitate the linkages – currently this is non-existent.
- The research found that the risk of disease spread is high due to the lack of formal planting material production and distribution systems to provide high quality and disease free planting materials to farmers. Current farmer practices involve farmers reserving planting materials themselves and source planting materials for new improved varieties through informal channels. These informal systems of trading and exchange of planting materials carry high risks of spreading

disease especially under the context that cassava mosaic virus has already spread out within countries in the region and provinces in the south of Vietnam.

Conclusions and Recommendations

Varieties:

Introduction of new improved varieties should be accelerated to allow for a more diversified portfolio of varieties within the province. This would lead to reductions in harvest losses and improvement of returns from cassava production. In the short term, BK and 13Sa05 varieties (both of which are suitable for the agro-climatic conditions and have high yield and starch potential) should be multiplied and distributed to farmers. In the medium and long-term, research into the development of sustainable planting material production and distribution systems providing disease free planting materials should be conducted. The establishment of this production and distribution system will aid in the prevention of the spread of disease- especially cassava mosaic disease which already widespread in the southern provinces of Vietnam.

Fertilizer:

Farmers awareness of cassava's fertiliser requirements should be raised. The fertilizer requirement of cassava is different from that of other crops such as vegetable, fruits and maize. While composite NPK fertiliser with the right ratio for cassava is not yet available in Son La, and application of single fertilizers - urea, triple phosphate and potassium at the right times (basal, top dressing 1 and top dressing 2) can support cassava to grow well and to give good yields. The correct dose is 40N/10P/40K (87 kg Urea + 142 kg Super Triple Phosphate + 80 kg KCL) or 60N/15P/60K (130 kg Urea + 213 kg Super Triple Phosphate + 120 kg KCL) per hectare.

Soil fertility management:

Appropriate technologies that should be promoted include contour lines using plant residues or grass strips and intercropping with legumes for soil coverage and soil fertility improvement. However, for adoption to occur in practice, there would need to be policies in place to support investment costs for farmers for the first few years of establishment and adoption of the technology. It should be emphasised that contour lines are only efficient on land suitable for annual cash crops with slopes of less than less than 20 degrees. Steeper land should be used to plant perennial tree crops, rather than industrial crops.

Value chain linkage development:

- Close linkages between and within direct and indirect actor categories of the cassava value chain is a must to address key problems.
- Decision makers should issue policies that create an enabling environment for farmers to adopt technologies and to utilise land resources properly for sustainable crop cultivation and development. Decision makers also need to play an active role in the development and facilitation of ongoing linkages between production – research - markets.
- The participation and commitment of the private sector is vital in encouraging farmers to adopt technology in production. If there is an alignment with the needs and requirements of processing factories, then they should also participate in trialling and distribution of new improved varieties developed by the research sector.

- It is recommended that the Department of Agriculture of Son La nominate cassava as a priority crop for extension support and for the research agenda within the province. This would pave the way for increased impacts in adoption of advanced technology in cassava production by farmers as training and extension services could be provided through the government extension system.
- More effective linkages between extension system – research agencies and processing entities would improve adoption of advanced technology and sustainable development of cassava production and returns for stakeholders of cassava value chain.

This stakeholder brief summarises issues, findings and key policy recommendations for the cassava sector in Son La emerging from ACIAR Project AGB/2012/*078 Developing value-chain linkages to enhance the adoption of profitable and sustainable cassava production systems in Vietnam and Indonesia.* The project is funded by ACIAR and implemented in Son La by NOMAFSI, CIAT and the University of Queensland. The intended audience of this brief is Ministry of Agriculture and Rural Development, Local Government and extension centres in Son La and the private sector stakeholders in the cassava value chain in the province.
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