



**Australian Government**  
**Australian Centre for  
International Agricultural Research**

## **Eastern Indonesia-Agribusiness Development Opportunities (EI-ADO)**

### **Potato Value Chain Study Executive Summary**



Locations: East Java, West Nusa Tenggara (NTB)

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Authors: Chris Wheatley, Teddy Kristedi, Budhi Prasetya

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## Executive summary - potato

### *Introduction*

This project is one of five lead commodity value chain studies undertaken as part of the larger \$1 million Australian Government's Department of Foreign Affairs and Trade (DFAT) funded project Eastern Indonesia Agribusiness Development Opportunities (EI-ADO). In this project, Australian Centre for International Agricultural Research (ACIAR) commissioned research to identify lead commodity value chains to be the focus of a new DFAT program Australia Indonesia Partnership for Decentralisation – Rural Economic Program (AIPD-Rural).

The aim of the potato value chain study is to identify development constraints and private sector agribusiness development opportunities with potential to increase incomes of the poor in NTT, NTB and East Java provinces in Eastern Indonesia. These results will be an input to future ACIAR projects and a new DFAT program: AIPD-Rural. The study focuses on two main distinct value chains:

- Potato for fresh consumption (Granola variety) mainly in East Java, and
- Potato for processing (Atlantic variety) mainly in Lombok, NTB.

The M4P methodology was used, with fieldwork involving key informant interview and farmer focus group discussions conducted in East Java and NTB during September/October 2013, supplemented by key informant meetings in West Java in July, and in Jakarta in October. Attention was also given to cabbage, as a crop associated with potato production systems in some locations.

### *Potato in Indonesia*

In a global context, Indonesia is a minor producer of potato (< 1 million ton/yr) with yields of 18.2 ton/ha, comparable to those of other Asian countries. Over the last decade, potato exports from Indonesia have declined substantially to very low volumes (<5,000ton/y) while imports have dramatically increased (to >80,000ton in 2011). Potato is an important component of highland (>1,000masl) vegetable production systems across Java, Sulawesi and Sumatra. Within East Java, the main potato producing area is around Mt Bromo crater, comprising four districts (Pasuruan, Probolinggo, Malang, Lumajang), and also the area around Batu. In NTB, potato production is restricted to the Sembalun area to the east-north-east of Mt Rinjani in East Lombok. Production in NTT is minimal and this province was not included in the study. Demand for fresh potato – Granola – is slowly increasing in line with urban population growth, although consumption (as vegetable, not staple) remains limited to approximately 2kg/capita/y, mainly through traditional market channels. Processing demand is increasing (growth rates not divulged by commercial actors); industry processing capacity is expanding, as is SME scale processing in East Java (using Granola as raw material). There are problems for domestic production of Atlantic to meet this demand.

### *Description of potato value chain in Indonesia*

The value chains for fresh consumption (Granola) and processing (Atlantic) are well differentiated, and are described separately. For Granola, the main production areas around Mt Bromo and Batu are linked to terminal markets through rural collectors, intermediaries/traders and wholesalers. There are a number of rural markets close to the production areas (e.g. Mantung in Malang and Tosari in Pasuruan) which serve as assembly points for shipment to wholesale markets in or near Surabaya, or directly to terminal markets. The main end markets are:

- (a) Local urban centres e.g. Malang, Probolinggo towns;
- (b) Other major population centres in East Java (e.g. Surabaya, Kediri);
- (c) Cities elsewhere in Java, especially Jakarta and Semarang, or
- (d) Other islands including Kalimantan, NTB and NTT, with shipment via ports in Surabaya and Semarang.

Finally, there is a specific market developing for premium quality potato to the tourist market in Bali, with shipment via ferry from Banyuwangi in the SE extremity of East Java.

For farmers, potato is one of several vegetable crops commonly produced in rotation, including cabbage, carrot, spring onion, tomato and chili. The main planting time is November/December, although in higher altitudes areas (Pasuruan) planting and harvesting is possible year-round. Crop rotation with non-Solanaceous species also helps to control pests and diseases. Compared to these other crops, potato is seen by farmers across the province as the most risky, with high production costs and moderate income/ha. This is based on the costs of seed and agrochemical inputs, the severity of plant production constraints (diseases especially) and the cost of their control, combined with market price uncertainty. However, farm gate prices in East Java in recent years have ranged between IDR 4-6,000/kg for commercial grade tubers. Farm yields of 12-18ton/ha are common, rising to 20ton/ha. Net income/ha for the most recent crop ranged between IDR13-41 million, compared to over IDR 117 million/ha for one cabbage crop investigated.

Potato is usually harvested by the producer, and may be graded on-farm too. Grades are complex, but the main commercial grade (e.g. for shipment to other islands, where storage life is important) are denominated A, AB or AL. Grade B is usually for local markets and the much smaller grade C are commonly retained for seed use on-farm. Losses during the marketing process are usually minimal, except in the rainy season when rotting can elevate them to the 2-5% level. Wholesale and retail prices indicate moderate margins at the intermediary level. Retail prices in Malang market were IDR 9,000/kg. In supermarket, potato is a minor component of the fresh produce offer, with very low turnover (20kg/week/store, IDR 14,000/kg) and poor quality on view. Higher value bagged and selected potato is also on offer at much higher prices (IDR 30,000/kg).

Granola variety is also used, around Batu, as the raw material for processed potato chips (*kripik*) produced by a cluster of 28 SMEs targeting the *oleh-oleh* market for tourists to the area. Although currently taking relatively small volumes of potato (500 ton/y) there are likely many unregistered operations, and the market is expanding, but based on an unsuitable potato variety for processing.

Production of Atlantic variety for processing is limited to Sembalun in East Lombok, and forms part of Indofood's raw material supply chain. Farmers are organised into groups, supported by farmer leaders/convenors and Indofood field staff, supplied with potato seed, given access to finance for input supply (cost discounted from potato sold to Indofood) and guaranteed a price (currently IDR 3,850/kg) at harvest. Problems with seed supply and quality have affected the smooth operation of this system in recent years, and some farmers have shifted to other crops (or to Granola production). As a result, Indofood apparently failed to meet Atlantic production targets for Sembalun in 2012. Harvests are organised by the farmer leaders according to Indofood's schedule, and transport is contracted directly by Indofood to deliver the produce to factories in Semarang and Jakarta.

The main constraints for the Granola value chain are on the production side, as there is little scope to improve traditional market chains, and the modern sector (supermarkets) remains too small to justify attention. The most frequently mentioned constraints by producers were poor yields and high production costs, which relate to potato seed quality and cost, and also to crop management issues and especially the relatively high use of agrochemicals during crop production cycle. The issues around potato seed are (a) high cost and limited supply of certified seed tubers of good quality and (b) locally produced uncertified seed tubers from clean meristem culture are of varying quality and also high cost (c) the farmer practice of using seed retained from previous harvests, over several cycles (up to G8-10) results in gradually increasing disease pressures and lower yields over time. There is also no pipeline of potential new varieties under evaluation in East Java. While current farm gate prices were seen as acceptable by farmers, there were concerns voiced about imports of ware potato from China, with potential to cause price falls below production costs.

The *kripik* value chain around Batu has a major problem in that a non-processing variety – Granola- is the only raw material available. This increases costs (for raw material and processing) and impacts negatively on product quality.

For Atlantic potato, improved supply of good quality seed is also a major issue for the producers in Sembalun. Improving the relationship between farmers and Indofood – perhaps through contracts – would be another positive development.

### **Cross-cutting issues**

Potato is a crop that demands investment to give good returns – in seed, purchased inputs and also labour. As such, it is not suited to the very poor, unless accompanied by adequate credit to finance input purchase. The labour requirements do however offer opportunity for rural employment for landless households. The combination of high

production costs and fluctuating market prices (for Granola) means that producers need to have tolerance for, and manage, risks at both production and market sides.

At farm level, women are commonly involved in all potato production activities except land preparation and pesticide application, but women may be paid at lower daily rates. Men are more usually involved in selling their produce, and will often hand over the income received to women who are responsible for management of household budgets. The use of agrochemicals can be a negative factor for the environment, especially at high application rates/frequencies, and issues such as worker protection, water resource contamination, and safe disposal of containers are all valid. Additionally, there are increasing environmental regulations around productive use of highlands, and many of the potato production areas in both East Java and East Lombok border on national parklands where reforestation is taking place. Tourism is expanding in these areas, and is increasing in importance to local economies and employment.

### **Pro-poor value chain development opportunities**

1. Upgrading the *kripik* value chain in Malang and Batu districts, through linking the *kripik* producers with a farmer group in Malang (Ampel Gading) that is already producing a new processing variety (Bliss). Processors in Batu are keen to evaluate and promote a new variety, and the recent development of seed production facilities and the program of G0 production of Bliss potato seed, is a promising development that can be supported. Introducing a high dry matter variety has potential to reduce processing costs, and thus allow processors to pay a higher price/kg for fresh potato tubers, as an incentive for varietal adoption. If benefits were divided equally between producers and processors there is scope to increase net income/ha by IDR 12 million. Although the total current market size is relatively small (500ton/year) it is growing by approximately 20-25% annually, according to one manufacturer.
2. Improving local supply of quality potato seed for the fresh market. Poor quality seed is the main constraint faced by producers, with costs – and lack of finance – holding them back from purchasing seed, instead of using their own retained seed for many generations. In order to overcome this constraint, investment is needed in local facilities to produce greater volumes of seed. A number of entrepreneurs are already involved in seed production in East Java, and these can be harnessed to support such expansion, e.g. to 5,000ton/y seed tubers initially (planted at a rate of 1.5ton/ha). Yield increases of 25-35% can be expected from using purchased quality seed, instead of seed retained on farm for many cycles. Assuming an increase from 15 to 20ton/ha, this could result in an additional IDR25 million/ha gross farm income, less cost of purchased seed (IDR15 million/ha), producing IDR 10 million/ha net benefit.
3. Market-based incentives to encourage adoption of efficient use of agrochemicals. More efficient agrochemical use would potentially reduce production costs, increase profitability, as well as reduce residues on fresh produce and the associated adverse environmental impacts. However, current market incentives

and farmer practices encourage inefficient usage (over-application etc.). Input suppliers and field staff of agrochemical firms are incentivised to expand sales. However, there is a logic to reducing agrochemical use as it (a) helps to prolong product life, by reducing pressures on pests and diseases to evolve resistant strains and (b) may facilitate development of higher value markets that value food safety and the environment. This requires more study, and interaction with agrochemical firms, and exploration of tourist markets (e.g. Bali and Mt Bromo) and related branding for premium potatoes.

4. Development of contract agriculture for Atlantic potato supply to Indofood. The Atlantic supply chain developed by Indofood has problems with seed supply – poor quality, late delivery etc. The fixed price offered by Indofood is attractive even if (usually) lower than Granola price. Indofood operates a policy of not using written contracts with farmers, or group convenors, apparently due to historic problems with contract farming in West Java. Use of written contracts could improve the operation of Indofood's raw material supply, to lock-in production to the processing factories, and work to farmers advantage if conditions such as seed tuber supply (quality and delivery dates) were included. If the introduction of contracts results in more timely delivery of better quality seed tubers, and thus in higher yields per hectare, and reduced seed cost per hectare (as smaller sized potato can be supplied, reducing the weight of seed tubers needed per hectare), the innovation could benefit both farmers (higher incomes) and Indofood (increased Atlantic volumes, reduced need for imports). For example, if seed requirements can be reduced from 2.1 to 1.5 ton/ha (as smaller seed tubers are supplied under contract) even with no change in yield, then production costs will decrease by 0.6 ton x IDR 10,500/kg = IDR 6.3 million per hectare, increasing net income by 19%, (assuming other costs stay the same).

### **Conclusions**

Additional research and analysis is proposed on the potato market in Bali (especially for premium potato products for the tourist market) to determine if this is a worthwhile market to develop, based on current size, growth potential and desired potato quality criteria; on the process for *kripik* manufacture in the Batu SME cluster, to identify process improvements and product innovations that could be supported (including use of other root and tuber raw materials, such as sweet potato), and policies/regulations especially as regards imports of potato seed, both ware and processing varieties.