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The potential for passionfruit in eastern Indonesia

SADI-ACIAR research report

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ACIAR is committed to the partnership through the management of a component of the Smallholder Agribusiness Development Initiative (SADI), which aims to improve rural sector productivity and growth in four eastern provinces—East Nusa Tenggara, West Nusa Tenggara, South East Sulawesi and South Sulawesi.

This initiative will improve incomes and productivity for farmers and agribusiness in response to market opportunities, through a process that is underpinned by improved adaptive research and development capacity.

ACIAR's role in the initiative is to strengthen province-based agricultural research and development capacity that is market and client-driven, and effectively transfers knowledge to end users. A key part of this approach is delivered through market-driven adaptive projects which are priorities for smallholders, farmer groups, agribusiness, government and other supporting agencies.

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2 Executive summary

Passionfruit, known as markissa in Indonesia, is a small horticulture crop, grown predominately in South Sulawesi. It is a crop of regional importance associated with a high level of regional pride rather than of significant economic value.

Production is currently concentrated in highland areas of South Sulawesi, largely because of the traditional varieties being grown. There is a significant amount of land use pressure on this production base due to the introduction of high value vegetable production.

There are 2 peaks in production, one in July-August and the second in December - February, with little production outside of these times. Almost all of the production is destined for the processing sector, which is largely concentrated in Makassar.

Contract relationships between growers and processors are poor with growers' returns low when supply is high.

New varieties could be evaluated that allow production in lowland areas close to the processing hub of Makassar, which will spread the supply window for processors. New varieties for highland areas should also be evaluated to improve quality of product.

With root diseases identified as a serious constraint which causes rapid deterioration of planted material, resistant rootstocks are available that should be evaluated in South Sulawesi.

It may be possible to have varieties and rootstocks released in a closed supply line through processors, linked to contracts between farmers and processors. Contracts based on a set price and volume (matched to processing capacity) should be the basis of trade between wholesalers and processors. The varieties and rootstocks are the basis of these contracts.

Other market opportunities for processed passionfruit in Indonesia and overseas should be explored.

3 Introduction

This report is part ACIAR's contribution to the Smallholder Agribusiness Development Initiative (SADI) in eastern Indonesia. The concept arose from a series of priority setting workshops.

This scoping study operated from a supply chain approach, looking at ways income could be increased for smallholders as part of a supply chain. This analysis operated from the position of researching issues in profitable sustainable supply chains, rather than an identification of technical constraints. There are many technical constraints, the only ones that matter are those that support profitable and sustainable supply chains. A number of project concepts were developed, identifying research required to make the supply chains work to the benefit of smallholders.

Analysis of the current situation operated from an understanding of the technical, marketing and economic issues faced by the crop. It rapidly became apparent that for some situations, it was difficult to improve incomes in the existing supply chain, despite many researchable problems. Adoption of improved technologies in this supply chain is unlikely, as margins are low for all in the chain.

Developing a new supply chain at a higher price, provides the market pull in terms of price for farmers and others to invest and adopt new technologies. Farmers will adopt new technologies where there is sufficient price pull. These benefits will spill over to existing supply chains e.g. if a farmer adopts new production systems to improve quality to meet high priced export markets, the portion of the crop sold into domestic markets also benefits from this technology.

The analysis also looks at the economic situation faced by a family farming enterprise, particularly in relation to the ability of the farm to generate sufficient revenue to maintain a standard of living similar to the rest of the population. It is a very high priority to generate economic wealth at least equal to the rest of the population and create an environment where incomes can rise along with the rise of incomes in Indonesia.

Successful implementation requires strong involvement by all members of the supply chain as active participants in the research. These initiatives will fail if researchers proceed in the absence of input from as many participants in the supply chain as possible.

In some cases it is recommended that closed supply chains be considered for improvement. This means beneficiaries are limited to those who are participants in the supply chain. Closed supply chains can be criticised as undemocratic, excluding some to remain in less profitable markets. Only after much deliberation, the analysis came to the position that in some situations, closed supply chains are the best way to ensure profitable, sustainable chains. In a free market situation where access to technology is open to all, two outcomes can result:

1. the supply chain becomes oversupplied and no longer profitable with no one benefiting.
2. there is no control of the technology in the supply chain. Some fail to use the appropriate technology, comprising the viability of the chain.

Closed supply chains offer the opportunity to ensure the chain remains profitable and sustainable, at least for some, as against no one financially benefiting if the supply chain is open. So in some cases the analysis has recommended a variety be developed and released through an exporter or processor who controls the level of production appropriate to the market to maintain sustainable prices for all in the chain.

The results of the analysis arose from visits to farmers, government and private sector players in South Sulawesi and other areas of Indonesia, where similar crops are grown.

Passionfruit has arisen as a crop of interest in South Sulawesi. It is a very small crop in terms of production, number of farmers and value. It is a crop for which people of South Sulawesi are very proud.

However it is an important product of regional pride, as most people from South Sulawesi identify passionfruit as an industry they have developed and unique to the region.

It appears to be grown primarily for processing though excess requirements are sold on local fresh market.

4 Current production

Passionfruit is grown in highland areas above 700m. Most production is now in Malakaji and Toraja. Malino was formerly a large centre for production but it is clear that more profitable temperate vegetables have taken over from passionfruit. Some farmers remain in Malino, but its proximity to Makassar, where there is a good market for temperate vegetables means that passionfruit has little or no future in Malino.

Most of the passion fruit are trucked to Makassar for processing, a journey of up to 12 hours and a cost of around Rp500/kg.

There seems to be around 100-200 farmers, very small compared to the large fruit crops such as mango, citrus and banana. The total quantity of production seems difficult to determine but discussions with processors indicated there is around US\$1 million of production.

There are 2 seasonal peaks in harvest from December - February and June- July.

5 Production Technology

All of the passionfruit sold for processing is *Passiflora edulis* (like variety Nelly Kelly in Australia).

It is grown from seed. Formerly single wire trellises were the main production system but more is now grown as single plants over a large tree.

Vine life seems to be a maximum of 3 years, formerly up to 8 years. Inspecting vines in Malino and Malikaji, it was clear that root rots and nematodes were common. Processors spoke of up to 50% of vines dying in 3 years in Malikaji.

There may be some use of organic or inorganic fertilisers.

Fruit are picked, packed in sacks and transported to processors. There do not appear to be any problems with post harvest losses at the processing factory. Processors complained that there was a small percentage of immature fruit (observed <10%).

There are some problems with *Alternaria* leaf disease. No one was aware if viruses such as woodiness virus were prevalent, though previous reports indicate woodiness virus was not present. Yields seem to be around 4-5 kg per plant for 2m spacing and around 2 kg at 1m spacing.

There is no extensive use of chemicals for pest and disease control. Most farms are now small though there may be larger farms in the areas more distant from Makassar. Much Passionfruit production is now from single plants planted against trees in gardens. Some farmers in Malino formerly had up to 10,000 plants (2-3ha), producing around 40-50 ton/year.

6 Current market situation

Fruit are sold to a number of processors (10-20), mostly based in Makassar though there are some in the production regions. One attempt was made some years ago to establish a large processing facility in Malino, with a focus on greater export but this attempt failed.

Excess fruit are sold on wet markets. Fruit are collected by collectors then consolidated for shipment and sale to a processor.

There are many conflicting stories on prices from growers and processors.

In essence, when fruit are in plentiful supply in season, it is likely prices are very low (as low as Rp400-500/kg). Farmers indicate they need at least Rp2 500-3,000 to make passionfruit a profitable agribusiness.

Processors indicate they are prepared to pay up to Rp3 500 /kg as a fixed price contract. Processors indicate their biggest constraint is insufficient supply. This does not fit well with complaints of growers in Malino they couldn't sell fruit and complaints from growers of very low prices (Rp500 /kg).

Given that the crop has 2 seasonal peaks it is likely that production exceeds processing capacity in the season. One of the largest processors (with a claimed 40% market share) can only handle around 10 ton/day. During the field visit in late February there were only very small quantities being processed at this facility. Importantly, processors do not have storage facilities. Passionfruit does keep for some time (1-2 weeks) without good post harvest handling.

Most passionfruit juice sales seem to be in Makassar, through supermarkets, airport gift shops and hotels. It seems the juice is a popular gift for visitors to Makassar. The former large processing plant in Malino supposedly had markets in Europe and Australia. Passionfruit puree is only a small market worldwide, supplied mostly from Brazil.

There is a passionfruit processors association in Makassar. They were planning to deal with their supply problems by convening a meeting of growers, collectors and processors to fix a price of Rp3 500 /kg. Processors complain there is a large lack of supply.

Some processors had made initial contacts with juice processors in Jakarta.

The processing technology is fairly simple. The product was very good quality. It is sold in a range of forms from ready drinks to concentrates in 1-2 litre pack sizes.

7 Economics of current production

In comparative terms, passionfruit is not very attractive compared to temperate vegetables that can be grown in elevated areas. At best prices of around Rp2 500/kg, it seems passionfruit can return around Rp30-40million in gross sales/ha whereas vegetables (3 crops/yr) can net around Rp30 million/ha, with significantly less price fluctuation risk.

It seems the future of passionfruit in highland areas is under threat from low prices, root rots and increasing demand for temperate vegetables.

8 Future prospects

The issues for passionfruit seem to be related to poor coordination between processors and producers, with producers suffering in the peak of the season and the processor benefiting. In the low season, for approximately 6 months, processors have no supply.

Processors seem willing to negotiate fixed price contracts at a good price of Rp3 500 /kg. This allows for a price to growers of around Rp2 000-2 500 /kg after freight (Rp500 /kg from distant areas) and a margin for the collector.

There clearly needs to be some better contract relationships between farmers and processors in terms of price, quantity and quality. There do not appear to be any serious quality problems in the supply chain other than a small percentage of immature fruit. This can easily be benchmarked and a price discount applied.

For processors there are at least 6 months of the year their facilities are not used. If their supplies could be made more even then it may be that they could sustain better prices and develop market opportunities.

For growers, the issues of vine life, and root diseases are significant and can be solved with resistant rootstocks, which are available in Australia. Clearly this requires a move to grafted plants. Passionfruit are easy to graft. Grafted plants offer a way for processors to control their supplies, by controlling the availability of grafted plants, and ensuring they get better production from farmers, no longer suffering significant losses due to root disease.

Over production and a poor relationship between production and marketing is a common problem in Indonesia. If a closed supply chain, controlled by the processor, could be developed, then all benefit – the growers in terms of a set contract price and better production, and processors at a sustainable price and guaranteed supply.

Passionfruit varieties have made major shift away from edulis types (Nelly Kelly) to hybrids that are generally more productive. The Panama Red types can also be grown in lowland areas, offering processors the opportunity to source supplies closer to their facilities, avoiding competition from more attractive temperate vegetables and most importantly over a different supply period to existing supply. Panama Red types in the lowland would also have peaks in production but these will be different to the peaks from the highland areas, giving processors a longer processing period.

Evaluating the performance of Panama Red types, on resistant stocks, offers processors to exert some control over production, matched to processing capacity, if they have control over the release for these varieties, in a closed supply chain. If large numbers of growers access these varieties in a free and open market, the existing situation will be replicated - oversupply and poor prices to growers.

Market opportunities for processed juice or pulp outside of Makassar need to be developed into Jakarta fruit producers and international markets. It is interesting to note that the largest juice producer in Indonesia is the Berri group from Australia. There may be opportunities to develop markets in Australia and Indonesia through this group. Indonesian juice processors are innovative with products like sirsak. The market is also responsive to new products. Passionfruit from Makassar is a “brand” already with some level of recognition in Indonesia, especially in the higher income groups that travel.

If sufficient supply could be guaranteed then it would be worth considering export opportunities.

There may be some opportunity to look at processing technologies more appropriate to international markets e.g. puree, pulp. Current processing, while effective for the local market in concentrates and fresh drinks may not meet international market requirements. The current fresh drink has a limited life, requiring refrigeration. A link with a company like Berri may assist in both markets and processing technology. This also includes a move to international food safety standards.