PRESENT SITUATION AND FUTURE POTENTIAL OF CASSAVA IN MALAYSIA

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ABSTRACT

In Malaysia, the processing of sago starch predates that of cassava, having been established before 1416. With its introduction, cassava, which is a much shorter term crop, quickly replaced sago palm as the preferred raw material among starch processors. Hence, except for a small amount serving the fresh food market, cassava is planted in Malaysia mainly for starch processing. The cassava area in Peninsular Malaysia has declined steadily to 1,631 ha in 1997 after peaking in 1976 at 20,913 ha. This decline is due to the curbing of illegal cultivation; land alienation policy with a bias against cassava; switching from cassava to more lucrative crops; rising costs of production; low prevailing price for cassava roots; and competition for land for agricultural and non-agricultural activities during the economic boom prior to July 1997. Of the eight starch factories reported in Perak in 1984, only two are still in operation. Recently, in Sabah, a starch factory opened to process roots supplied through contract farming from an area of more than 3,000 ha. In trade, cassava starch takes the form of flour, flakes, pearls and starch powder. There is a growing demand for starch with imports amounting to 88,210 tonnes in 1997. Most of this starch is used in food industries, particularly for making monosodium glutamate (using about 3,000 tonnes of starch per month). Other significant users are manufacturers of glucose, bakery and biscuit products, textiles and paper. There is also increasing interest in growing edible varieties of cassava for processing into snacks.

The future potential in terms of domestic demand for cassava starch is very good. Since the onset of the economic downturn faced by Southeast Asia, the Malaysian government has actively encouraged agriculture (to offset the country's huge food import bill amounting to almost US$ 2.9 billion a year) by providing easier access to farmland. There is recent renewed enthusiasm for planting cassava for production of starch, dried chips for livestock feed and sweeteners (high fructose glucose syrup or HFGS). For large-scale mechanized cassava production, certain prerequisites of soil type, terrain, climate and farm size matching the factory's capacity, must be satisfied. While land is hard to come by in Peninsular Malaysia, more than 80,000 ha of land are still available in Sabah.

Starch is the most likely product to be feasible and profitable in the immediate future compared to dried chips and HFGS production, because of a high demand in the local market, and a well-established technology for starch processing. Stable, high-yielding varieties with intermediate to high starch content to ensure higher starch recovery are required; better still if they can be harvested early.

The potential of using cassava as a carbohydrate-rich animal feedstuff is promising, but being low in protein compared to maize, additional protein is required from another source, entailing extra costs. Also, it is costly to dry cassava by artificial means. Although it is technically possible to produce HFGS from cassava, it involves converting starch by enzymatic processes – a complicated and expensive procedure. This does not seem economically feasible in the immediate future, given the current low world price for sugar. Instead, modified starches and their products have very good future potential as profitable agro-based industries. Modification of starches not

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only expands their scope of utilization by altering their physico-chemical characteristics, but also increases their value as compared to native starch.

An alternative use of cassava, which has some prospects, is the production of snack foods. Although oil-fried crisps and crackers are traditional snacks produced by cottage industries, only recently have attempts been made by larger food processors to improve their quality and packaging, and to target the more up-market urban consumer and overseas market. Preliminary work at MARDI has shown that cassava makes a very good raw material for extruded snacks.

INTRODUCTION

One of the earliest records of cassava in Asia was in 1786, when it was introduced into Ceylon (present-day Sri Lanka) from Mauritius. Two routes of introduction into Asia have been postulated: (1) by the Portuguese to India *via* Africa from Brazil; and (2) by the Spanish to the Philippines, directly from Mexico (Burkill, 1935). Burkill also mentioned that cassava was brought to Penang from Batavia (Jakarta in present-day Indonesia), while the first recorded commercial planting of cassava in Malaysia was in Malacca state around 1851.

The sago palm processing industry predates cassava starch processing, having been carried out earlier than 1416. However, with the introduction of this far shorter term crop, cassava was quickly able to replace sago palm as the preferred raw material among starch processors. The resultant product was of a high enough quality to be able – to quote Burkill – “to hold its own against the tapioca (cassava starch) of Brazil” in European markets.

CURRENT SITUATION

Current Situation in Cassava Production

Except for a small amount destined for the fresh food market, cassava has been planted in Malaysia mainly for starch extraction. The production area of cassava in Peninsular Malaysia (no accurate figures for Sabah and Sarawak are available) shows a steady decline since peaking in 1976 (**Figure 1**). From an all-time high of 20,913 ha, the area has shrunk to 1,631 ha in 1997 (latest published figure). This decline may be attributed to several reasons:

1. Curbing by relevant authorities of illegal cultivation (rampant in the 1960s and 1970s) on state and private land
2. Land alienation policy for agriculture with a bias against cassava, based on a negative impression of its soil-exhaustive properties
3. A switch by small farmers from cassava cultivation to more lucrative crops, especially oil palm and fruits
4. Rising costs of production (mainly due to farm labor shortages)
5. A very low prevailing price for cassava roots at RM 0.13 per kg, equivalent to US$ 0.034 (based on US$ 1.00=RM 3.80);
6. Competition for land for agricultural and non-agricultural activities (e.g. housing development, industries) during the economic boom prior to July 1997.

Figure 1. Area cultivated with cassava in Peninsular Malaysia (1970-1997).
Source: *Anon. 1971-1997, 1998.*

By contrast, currently sago covers 34,000 ha under smallholdings and 10,700 ha under estates in Sarawak, producing more than 60,000 tonnes of starch per year.

Cassava Processing and Marketing

As mentioned above, cassava is grown in Malaysia for the decades-old starch extraction industry. At least three family businesses had been operating starch factories for more than 40 years. These factories were facing increasingly a lack of sufficient root supply to keep them running at full capacity due to the decrease in production area. Since early 1999, most starch factories in Perak state (where the majority of them were located) have stopped processing cassava roots, leaving two still in business – a significant drop from the eight factories mentioned in 1984 (Tan and Welsch, 1986).

Starch sells currently for RM 700 per tonne (equivalent to US$ 184 per tonne). At this price, some of the formerly larger starch companies have found it more profitable to switch from processing to importing starch from Thailand for repacking and sale to those small local industries using starch as a raw material.

In trade, cassava starch takes the forms of flour, flakes, pearls and starch powder. A growing net demand for starch can be seen in **Figure 2**, which traces the total imports and exports of cassava starch over the period 1971-1997. The net imports of starch in 1997 amounted to 88,210 tonnes (this tallies closely with the figure provided by Rojanaridpiched and Sriroth, 1998), valued at RM 52.9 million (currently, equivalent to US$ 13.9 million). A major proportion of this starch is used in the food processing industries, not the least of which is the manufacture of monosodium glutamate. An estimated 3,000 tonnes of starch is used per month (36,000 tonnes per year) for this purpose. Other significant users of starch are manufacturers of glucose, bakery and biscuit products, textiles and paper.

As a matter of interest, cassava starch imports amount to 58% in value of the total amount of starches imported into Malaysia. These other starch sources include maize, wheat, sago and potato (**Table 1**).

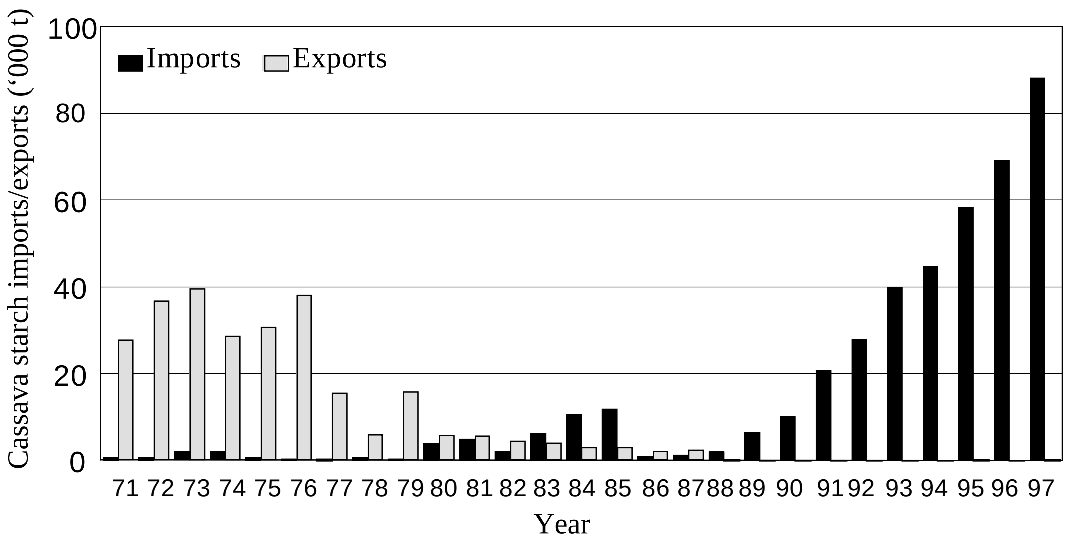

Figure 2. Imports and exports of cassava starch in Malaysia (1971-1997).
Source: *Anon. 1972-1998.*

FUTURE POTENTIAL

Renewed Interest

As may be seen from **Table 1**, imports of cassava starch have an annual growth rate of 36%. Thus, the future potential in terms of domestic demand for cassava starch is very high. As will be discussed later, the potential demand for cassava in other processed forms is also significant.

Since the onset of the economic downturn currently faced by Southeast Asia, the Malaysian government has actively encouraged greater agricultural output, particularly to offset the country's huge food import bill amounting to RM 10-11 billion (US$ 2.63-2.9 billion) a year. One way is to provide easier access for interested parties to farmland for growing crops.

This move has generated recent renewed enthusiasm for planting cassava for several purposes:

1. Starch (to reduce growing imports)
2. Dried chips for livestock feeding (to counter the large amount of maize imported annually, totaling 2.0 million tonnes and valued at US$ 0.28 billion in 1996)
3. Sweeteners - mainly high fructose glucose syrup or HFGS (to offset high annual sugar imports, amounting to US$ 216.4 million in 1996).

Table 1. Imports and exports of various starches in Malaysia (1997).

	Cassava		Sago		Others[1]	
	Quantity (tonnes)	Value (US$'000)	Quantity (tonnes)	Value (US$'000)	Quantity (tonnes)	Value (US$'000)
Imports	88,210	20,565	750	121	32,581	14,615
AGR[2], 1989-97	36%		60%		3%	
Exports	14,292	2,713	9,568	3,335	1,161	958
AGR[2], 1989-97	63%		2%		16%	

[1]Starches from wheat, maize, potato and others.
[2]AGR = annual growth rate

Sources: *FAOSTAT and Department of Statistics, Malaysia.*

Prerequisites for Large-scale Production

It is unlikely that cassava production will remain the domain of the small farmer for long, except for cases where the crop is produced on a small or backyard scale to serve the small fresh food market. Field production technology for cassava is well-established in Malaysia.

Several companies have shown interest in investing in large-scale cassava production, but before this can become a reality the following prerequisites must be satisfied:

1. Production must be at least partially mechanized (planting and harvesting) to overcome the farm labor shortage
2. The terrain must not be hilly (i.e. not exceeding 6º slope) to allow for safe tractor maneuverability and to curb soil erosion
3. The soil must not be drained peat (not mechanizable with current technologies) nor heavy clay (which hampers machine operation when wet, and cakes up into hard clods when dry)
4. The soils should be well drained and not prone to seasonal flooding (which causes root rot)
5. Rainfall pattern should provide sufficient rainless days in a month to allow for high number of machine workdays per month throughout the year

6. The land should be a single contiguous piece for ease of mechanization and to match factory capacity (it has been estimated that for a factory with a daily capacity to produce 25 tonnes of starch 1,500-2,000 ha of land will be required to keep it fully running using one shift per day).

Production Constraints and Research Solutions

Starch

Assuming the land and climate prerequisites for large-scale production are satisfied, growing cassava for starch is the most likely to be feasible and profitable in the immediate future. This is because:

1. There is a ready and growing market for starch within the country
2. Starch production is more profitable than dried chip and HFGS production (see explanations which follow)
3. The technology for starch processing is well-established and readily available for new-comers.

The only area where research is likely to make an impact is the development of stable, high-yielding varieties with intermediate to high starch content to ensure higher starch recovery at the factory. Another bonus would be the characteristic of early harvestability in new varieties, i.e. producing a reasonably high yield after six months' growth, in contrast to the growth period of 12 months shown by the current commercial variety, Black Twig. Early harvestability also allows for greater flexibility in scheduling planting and harvesting in a mechanized production system.

Animal feedstuff

The potential of using cassava as a carbohydrate-rich animal feedstuff is promising, considering the large volume of maize imported annually for the production of poultry and pig feeds. Up to 30% maize can be replaced by dried cassava chips without detriment to the two categories of livestock. However, being poorer in protein content (<2%) compared to maize (about 7%), it is necessary to add more protein from another source (like fish meal) when cassava is used in feeds. This of course entails additional costs.

Maize is currently very cheap in the world market. Despite the currently unfavorable exchange rates facing Malaysia, the price is around 13 US cents per kg (FLFAM, 1998). Fresh cassava roots (at about 65% moisture content) is currently sold to starch factories at 3.4 US cents per kg. The dried chips have a moisture content of around 15%; this means its equivalent price works out to 8.3 US cents per kg. Such a price level may not be considered favorable compared to the price of imported maize because it does not yet account for chipping and drying costs nor the addition of protein. Of course, there is currently a problem of availability as well, since cassava roots are in short supply even for starch extraction, let alone trying to process them into dried chips.

There is in fact a lack of a cost-efficient mechanical drying system for producing dried chips. In Malaysia, unlike Thailand, it is not possible to depend on sun-drying because the climate is much wetter throughout the year, and rainfall is largely unpredictable. For cassava production to take off as an animal feedstuff, replacing at least 30% of the imported maize, research has to address itself to developing an efficient and relatively cheap system for drying cassava. Perhaps, solar energy can be harnessed for the initial stages of drying before mechanical dehydration involving fuels take over to finish the job.

Sweetener

Malaysia has limited areas which have the correct agro-climatic conditions for growing sugarcane. Thus, the importation of raw sugar is likely to continue. The good news is that the price of raw sugar in the world market is currently very low at 12.3 US cents per kg (futures market in October 1999) (CSCE, 1999).

High fructose-glucose sweetener (HFGS) has almost the same degree of sweetness as sucrose sugar. It is especially useful in replacing sugar in the manufacture of canned, bottled or packaged beverages as well as tinned foods. However, its direct use as a substitute of sugar by the ordinary man in the street is less suitable by virtue of its liquid nature.

Although it is technically possible to produce HFGS from cassava, the process requires starch first to be extracted then converted by enzymatic processes into the sweetener – a complicated and expensive procedure. This is certainly not economically feasible in the immediate future, given the current price of sugar.

Other uses

Modified starches and their products (e.g. beverages, sauces, extruded snacks, coatings, emulsifiers, bulking agents, encapsulators, paper, textiles, adhesives, water absorbers, fat replacers, biodegradable plastics, industrial acids and alcohols) have very good future potential as profitable agro-based industries. Modification of starches not only expands their scope of utilization by altering their physico-chemical characteristics, but also increases their value in comparison with native starch.

An alternative use of cassava which has some prospects, is as a raw material in the production of snack foods. A local survey showed that many of the snacks (not including confectionery) available in the market are manufactured from wheat flour, maize and potato – all of which are imported (Lee *et al*., 1997). Although oil-fried crisps (*kerepek*) and crackers (*keropok*) are traditional snacks produced by cottage industries, only recently have attempts been made by larger food processors to improve their quality and packaging and target the more up-market urban consumer.

Demand for *kerepek* especially is good in the nearby Singapore market. Preliminary work at MARDI has shown that cassava makes a good raw material for extruded snacks: it has expandable/puffing qualities, producing a crispy product; and it has a bland taste which is favorable for addition of various flavorings to give a range of different tastes (Lee, 1999).

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