

Ethanol : Growth Impact on Thai Cassava Industry

by... Prof. Dr. Chareinsak Rojanaridpiched ⁽¹⁾
and Assoc. Prof. Dr. Vichan Vichukit ⁽²⁾



Thai Cassava Industry has undergone continual development and significant transitions. Before 1937, Tuan Komgris, stated that there is cassava growing for starch in Songkhla province, exporting to market in Penang and Singapore prior to shipping route to Bangkok. Commercial production of cassava started in the eastern provinces after World War II, cassava were grown in Chon Buri and Rayong provinces as raw material for starch production as export to foreign market. Department of Agriculture's statistics accounted for 307,000 tons of cassava, from 102,000 rai, in 1949.

The expansion of feed market in Europe in the seventies, spurred expansion of production base from the east to the northeast, southern part of the north, the west. Production acreage reached 10.12 million rai, producing raw cassava roots of 24.26 million tons. It was hard to believe that in 1978, cassava produce was the highest earner of the country export, totaling more than ten thousand million Baht.

After 1993, the European feed market digress its dominance, owing to the cereal feed support policy, the Thai cassava chip/pellets was unable to compete with the European market. The growth of starch and modified product together with utilization of cassava pellets converted into ethanol for liquor in China caused significant changes to the market. Cultivation acreage decreased to 6 million rai, but yield/production per rai increased from 2,200-2,300 to 2,800-2,900 kg/rai.

The government policy of utilizing 10% ethanol mixed with 90% benzene, as gasohol 95 becomes a

reality in 2005. Everyday, in October 2005, gasohol sales per day are 3 million liters (equivalent ethanol required is 300,000 liters). It is anticipated that by January 1, 2007 the whole country will be deprived of benzene 95, available only gasohol 95. The need per day in 2007 should be 1 million liter, which would require a huge amount of cassava and sugarcane as raw materials. Cassava starch industrialists get worried there would be insufficient cassava roots. The ethanol industry will cause tremendous impact as would be related in details in following sections.



National Ethanol Strategy:

Summary of Ministries' Meeting among Ministry of Energy, Ministry of Agriculture and Ministry of Industry conducted on December 9, 2003 and related agencies as follows:

Ministry of Energy goal is to articulate on ethanol utilization, specify clearly on buyers, amount of 1 million liter/day in 2003-2006 as alternative replacement for MTBE substance in benzene 95, and 3 million liter/day in 2011 as replacement for benzene 91, policy on pricing of gasohol, expansion of gasohol station.

Ethanol Production Capacity:

Data collected from the ethanol development and utilization subcommittee: October 2005 - Presently

there are 26 authorized factories, with maximum production capacity of 4,685,000 liters- only 3 factories are in operation as follows:

1. Phorn Vilai International Group Trading Co., Ltd. Ayuthaya province, from sugarcane, capacity 25,000 liters
2. Thai Alcohol (pub.) Limited. Nakorn Phatom province, from sugarcane molasses, capacity 100,000 liters
3. Thai Agro Energy Co.,Ltd. from sugarcane, capacity 150,000 liters

But during September-November, not yet in season for sugarcane extraction, there were shortage of molasses and pricing estimate for ethanol were not completed, causing a temporary shortage, hence temporary import of ethanol was allowed to ease ethanol marketing activity.

Factories that rely on cassava as raw material, such as Tai Nguan Ethanol Factory, Khon Kaen province, daily production capacity of 130,000 liter/day and International Corporation Factory, Rayong, capacity 170,000 liter/day, in pilot test production phase. Other factories such as Khon Kaen Alcohol Co.,Ltd. use sugarcane and cassava as raw materials, capacity 100,000 liter/day will conduct production test in December 2005. If all go well, with the three factory at full operation, the shortage will be eliminated.

In conclusion, as things go as planned.

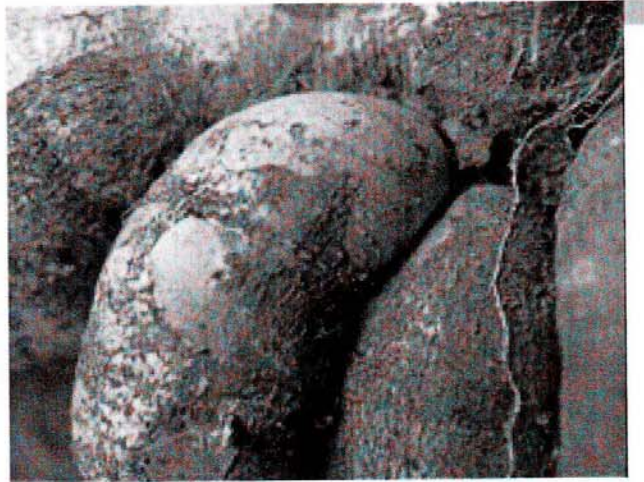
2005 estimate should attain maximum capacity of 675,000 liter/day.

2006 estimate should attain maximum capacity of 1,375,000 liter/day.

2007 estimate should attain maximum capacity of 4,685,000 liter/day.

However, the production capacity of 4.68 million liter/day is the maximum figures, actual number should be 80% of the maximum.

Besides, there are several interested individuals requested for official permit to set up ethanol plants, however, the 26 authorized plants are expected to complete the construction of factories by 2008. By that time, the production capacity will override the country's need, the surplus shall be exported to external markets such as China and Japan and used by other industries internally.



Raw Material Needs:

The authorized factories estimated their needs for raw materials as follows:

(Figures in tons)

Year	Molasses	Sugarcane	Cassava
2006	495,000	0	709,412
2007	363,000	3,792,857	2,197,059
2008	363,000	7,590,000	4,658,824

source: Subcommittee on Development and Utilization of Ethanol

It is conceivable that with full production capacity in 2008, authorized factories are determined to use 363,000 ton of molasses. As the molasses are limited in quantities, and expensive, owing to the fact that it is also raw material in liquor alcohol production, monosodium glutamates food additives and several others and also export. The industries is determined to stilize 7,950,000 tons of sugar cane. Which is sugar-factory related. Therefore, instead of using total 1 ton of sugar cane to produce 100 kilograms of white sugar, the factory will use secondary cane juice with lessened sweetness to produce ethanol. 1 ton of sugarcane will yield 70 kilograms of white sugar and 39 liters of ethanol. Even the 1984 decree controls the commerce of sugarcane, how the 9% of molasses to produce ethanol will benefit the farmers should be under close consideration.

Trade and cassava production in Thailand goes on rather free, high productivity, able to stock the surplus in the form of cassava chip. Ethanol processes byproduct result as electricity from biogas of wastewater

association of cassava production. Official statistics is 2.8-2.9 million tons/rai. The portfolio of higher figures remained unsolved. By conducting farmer interviews yield of 3.5 tons/rai is quite normal. Hence cassava production figures 2.8-2.9 million ton/rai should be too low???

Future cassava scenario:

The author used the strategies derived from alternative energy in ethanol and biodiesel, the development of factory, land resources, technology, overwhelming farmers' environment to estimate the cassava portfolio as follows:

1. Raw material is the main factor of success of ethanol production

Competition in purchase of sugarcane and cassava as raw material by cassava chip/pellets factories, starch factory, ethanol factory and sugar factory. In the past 2-3 years, produce of cassava is insufficient. The relations of farmers and factories are affected, changes slowly follows.

Impact: The ethanol, the big starch factories must logistically prepare with farmers as contact farming similar to sugarcane industry in order to secure constant supply of the raw material. The successful factory must take care and cooperate with farmers in technical knowledge and production necessities, soil preparation, harvest machinery, transportation, logistic planning. The bad practices of merely paying brake fee will not work in the long run.

2. Price Stability and Higher price for cassava and sugarcane

Price higher than 1.5 baht/kilogram influenced acreage reduction and enable more cassava plantation. In order to keep sugarcane acreage, cane price must not be lower than 800 baht/ton. Latest news, Nov 25, 2005 the EU decision to reduce 36% sugar price support upto the year 2015. It is conceivable the EU sugar quantity dumping to world market will decrease. World price will rise, and it will influence sugarcane price in Thailand. Thai is second rank world sugar exporter. If this analysis is wrong it must due to Brazil overproduction.

Competition among ethanol factories, starch factories, cassava chip/pellets factories will influence

higher price and stability of price.

If good price is sustained 2-3 years continuously, it will tremendously influenced farmers to seek ways to increase production/per rai, by better cultivars, more fertilizers, pest and weed elimination, underage harvest is not encouraged. The possible yield of 4-5 tons/rai in the next 4-5 year is feasible.

3. Higher demand for ethanol:

It is estimated that demand of ethanol will be 3 million liter/day by the year 2011. If production goes as planned and Thailand is able to increase percentage mixture in benzene from 10% to 20% from E10 to E20, accelerate use of flexible fuel car that is capable to use any amount of ethanol mixture from E10 to E100.

Bio-diesel production from palm oil reacted with alcohol, and specify ethanol as source of alcohol instead of methanol. In the future, demand of 8.5 million liter/day for biodiesel will need supply of ethanol of 850,000 liter/day for production of biodiesel.

If free ethanol production is allowed not only for source of energy but as solvent in production facility such as acid, vinegar solvent, etc. will enhance more demand for ethanol.

Demand for ethanol in China and Japan will likely increase in the long run.

Thai will be the ethanol hub in Asia, due to its location is closer than Brazil. Thai cassava farmers will be seen as "bio oil well" or "renewable oil well". There will be expansion area to neighboring countries.

1 Acre = 2.5 Rai (approx.) - 1 Hectare = 6.25 Rai (approx.)

1. President, Sub Committee of Promotion and Development of Ethanol Utilization; and Assoc. Prof., Dept. of Agronomy, Faculty of Agriculture, Kasetsart University.

2. Dept. of Agronomy, Faculty of Agriculture, Kasetsart University



from factory contribute to year round non-stop production. Presently 8 authorized factories with production capacity of 1,950,000 liter/day estimate to use cassava roots 4,658,824 tons in the year 2008, not including factory with sugarcane as raw materials. Several impending potential factories are coming up in the future; contribute to make cassava as raw material for ethanol production.

Thailand differs from Brazil, the most sugar and ethanol producing country of the world, that it is free and unrestricted. Yield of cassava in Brazil is very low, affected by pest and insect. Furthermore, cassava is used for human food in Brazil. In Thailand, sugarcane input to factory is 120-150 days/year, it is planned to use cassava as co-material to make it possible for year round production.

Such transition worries the cassava industrialists of insufficient cassava as raw material. It is predictable that raw material is limiting factor of the industry.

Cassava raw material as limiting factor:

Sugarcane milling of 120 day/year for all factory in the country. Raw material need is 80 million tons. Due to price fall in the interval 2002-2003 limited production to 60 million tons. For the 2005-2006 season, negotiate price range at 770-800 baht/ton. Estimate

need for ethanol production is 7.5 million tons

The price of cassava roots is higher than 1.50 baht/kilogram for 2005-2006 cultivating season. Less acreage may affect the sugar industry. Estimate price of sugarcane is expected at not less than 800 baht/ton

Need for cassava root is increasing, for export of starch 1.8 million tons, for domestic consumption approx. 1.2 million tons, starch production total 3 million tons/year, on basis of 4.1 kilogram fresh tuberous root will yield 1 kilogram of starch.

In conclusion, demand for fresh cassava root for starch production = $3 \times 4.1 = 12.3$ million tons. Detail of export and internal domestic consumption of cassava chip and pellet as follows:

Export to EU 2 million tons

need fresh cassava root 4.4 million tons

Export to China 2 million tons

need fresh cassava root 4.4 million tons

Domestic feed .5 million tons

need fresh cassava root 1.1 million tons

total need for cassava chips and pellets 9.9 million tons

The whole demand of cassava is 22.2 million tons, if in 2008 demand for fresh cassava roots yearly estimate 26-27 million tons in equivalent plantation acreage, with same production efficiency, the industry is likely to suffer shortage of cassava raw material.

Cassava production strategies for present environment: if the acreage of sugarcane and cassava total to 13 million rai, approximately close to present conditions with cassava and sugarcane coexisting in same area, expansion is not possible. Decline of acreage is due to the rubber plantation taken over in the northeast.

Consider cassava and sugarcane acreage each 6.5 million rai, it is suggested that production efficiency must be increased from 3 tons/rai to 5 tons/rai for cassava, and from 10 ton/rai to 12 ton/rai for sugarcane to attain domestic sufficiency. The budget for such project to increase the productivity is not yet approved. The figures of sugarcane estimates are quite accurate. All quantities arrived at factory is fully reported, but subject cassava data to investigation from Department of Agricultural Economics in cooperation with various