Production, Marketing and Utilization of Soybean in Thailand*

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Abstract

Originally grown as a minor crop for local consumption in Northern Thailand, soybean attained an important role as an economic crop three decades ago when its potential as an industrial crop was recognized. Production was highest during the past decade as a result of government promotional campaign and in-kind support to meet the rising demand of soybeans for oil and animal feed industries. Due to the enforcement of the free-trade agreement as well as the competition from other economic crops, soybean production has declined steadily in spite of the fact that technology for increased production is available and a high demand for their products. This paper will describe present production, marketing channel and utilization of soybeans as sources of oil and protein for human, animal and industries in Thailand; the impact of GMO and food security as incentives for continued production will also be discussed.

Keywords: Production, marketing channel, utilization, free-trade agreement, incentives, food security, GMO.

Introduction

Introduced by the Chinese emigrants from southern China about one hundred years ago, soybean was originally grown as a minor crop of local importance in the northern part of Thailand where it was used directly as food or for making several traditional soyfoods such as soycurd, soft-sweetened soycurd, fermented soycurd, fermented whole soybean, and home-made soymilk. About three decades ago, the government recognized its potential as an industrial crop, mainly to provide animal feed which had shown remarkable growth rates during this period. Oil production was only a secondary, yet valuable contribution to fulfilling national demand.

Present Production

Starting from the Second Social and Economic Development Plan (1967-71), soybean was regarded as an economically important crop with a target to produce 50,000 t. It was only in the Fifth Plan (1982-86) that the production was significantly increased and came close to the target set of 390,000 t. This period has witnessed a boom in agro-industry and the increasing need for soybean oil and meal. Due to problems in production, coupled with a new policy of the government in allowing free import of soybean, domestic soybean production and area harvested have steadily declined from the beginning of the 6th Plan (Table 1) while the yield has slightly increased. The nature of soybean production at present is described below:

Cropping Patterns

Soybean is grown in sequence with other economic crops in three cropping patterns, viz.:

Dry Season: Traditionally cultivated in the paddy fields in the dry season after rice harvest with the technique known as “no tillage-rice stubble-soybean culture”, soybean seeds are dropped in holes made by a pointed, wooden stick onto the rice stubble. In spite of yielding low, this method practiced originally by farmers in Chiang Mai, and a few other upper northern provinces, has now been
adopted in some provinces in lower northern part (Sukhothai and Kamphaeng Phet) and northeast part (Loei and Khon Kaen). In such a system, land is prepared immediately after rice harvest (December-January). As there is no rain after October - November, supplemented irrigation is usually provided. The crop which is harvested in March to May accounts for about 48% of the total annual production. As the seeds are gathered during the dry period, they are normally classified as “First Grade” and are either used as seeds for planting in the rainy season in other areas or sold to the food processing factories. A small amount is also sold as “Second Grade” grains to the oil extraction factories.

**Early Rainy Season**: Starting from early May to June, soybean is grown in the rainfed areas in the lower northern part (Kamphaeng Phet, Sukhothai, Uttaradit, etc.). Land preparation is done by a hired tractor in the dry season. It is harvested around August-September, and is immediately planted with certain field crops such as cotton, mungbean, blackgram, or sorghum. The soybean seeds obtained are of low quality and thus, classified as “Second Grade” because harvesting has to be done in the wet weather. All grains are sold to the oil extraction factories.

**Late Rainy Season**: After a crop of corn, mungbean or blackgram which is grown during April to mid July, soybean is normally planted in August-September and is harvested in November to December. This cropping pattern is popular in the rainfed areas in the lower northern part (Sukhothai, Kamphaeng Phet.) as well as in the Central Plain (Phetchabun, Lop Buri, Sara Buri) and the Northeast (Nong Khai, Nakhon Phanom). The harvested seeds are of high quality; a small portion is used as seeds for dry-season planting in the north. The majority of the remainder seeds is sold as “First Grade” grain to food processing industries. Only a small portion is sold as “Second Grade” grains to the oil extraction factories.

The early- and late-rainy season crops, together, account for 52% of the total annual production. This system in which three cropping patterns are employed in different seasons and in different areas offers several advantages to soybean development in Thailand. One obvious advantage is the availability of seed for the next growing season. For example, seeds obtained from the late rainy season crops which is grown in the lower northern provinces are used to plant the dry season crop in the upper northern provinces. As the seeds are harvested during the dry period and are used to plant the next crop within a month after harvest, germination is quite good. Seeds sold for planting normally fetch higher price than those sold for other uses. Similarly, seeds grown in the dry season are also used for planting in the rainy season (both early and late).

Another advantage of these cropping patterns is that the grains are available to the market in three periods throughout the year. Such availability results in adequate supply of raw materials for the users and at the same time gives the farmers reasonable income from the sale of seeds as there is always a demand of seeds. Moreover, there is no need for a large warehouse to store large quantities of seeds, thus another saving for the investment.

**On-farm Test of Packages of Technology**

As is the case for most field crops grown in Thailand, farmers’ yield levels of soybeans are much lower than the achieved experimental yield or potential farm yield. The research and extension effort during the past two decades has made only as small impact on the improvement of the overall national average of this crop. Many of the constraints for soybean production in Thailand are location specific; professional judgement is therefore necessary to identify the most important ones. Information in the literature cannot be readily applied to determine what are really the major factors limiting yields for particular areas or at what levels. Laosuwan and Macartney (1992) listed the factors which are considered limiting to on-farm yield as follows:

- Marginal agro-ecosystem due to climate and soil fertility.
- Poor seed quality, insufficient irrigation water, etc.
• Inadequate applications of inputs particularly *Rhizobium*, fertilizers, and control of weeds, pests and diseases.

• Inadequate planting techniques: land preparation, broadcasting, plant population, etc.

**Breeding and Improvement**

Breeding is regarded as an important component of crop improvement. Generally speaking, breeders would like to develop cultivars suitable to particular production systems of production environments. Conventional procedure of soybean breeding accepts that the cultivars be tested under a high input management system to enable the expression of certain characters or gene action without regard to the eventual environment under which the cultivars will be grown. Only recently have the breeders considered selection of soybean cultivars suitable for marginal growing conditions such as salinity, drought, waterlogging, toxicity to nutrients, and resistance to pests, diseases and weeds. As a result, many new cultivars have been developed and tested. These include Chiang Mai 2, SJ 4, SJ 5, Chiang Mai 60, Sukhothai 2, KKU 35, and Chakkrabhandhu 1.

**New Production Technology**

The Department of Agriculture, in cooperation with the Kasetsart University, Naresuan University, Suranaree University and the Office of Agricultural Economics recently organized soybean on-farm demonstration at Wang Nua district of Lampang province in the northern part of Thailand with the aim of testing transfer of technology for increased production of soybean and reduction of production cost. At the same time, such demonstration will also help in the production of good cultivars of soybean adaptive to local condition during the dry season, in order to satisfy the high demand of soybean for processing industries such as oil, food and feed. It was revealed that during the 1999/2000 cropping year, the yield obtained from the farmers’ field using ‘Chiang Mai 60’ variety in the area having adequate irrigation water was 1875 kg/ha. In the area where irrigation water was not available, the cultivar ‘Sukhothai 2’ gave a yield of 1560 kg/ha. However, if the farmer mulched his plot with rice straw instead of burning it as normally practiced, he would obtain 20% higher yield (Pookpakdi, pers. comm.).

**Marketing and Utilization**

**Marketing Channels and Utilization**

Marketing channels and utilization of soybeans in Thailand were investigated by Chainuvati and Chomchalow (1988). Although the present quantity of soybeans produced in Thailand is reduced as compared to 1988, the pattern practically remains the same as shown in Fig. 1. Domestically produced soybeans are either processed as foods or extracted for vegetable oils while the meal is used as animal feeds.

**Demand**

Total demand for soybean seeds is around 1.35 mill.t annually. They are utilized in the following ways:

*Seeds for planting*: 0.03 mill. t. All is obtained from domestically grown soybeans.

*Seeds for processing*: 1.32 mill.t. They are utilized in the following industries:

*Oil extraction*: This type of industry yields: (a) oil for domestic and industrial uses (e.g. paint), and (b) meal for animal feed and human food (e.g. seasoning sauces). A total amount of 1.00 mill.t. is used for oil extraction. The remaining 0.32 mill.t are used for animal feed and human food processing (discussed below):

*Ground soybean*: This is in the form of full fat soy for young swine feeding and other feed mix.

*Human food*: This is in the forms of: (a) fermented products (soysauce, soypaste, fermented soycurd, and fermented whole seeds), and (b) non-fermented products (soyflour, soymilk, soycurd, soysheet, and soysprout).
Supply

As domestic production is only 0.35 mill.t while the demand is 1.35 mill.t, a total of 1.00 mill.t of grain has to be imported annually. The Government has set up the policy for free importation, regardless of quantity and period of introduction, with 0% tax. At the same time, there is a measure to protect the farmers in that only those authorities who utilize the seeds as raw material for oil extraction, animal feed and human food processing are permitted to import under the condition that the importers will have to buy all seeds which are domestically produced. As there is also a standard set for these seeds, the farmers have to develop the quality required by the market. This has made the trading system and marketing mechanism operate effectively.

Conclusion

In describing a success story of soybean development in Thailand up to 1989, Okabe (1996) listed three factors which contributed to the dramatic increase in production in the 80’s, namely: the Thai Government policy instruments, the intensive participation of the private sector in processing industries and marketing, and a diversified cropping system adopted by farmers. Unfortunately, these favorable conditions have almost disappeared at the present as is reflected in the drastic decrease in production in the 90’s (Table 1). Following the peak of 625,000 t in 1989, production has declined continuously to the present level of around 350,000 t.

Policy Issues

Of the three factors responsible for the increase in production listed above, the Thai Government policy was the most important in causing the fluctuation of production level. Import tariff and quota system which worked so well in the 80s (Chainuvati and Chomchalow (1988) were no longer valid since the early 90s. Even though the 1977 Investment Promotion Act was still valid, it did not help much during such a critical period for the private sector engaged in the feed business and export of agricultural products to enjoy preferential taxation treatment in their agro-industrial activities, and as such, could no longer expand their activities along these lines. Furthermore, due to the shift of priority, budget for soybean R&D program in breeding, plant protection, and establishment of an adequate seed production system, have all been stagnant or reduced. The situation worsened in 1997 when Thailand signed the free-trade agreement with WTO, as a result, no government support of any kind can be provided to the farmers. Worst of all is the drop of supply of certified seeds in which the farmers have to depend so much on them. At the same time, due to the pressure from the animal feed industry, the Government has to allow tax-free, no-quota importation of soybean. This has resulted in the reduction of the price of domestically-produced soybean to the level that it is unattractive for the farmers to grow, as it cannot compete with other economic crops.

Periods of Soybean Development in Thailand

Soybean has been grown in Thailand for about one hundred years. The phases of production of soybean in Thailand can be visualized under six more or less distinct periods, viz.:

Period 1 (1900-29) - Introduction and Latent Period: Started from the early introduction of soybean from southern China and grown for local consumption in the North.

Period 2 (1930-65) - Early Stage of Development: The farmers were able to develop their own techniques of cultivation (e.g. ‘no-tillage on rice-stubble’) and one high-yielding, small-seeded cultivar (Utsaha) was developed.

Period 3 (1966-76) - Potential Economic Crop: Realization of its potential during the 2nd Plan. R&D had been initiated, but production had increased very slowly as the yield was quite low due to poor adaptability of the cultivars and harsh condition for soybean.
Period 4 (1977-86) - Important Industrial Crop: A boom in agro-industry and the need for its oil and meal during the 4th (1977-81) to the 5th Plan (1982-86). Intensive cultivation and support from the Government and the private sector have helped to boost production several folds.

Period 5 (1987-91) - Accelerated Soybean Production to Replace Importation: Further expansion during the 6th to 7th Plan of animal industry, particularly the raising of broilers and aquaculture, required larger quantity of soymeal at a cheap price, resulting in more quantity being imported. During this period, there has been a drastic increase in soybean production in Thailand, even with no significant changes in the cultivars; no inputs provided.

Period 6 (1992-present) - Stabilized Production: Due to prevailing crises, especially the free-trade agreement, the Government has adjusted the policy to maintain minimum production in order to stabilize national food security and industry.

Factors Accounting for Decreased Production

During the early stage of soybean development in Thailand, promotional campaign was quite successful. This was culminated after 1989 when production peaked at 625,000 t, and then steadily decreased to about 350,000 t at present (Table 1). Several factors which are responsible for such a phenomenon are:

Technological Factor: Soybean is originally a temperate zone crop. Although a lot of cultivars had been developed, many of which were quite adaptive to tropical conditions, they were still producing much lower yield than those cultivars in the temperature-zone countries.

Socio-economic Factor: Soybean is one of many crops which is still dependent on natural condition in which drought, flood, storm, hail, etc. are playing their role in reducing the yield. Moreover, Thai soybean growers are poor, with holding less than 2 ha per family, thus unable to invest in the new but rather expensive technology. With no further support and subsidy from the Government, they can no longer produce profitable soybean, especially with the economic crisis and a lot of other crops to choose.

Impact of Free-Trade Agreement: As one of the 127 member countries of WTO, Thailand was forced to abandon every rule and regulation in favor of free trade, such as subsidy, tax and surcharge, quota system, etc. Soybean was hard hit with this Agreement because Thailand cannot compete with major soybean-producing countries having favorable growing conditions and other technological advantages. As a result, farmers shifted their crops from soybean to other crops that give them better income.

Psychological Impact: As a consequence of all the above, the middlemen who used to provide credit and other supports to soybean growers were reluctant to continue such supports as they were not sure of the soybean marketability and profitability. This leaves the farmers with less choice to grow soybeans.

Future Outlook

The present production of around 350,000 t has been stabilized since 1995, in spite of the fact that many factors have been encountered which might have further reduced production. These include the free-trade agreement, the economic crisis, competition from other crops, and the impact of genetically-modified soybean (GMO). The last, which took place only recently, has been envisaged as an incentive for the Thai growers and the users to produce and use non-GMO soybean domestically in order to supply raw material to the industry requiring it, such as feed for broilers, oil for canned tuna, and soymilk. There is a tendency that these products, in order to be marketable, need to use non-GMO soybean.
References


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Table 1. Soybean production in Thailand from the 3rd to 8th Plan, 1974 to 1999 (unit: 1000 t)

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Fig. 2. Soybean marketing channels and utilization in Thailand (modified from Chainuvati and Chomchalow 1998)