Peanut in the Thai Food System

A Macro Perspective

Peanut in Local and Global Food Systems Series Report No. 8
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Peanut in the Thai Food System: A Macro Perspective

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1. Introduction

It is unknown when peanuts became a part of the Thai food system, but it is believed that foreigners brought peanuts into Thailand about 400 years ago. Votethisak Butaranu, 1997 reported that a French missionary record of 1854 indicated that peanuts were planted in Chantaburi Province, a province in the Eastern part of Thailand. In 1929, a record showed that Thailand imported peanuts for domestic consumption (Sitthiporn Kritsadakorn, 1929). In 1932, the Department of Commerce published a document in Thai describing how to grow peanuts based on Indian data. In 1947, commercial plantation of peanuts occurred in Chachengsao and Prachineburi provinces (Sawafddecha, 1948). The total planted area was 6,000 rais (or 960 hectares), and the yield was 120-150 kilogram/rai (750-1125 kilogram/hectare). Today, peanut growing is spread throughout the Kingdom; the Northern, North-East, Central and Southern regions of Thailand (Figure 1).

The peanut planting area, as compared to total farm holding land, reveals how much agricultural land was allocated to peanut farming. The area planted with peanuts in 1995 was only 0.47 percent of total farm holding land. Among regions, the planted area of peanuts to the total farmland in the Northern and in the North-Eastern region were 28.29 percent, and 7.93 percent respectively. For the Eastern Central and the Southern regions, the planted area was 3.42 percent, 2.45 percent, and 0.85 percent of the total farm holding, respectively (Table 1). Peanuts were one of the major crops of the Northern region, but not for the Central, North-Eastern, or Southern regions.

The ratio of the regional area planted with peanuts to the total peanut planting area, together with the average yield, should indicate which regions are the major sources of peanut supply. Statistics in 1998 indicated that the total area planted with peanuts in Thailand was 559,316 rais. The Northern and the North-Eastern regions hold was shares of 43.41 and 34.80 percent, respectively (Table 2). The total harvested area was 96.65 percent of the planted area (Table 3 and Table 4). Total peanut output in dry pod was 135,316 tons. The average yield with respect to the planted area was 187.72 kilogram/rai or 1.173 tons of dry pod peanut/hectare (Table 5). Table 6 shows time series of planted areas, harvested areas and yields of peanut production. The regression of planted area with time over the period of 1973-1998 shows that the planting area of peanut declined by 1.01 percent/year. However, the yield increases by 1.24 percent/year. Annual output has no trend. The decline of output due to declining planting was compensated for by the increase of yield trends (Table 7). Thailand's peanut production between 1994 and 1998 were above the world average (Table 8).

1. Account and Balance of Peanuts

Domestic production of peanuts has never met total domestic demand. Domestic output became stable while imports increased at a rapid rate. In 1980, the domestic output satisfied 89.28 percent of the total demand. In 1998, the domestic production reduced to 32.37 percent of total demand (Table 9 and Table 10). The deficit has been filled by imports. Thailand imported peanuts in different forms: with shell, without shell, as peanut oil, as peanut meal and in other forms. There is some restriction on peanut and peanut product imports. Imports of shelled and unshelled peanuts are subject to the import tariff at the rate 3 Baht/kg, import of peanut oil are taxed at the rate of 1 Baht/litre, and of meal at the rate of 0.30 Baht/kg, respectively. The import tariffs imply that government

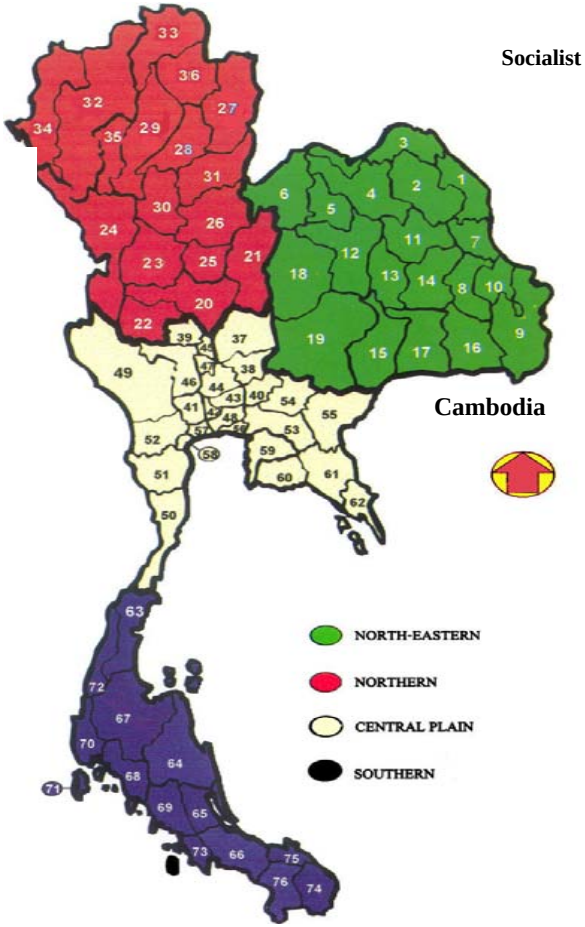


Figure 1: Map of Thailand, Provinces and Regions

LIST OF PROVINCES AND REGIONS

North-Eastern Region

1. Nakhon Phanom
2. Sakon Nakhon
3. Nong Khai
4. Udon Thani
5. Nong Bua Lam Phu
6. Loei
7. Mukdahan
8. Yasothon
9. Ubon Ratchathani
10. Amnat Charoen
11. Kalasin
12. Khon Kaen
13. Maha Sarakham
14. Roi Et
15. Burirum
16. Si Sa Ket
17. Surin
18. Chaiyaphum
19. Nakhon Ratchasima

Northern Region

20. Nakhon Sawan
21. Phetchaburi
22. Uthai Thani
23. Kamphaeng Phet
24. Tak
25. Pichit
26. Phitsanulok
27. Nan
28. Phrae
29. Lampang
30. Sukhothai
31. Uttaradit
32. Chiang Mai
33. Chiang Rai
34. Mae Hong Son
35. Lamphun
36. Phayao

Central Plain Region

37. Lop Buri
38. Saraburi
39. Chai Nat
40. Nakhon Nayok
41. Nakhon Pathom
42. Nonthaburi
43. Pathum Thani
44. Ayutthaya
45. Sing Buri
46. Suphan Buri
47. Ang Thong
48. Bangkok Metropolis
49. Kanchanaburi
50. Prachuap Khiri Khan
51. Phetchaburi
52. Ratchaburi
53. Chachoengsao
54. Prachin Buri
55. Sa Kaeo
56. Samut Prakan
57. Samut Sakhon
58. Samut Songkhram
59. Chon Buri
60. Rayong
61. Chanthaburi
62. Trat

Southern Region

63. Chumphon
64. Nakhon Si Thammarat
65. Phatthalung
66. Songkhla
67. Surat Thani
68. Krabi
69. Trang
70. Phangnga
71. Phuket
72. Ranong
73. Satun
74. Narathiwat
75. Pattani
74. Yala

protects domestic peanut production as domestic producers can sell their products at the higher price. However, the protection could not boost the domestic production because, in some years, the imported price is less than that of the domestic product after inclusion of the import tariff. There is no restriction or ban on the export of peanuts (shell and unshelled). No export tax is imposed on the export of peanut seeds. In order to guarantee sufficient domestic supply, export of peanut oil is controlled by the Ministry of Commerce. The export of peanut meal is banned in order to secure peanut meal for animal feed.

The total amounts of domestic use of peanuts with shell, peanuts without shell, peanut meal, peanut oil and peanut consumption are adding up to equal the total domestics output plus net imports. Peanut oil, peanut cake and peanut meal can be combined to estimate the amount of demand for peanut seed of the peanut oil industry.

In Table 10, time series of domestic demand, imports and exports of peanuts over 1977-2001 showed that estimated domestic demand for peanut seed was 170,000-180,000 tons. This is higher than domestic production by 81,190 tons. Demand for seed for planting is estimated at 12,000-15,500 tons. Exported demand has been declining. For peanut meal, animal feed industry demand is in the range of 91,000-189,000 tons. Imported peanut meal is usually contaminated more by alfatoxin than domestic products. Peanut meal has a high protein content, however, it is not as popular as soybean meal.

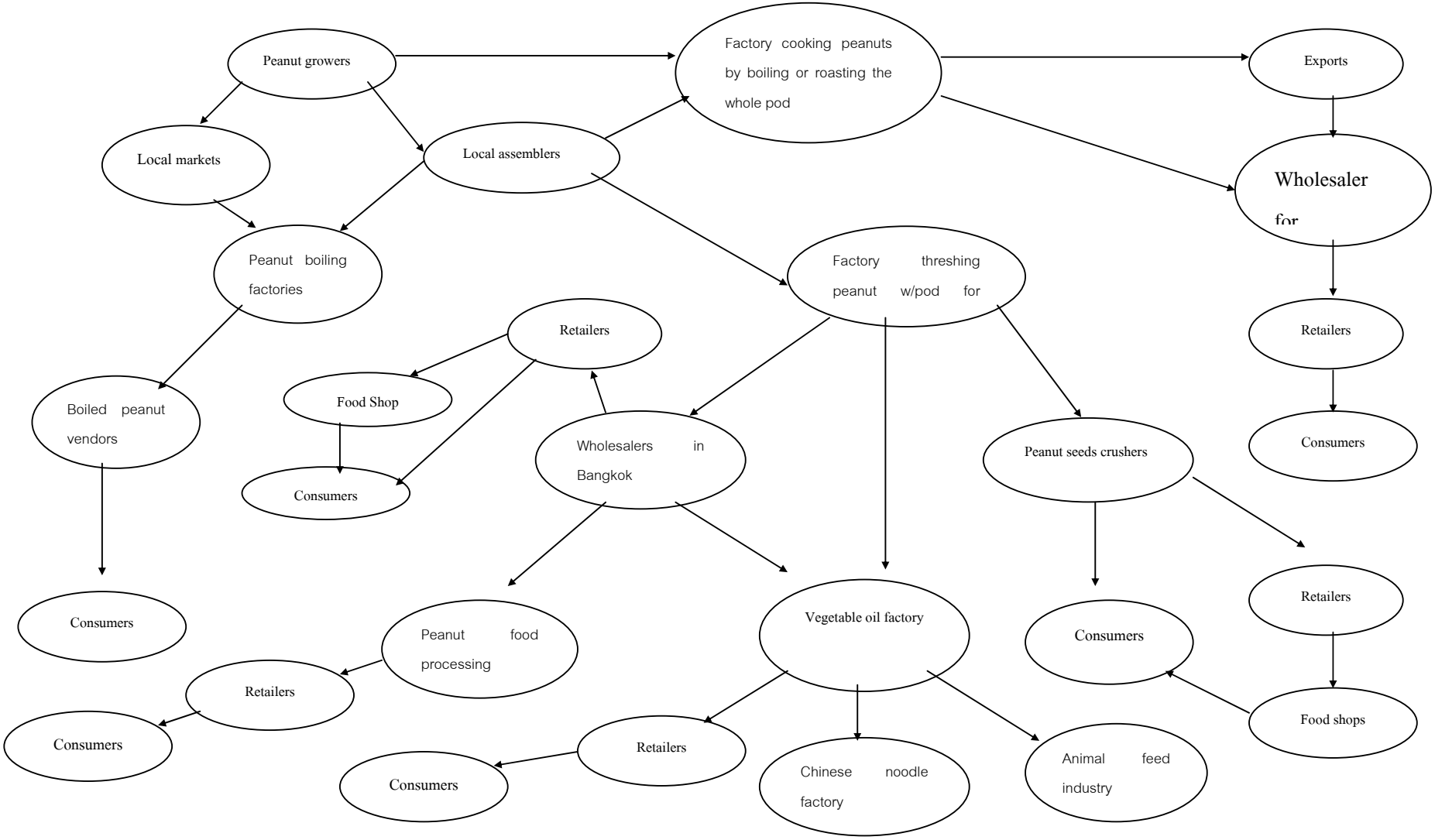
2. Structural Relationship of Production, Distribution, Processing and Consumption of Peanuts

Figure 2 shows the structure of the relationship between peanut production, unshelled peanut output distribution and peanut processing, and of peanut consumption. The nature and the practice of production, distribution, processing, and consumption of peanuts in Thailand in different geographical areas are reviewed and summarized in the next sections.

4. Peanut Production in Thailand

Peanut production can be viewed as a system structure of the relationship of inputs required for peanut production. The inputs include natural environmental factors where peanuts are grown, farming entrepreneurs, power and technology. These kinds of inputs are used in 90 to 120 days of timeline activities starting from land preparation, planting, caring and harvesting. Types and amounts of these inputs used in peanut production in Thailand vary regionally.

Figure 2: Distribution Channel of Domestically Produced Peanuts.



4.1 Production System

There are three systems of growing peanut (1) Inter-cropping of peanuts in Para rubber plantations, fruit trees, and field crops (especially cassava, corn). Inter-cropping is usually practiced in the Eastern and Southern regions where para rubber and fruits tree are the major perennial crops. (2) to grow peanuts as a major crop in the wet season. (3) to grow peanuts after harvesting rice, corn and other field crops. In 1981, 93.32 percent of farmers in the major peanut production areas of the Northern, North-Eastern and Eastern regions grow peanuts as a single crop either in the wet season or after harvesting other crops; inter-cropping was practiced by 6.67 percent of peanut growers. In the Southern region, 68.8 percent of peanut planting is as an inter-crop of para rubber trees.

4.2 Environmental Factors Contributing to Peanut Production

Climate, temperature, precipitation, soil fertility and the location of production areas are the environmental factors. Planting of peanuts in Thailand in some areas is possible at three different times: The wet season peanut planted from April to May, the near end of wet season planting from July to August, and the dry season planting in December and January. Farmers usually plant peanuts for sale in the wet season, while at the near end of wet season, farmers plant peanuts for seeds for the next cropping season. Planting months may shift according to location, region and rainfall. In the Southern region, farmers grow peanuts during February and March. Some farmers plant peanut after harvesting wet season rice (approximately from December to March). Planting schedules are adjusted in correspondence to the beginning of the local rainy season.

4.3 Farming Entrepreneurs

Farm households are a decision unit of peanut production. Farm households play two main roles, viz. that of the entrepreneur and as a source of input supplies including labor, land, seed and farm power. Farmers as entrepreneurs choose the crop and farming system in growing peanuts, deciding when and how to procure inputs for land preparation, seed treatment and plant spacing, caring, harvesting and post harvest practice on output. The description of farm households and the ways in which farmers manage to produce and sell peanuts reveals ways to improve production efficiency, quality of peanut output and the income of farmers from peanuts as well.

Sarun and et.al., 1991 indicated that average family size was 3.52 persons/family, with about 2.3 persons doing farm work. The household head's average age was 43.16 years. More than 90 percent of the household heads were educated for 4 years or less. The average farm holding area was 16.64 rais (2.56 hectares). Farmers might own a small tractor, a water pump and farm tools. Peanut growers did not rely solely on income from peanuts; they grew other crops such as rice, corn, cassava, and also had off farm employment. Sarun and et.al., 1991 reported that the income from peanut of peanut growers contributed 32.91 percent of their total annual income while the off farm income contributed 42.03 percent.

4.4 Farm Technology Used in Peanut Production

Farm technology currently used in producing peanuts includes biological, chemical and labor saving technology. Biological technology is seed inoculation with

Rhizobium which is practiced by a small group of farmers participating in the peanut technology extension program of the Department of Agricultural Extension of MOAC. Peanut growers mainly use traditional seeds. Recommended and certified seeds officially produced under the seed multiplication program are of good quality. However, good seeds are not widely spread because the Department of Agricultural Extension cannot produce enough to meet the entire country's demand. No private farm commercially produces peanuts for seed.

Chemical technology includes the use of insecticides, herbicides, fungicides, and gypsum and calcium. All of these chemicals are used by a small group of farmers. Pesticides are used when necessary by farmers who have enough cash to afford them. The information on the usefulness of gypsum and marl is known by farmers, but the number of farmers and the amount of actual use is not known.

4.5 Seeds for Peanut Planting

4.5.1 Peanut Line and Varieties

Type and accession of peanuts genetically determines yield, the resistance to insects, disease and aflatoxin and the percentage of threshed seeds. Spanish type is the traditional accession that has been popular among Thai farmers since it requires less fertile land as compared to the Valencia type (Somchinana Tumsean, Center of Field Crop Research at Khonkean Institute of Field Crop Research p.14, Department of Agriculture, 1999). Traditional accession of peanuts has been gathered by agricultural stations to select the best line since 1933. In 1962, two lines of peanuts, named Sukhothai 38 and Lampang, were recommended by the Department of Agriculture, MOAC. The dry pod yield of the two recommended lines is 279 and 247 kilogram/rai, respectively. Since then, those two lines of peanuts have been officially recommended to farmers for the different regions of Thailand. However, farmers still use local lines since the recommended seeds are not accessible to all farmers on the planting period due to limited supply and the distance from the agricultural extension station to a main source of recommended seed supply.

Starting in 1958, other different types and accessions of peanuts were imported for research and experimentation to select lines that fit local conditions. The new accessions of peanuts were certified by the Department of Agriculture in 1972 under the name of Tainan 9. In 1987, fifteen years later, the new lines were certified under the name of Khonkaen 60-2 and Khonkaen-3; in 1994 named Khonkaen 60-4 and under the name of Khonkaen 5. The characteristics of the certified and the recommended seeds are described in Table 12.

A survey conducted by the Department of Agricultural Extension in 1994 (Darunee and et.al., 1994) showed that in the Northern region, peanut farmers use both the recommended seeds Lampang and Tainan 9, and traditional seeds. However, the percentage of traditional and officially recommended seed use is not known. A study in 1986 has shown that in the North-Eastern region, 94 percent of farmers use Sukhothai 38, Lampang and Tainan 9. Only 6 percent of farmers use traditional seeds. In the Eastern region, 60 percent of farmers use Sukhothai 38, Lampang and Tainan 9. In the Western part of the Central region, 100 percent of farmers used Sukhothai 38 or Tainan 9. The

report also showed that 85 percent of farmers in the Southern region used recommended seeds (Sukhothai 38 and Tainan 9). It should be noted that the percentage of farmers using the recommended seeds reported in this survey were fairly high. Other reports, however, generally indicate that most farmers use traditional and mixed seeds with unknown lines.

4.5.2 Sources of Seeds

In 1994, a survey conducted by the Department of Agricultural Extension showed that farmers in Saraburi and Lopburi use traditional seeds. Farmers keep part of their output for seeds in the next cropping season. Farmers know that the dry pod peanut can be kept no longer than three months. For a better germination rate, farmers manually crack dry pod peanut for seed. Cracking for seed by hand will be done 3-7 days before planting. Threshing machines are commonly used for threshing dry pod peanuts for sale. Somchintana Tumsaeng (1999) suggested that seeds should have a germination rate of not less than 75 percent. The amount of seeds should be 15-20 kilogram/rai for medium sized seeds. For large seeds, the rate should be 20-25 kilogram/rai.

4.6 Farm Mechanization

Four wheel and two wheel tractors are used in land preparation. Mechanization in planting seeds, harvesting and threshing are not widely adopted by Thai farmers. However, research and development of these machines was conducted by the Department of Agricultural Engineering (DAE) of MOAC, and the Department of Agricultural Engineering of Khonkaen University. The prototype of the machines is to be disseminated to the local farm machinery manufacturers to produce at a commercial scale (Winitch Chinsuwan, and Pinai Sawadiwong, 1989). Prototype models of a peanut sheller machine and a peanut pod stripper are shown as Figure 3-5.

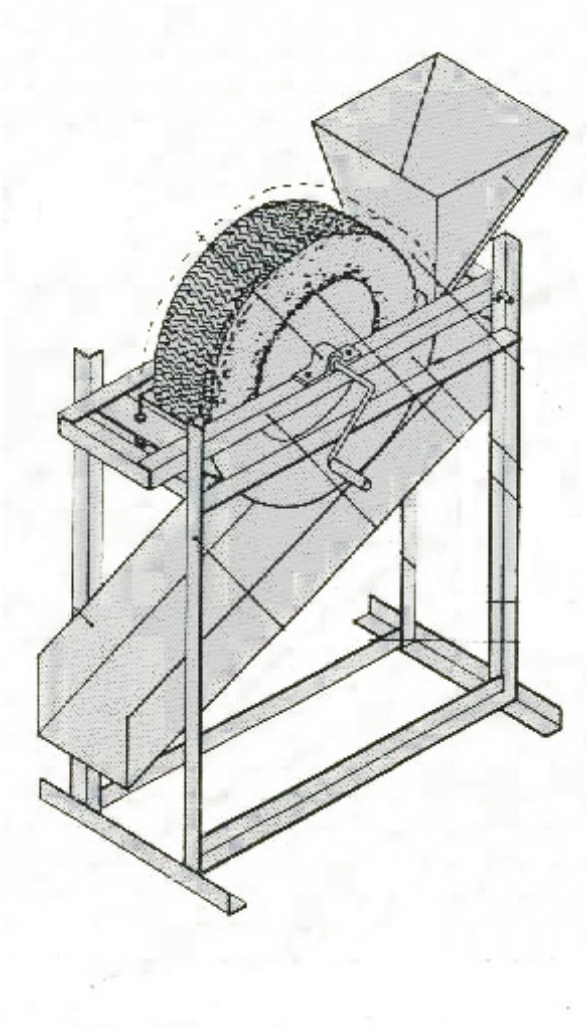


Figure 3: Manual peanut sheller machine

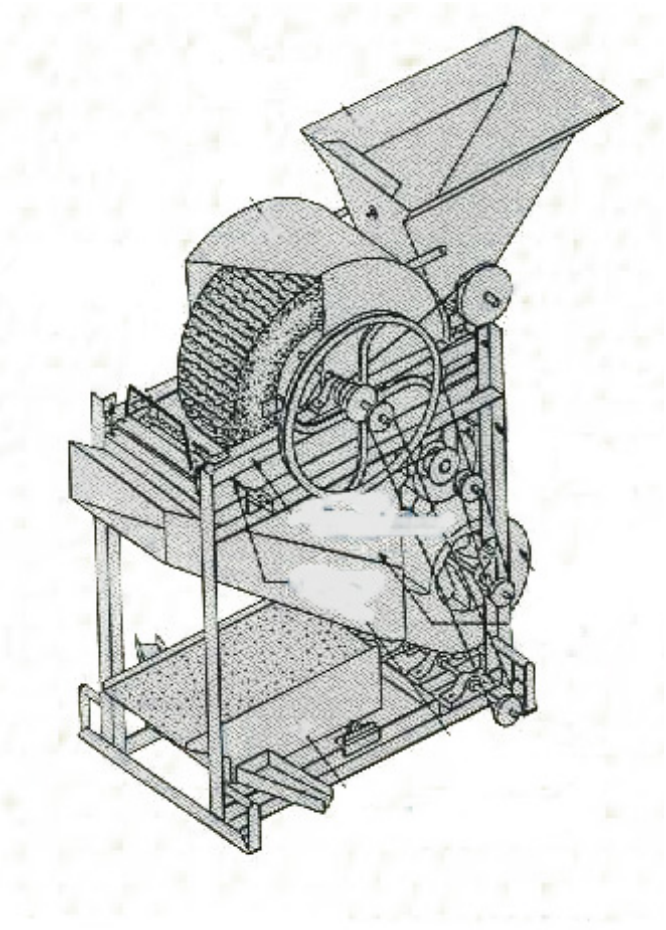


Figure 4: Motorized peanut sheller machine

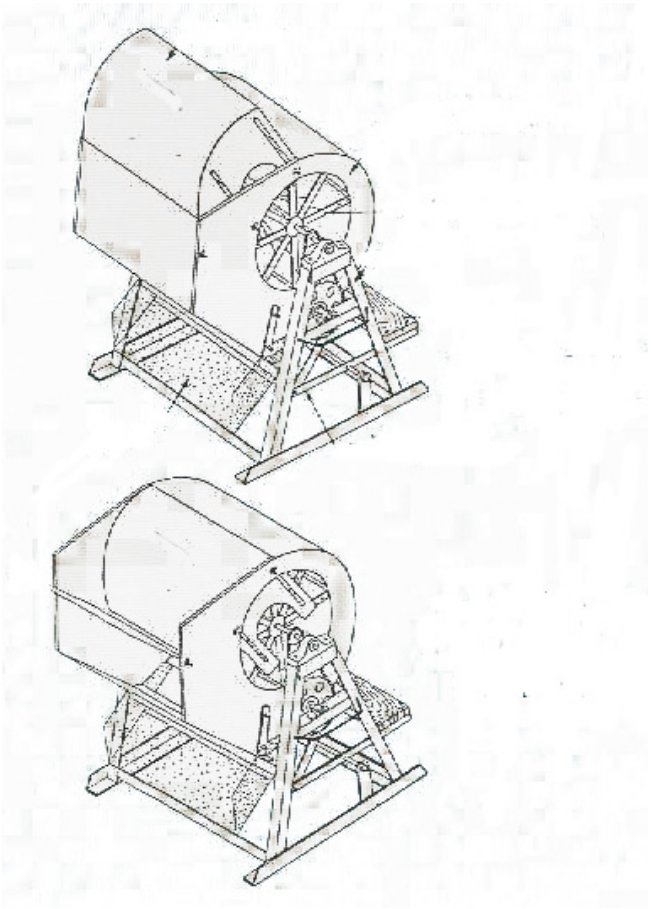


Figure 5: Peanut pod stripper machine

5. Activities in the Production Process

5.1 Land Preparation

96 percent of farmers in major peanut production areas use large and small tractors for land preparation. Small tractors are used for making furrows and lines. Hoes and hand tools are used to make lines of holes for seeds. In some areas where peanuts are planted as an inter-crop, seventy five percent of farmers do not plough the land before planting. Farmers use hoes to make lines for seeding (Sukanya Kuchaaisit, Nipons Poungkaew, Supote Saengpratoom and Chawalwuth Chainuwat, 1987).

5.2 Seed Treatment and Spacing

Amounts of seed per rai vary among regions. For example, in the Northern region, 38 percent of farmers use 20-25 kilogram/rai of dry pod peanut, while the other 26 percent use 10-19 kilogram/rai and the rest use 26-30 kilogram/rai (Sukanya Kuchaaisit, Ratana Sewatasai, Niponse Poungkaew and Chawalwuth Chainuwat, 1986). Farmers sow the recommended seed Sukhothai 38 at the rate of 26-30 kilogram/rai. Farmers put 2 seeds in each hole. The distance between holes in each row is 15-20 cm. The distance between rows is 20-30 cm. Farmers in Nakhon Sawan province put 2 peanut seeds in a hole. The distance between holes is 15-20 cm. The distance between rows is 20-30 cm. In general, farmers make distances between holes 20 cm. Into each hole, a farmer puts 2-3 seeds. The distance between the line of holes is 50 cm. In Tak province, farmers use hoes or sticks to make holes. The distance between holes is 20 cm and uses 30 cm to be the distance between line of hole. Farmers apply 2-3 seeds per hole. (Nien Kunwong, Taksina Sansayavichai, Panida Ratanapanachoti and Chonticha Saengpanya, 1989). It was observed that farmers use too much peanut seed per rai.

5.3 Cultural Practices

In the North, the North-Eastern and the Eastern regions, farmers weed, loosen soil, make heaps around the peanut stems and apply chemical fertilizer when peanut plants are 35-40 days old. 76 percent of farmers make heaps around the peanut stems. However, 33 percent of farmers reported that the shortage of labor prevented them from heaping and weeding (Sukanya Kuchaaisit, Nipons Poungkaew, Supote Saengpratoom and Chawalwuth Chainuwat, 1987). Farmers in the Southern region practice weeding, but apply no chemical fertilizers or pesticides (Sirikun Srisaeangjan, 1987).

Farmers in different areas have different cultural practices. In general, farmers practice weeding at two different times, first, when the peanut flowers, and again about two weeks later. Insecticides and chemical fertilizer are sometimes applied (Nien Kunwong, Taksina Sansayavichai, Panida Ratanapanachoti and Chonticha Saengpanya, 1989). The practice in Tak province is again different as the farmers use no chemicals or insecticides. Farmers do weeding 2-3 times, but heaping around peanut stems is not a common practice.

5.4 Insect and Disease Treatment

Eight of 20 kinds of insects are commonly found in peanut fields; viz. the leaf miner, thrips, aphids, leaf hoppers, cotton ball worms, subterranean ants, white group and

termites. Also, there are more than 30 types of peanut diseases. The most common are brown leaf, soft black leaf spot, Sclerotium stem rot, Asperigilus crown rot bacterial wilt, peanut strip disease, peanut bud necrosis disease, peanut mottle disease and peanut yellow spot disease. Agronomist know the methods and chemicals to prevent and/or reduce the spread of these diseases. However, peanut growers use little chemicals to prevent or reduce damage. Farmers responsd that it is expensive to farm peanuts. The information on chemical techniques is not well-known (Somchintana Tumsaen Center of Field Crop Research at Khonkaen, Institute of Field crop Research, Department of Agriculture MOAC p. 50-53).

6. Harvesting Practice

Based on various field surveys in different areas over 1985-94, harvesting practices in each region were very much alike. In 1986, another survey in 15 main production areas in the Northern, North-Eastern and the Eastern regions indicated that farmers use their hands to pull peanuts from the soil and leave the harvested peanut vine with the fresh pod in the field to dry in the sun for 2-3 days, and then strip the pod off the vine by hand. Farmers sell the harvested peanut pods to merchants.

More specific harvesting practices in different areas of the Northern region are as follows. Peanut growers in irrigated areas of Utaradit province strip the fresh peanut pods off the peanut vines (stems) on harvesting day and take the fresh peanut pods to be dried in the sun. After they are well dried, the dry peanut pods are threshed for seeds which are sold to merchants (Prasit Jaisil, Sanan Jogloy**,** Kamtoon Charurachatapan, Preecha Singha and Suriya Tonkoon, 1985). On Lampang province, the 1987 survey reported that peanuts were sold either as fresh or dry pods. In 1989, a survey in the main production area of the Northern region (Nakornsawan, Tak, Chiangmai and Payao provinces) showed that after pulling out peanut vines, farmers left the harvested vine and pod to be dried in the field for 3 days. After three days, farmers took the pods off the dry vine and stored the dry pods in jute bags for sale. Part of the peanut output is taken out to be dried and is kept for next season's seed. Farmers in Chiangmai province left the peanut vines to be dried in the field for 5-6 days before taking the pods off (Nien Kunwong, Taksina Sansayavichai, Panida Ratanapanachoti and Chonticha Saengpanya, 1989). Farmers allow the dry season vines to be well dried in the field. The method of laying peanut pods on a bamboo mat in an open space near home is a common practice to dry peanut pods. The dried peanuts are then stored in jute bags and taken to the markets to be sold in town. Transportation cost to town is about 5 Baht/bag.

Analysis of harvesting practice in the North-Eastern region shows that in 1987, farmers in Srisaket, a province in the lower part of the North-Eastern region of Thailand, allowed the harvested peanut vines and the fresh pods to be dried in the field for two days. Then, farmers took the dried vines home before stripping the pods off by hand. The pods would then be dried in the sun. When well dried, farmers store the pods in jute sacks and keep them at home. Farmers bring samples of the dried peanuts to peanut merchants to assess their price. Part of the dried pod output is kept in jute bags or jars as seeds for the next seasons (Watayanont and et al., 1987). In the Khonkaen and Kalasin provinces, a survey in 1990/91 indicates that the product was sold either in fresh pods or in dried pods. Fresh pods are sold in a higher percentage during the wet season. Farmers kept 10

percent of wet season peanuts for seeds. About twenty percent was sold in the form of fresh peanuts.

The remaining 70 percent of dried peanuts is sold to merchants. For dry season output, only 2 percent is kept for seeds. The other 98 percent is sold in the form of dry peanuts (Sarun Wattanutchariya and others, 1993).

In the Eastern region, 86 percent of farmers pull the peanut vines out of the soil. The fresh pods are taken out immediately after harvesting and are sold on harvesting day. Forty-four percent of farmers are not concerned about moisture content in peanuts. Forty-two percent sell peanuts with a moisture content of more than 12 percent. Only 14 percent of farmers sell peanuts at a moisture content of less than 12 percent (Bussaba Pransil, Office of Agricultural Extension in the North-Eastern region, Department of Agricultural Extension; Peanut Situation in the Northern-Eastern Region, 1988).

In the western part of the Central region of Thailand, farmers grow peanuts for their fresh pods. They sell their product right after harvest.

In the Southern region, most farmers take the fresh pods off the vines right after harvest and sell the fresh peanuts on harvesting day. However, some farmers let the output dry before selling to the merchants. Part of the output is well dried and kept as seed (Sirikun Srisaeangjan, 1987). Farmers in the Southern region keep 2.4 percent of the output for seed, and 5.3 percent for their own consumption. The remaining 92 percent of the output is sold in the marketplace.

From the above, it becomes clear that the method of harvesting and treating the harvested peanut output depends heavily on the peanut output's purpose and also on market demand at harvesting time. Farmers who sell fresh pods do so because of market demand for boiled peanuts. The peanut pod is taken off the freshly harvested vines and is sold immediately. Unless peanuts are kept for seed, farmers will not store the product on the farm. Whenever there is market demand for "a few days' dried pod peanuts", the output is sold right way. Peanuts grown in the Central region are produced for this purpose. Peanuts grown in other regions can be sold in the form of either fresh or dry pod peanuts. The proportion of fresh to dry pod output is not known. However, a higher proportion of wet season peanut output is sold in fresh pods as compared to dry season output.

The supply of peanuts around the year reflects the wet and dry harvesting seasons. Dry season peanuts are harvested in April and May, while wet season peanuts are harvested from August to September. Dry season peanut quality is better than wet season quality as it contains less moisture. About 75 percent of peanuts are sold in fresh pods.

Patamarat Rodkachen and Chawalwuth Chinuwat, 1983 found that the farmers' practice of leaving fresh vines of peanuts in the fields to be sun dried does make harvested peanuts vulnerable to seasonal climates and pests. During the wet season, rainfalls and moisture content make the harvested peanuts dry slowly. This situation leads to rodent and fungus infection. But, if farmers take fresh pods out of the stem immediately, these problems are averted. Aflatoxin contamination of peanuts occurs partly because of improper drying and storage.

The technology to dry fresh peanuts in shells has been on the research agenda for a while. There is no study, however, about farmers' storage practices.

7. Cost of Peanut Production

The cost structure of producing peanuts reflects the amount of domestic and foreign resources used. The conventional cost calculation for the average total cost is the ratio of total cost over total output. Time series of average cost per unit of planted area, per ton and per kilogram of dry pod output over 1970 to 2000, are shown in Table 13. In 1976, it was 3.8 Baht/kilogram of dry pod peanuts. By 2000, the cost had increased to 10.2 Baht/kilogram (Table 13). The main cost component is variable cost. This is the cost that varies with yield. Average variable cost contributed 92-93 percent to total average cost in 1998 and 1999. The rest is fixed cost comprising imputed land rent and imputed machinery depreciation cost. Table 14 shows the cost structure of peanut production per unit of planted area (rai).

Of the variable cost, 66-70 percent is labor cost; material cost contributes 20-23 percent. In peanut production, the main cost component is labor which is mainly used in harvesting. It comprises almost 50 percent of the labor cost. Labor cost in land preparation, planting, and caring make up the other 50 percent.

Material costs contribute 20-23 percent of the total cost; of this, 72-83 percent is comprised of seed cost. Other material costs are low which implies that Thai peanut farmers only use small amounts of chemicals and low quality seeds.

The cost of peanut production vary among regions, and also among provinces of the same region. Areas with lowest cost should be promoted to grow more peanuts. Another factor to reduce production cost would be yield, as higher yield implies lower unit cost. Sukharomana, 1979 indicated that peanuts produced in the Northern and Eastern regions have comparative cost advantages in producing peanuts. Updating cost data at provincial and regional levels should reveal the changes of the comparative cost advantage over time in producing peanuts.

8. Peanut Distribution, Marketing and Processing of Unshelled Peanuts

Farmers sell peanuts with pods to local assemblers, local markets, peanut middlemen and the local peanut processing factories. Local assemblers then sell them to processing factories for boiling or roasting or sell to shell threshing factories. Distribution channels vary between regions. In the North-Eastern region, shell threshing factories may secure peanut supplies by giving farmers peanut seeds as loans. Farmers have to return the loans by selling peanuts to the factories right after harvesting. (The loan is deducted from the sales revenue.)

Limitations on the supply of peanuts may be a driving force for manufacturers to secure their peanut supply by buying peanuts from other regions. In some cases, the peanut manufacturers send agents to purchase peanuts at farms during the harvesting period if farmers are not tied to middlemen through loans for seeds, fertilizer and cash. Farmers free of borrowing ties can choose to sell to merchants. Peanut markets at farm level are relatively competitive so farmers have a chance to sell their produce at the best

price. Farmers typically complain that the farm price is too low, especially during the harvesting season.

If the fresh peanut pods are not processed by manufacturers right away by boiling or roasting, they will be dried by the peanut middleman or by peanut shell threshing factories before being threshed for kernel.

9. Processing Plants

Processing factories boil and roast unshelled peanuts, remove peanut seeds from its shell, compress peanut seeds for oil and process peanut seeds into products such as snacks and desserts.

9.1 Factories Processing Fresh Pod Peanuts by Boiling and Roasting

A study in 1983 (Kasem Sirisukhodom, 1983) reported that factories that process fresh peanuts with shells by roasting or boiling, and boiled, unshelled peanuts that are dried by the oven or the sun and then packaged, emerged in 1979/80 due to strong export demand. Another survey in 1985 (Sukanya Kuchaaisit, Orapin Kerdchuen, Nipon Poungkaew and Chawalwuth Chainuwat, 1985) reported that there were at least ten factories with the total capacity of at least 20,000 tons of unshelled peanuts/year processing peanuts by such methods. The full capacity of a typical factory was estimated at 1,000-1,500 tons of unshelled peanuts/year. But the actual operating capacity was lower than the full capacity due to the shortage of peanuts, especially between October and February.

When unshelled peanuts are boiled, they are sold to vendors. Excess quantities are either dried by the sun or by oven. A hundred kilograms of fresh pod peanuts yields 52.4 kilogram of dry unshelled peanut products. If the factory uses ovens to dry the boiled unshell peanuts, the weight of the product reduces to 50.7 kilograms. Drying boiled peanuts by oven yields a better quality product, but at a higher cost, so drying by the sun is the common practice.

9.2 Processing Unshelled Peanut for Seeds

In 1983, (Kasem Sirisukhodom, 1983) reported that there were about 117 factories processing dry pod peanuts by removing the shells from the seeds. Factories are located in major peanut production areas. The total processing capacity was estimated at 55,000 tons of dry pod peanuts/year. Peanut seeds and peanut shells are joint products of the factories. Peanut shell is used as raw material for mushroom cultures and as organic fertilizer. The seeds are sold to the middlemen in Bangkok, peanut food processing factories and peanut oil factories**.**

Peanut seeds are graded as first, second or third grade. First grade peanuts are bulk peanuts with large-sized seeds, no cracks or other damages and no foreign material. The second grade comprises cracked seeds, small seeds, and some foreign materials. The third grade, called “mixed grade” comprises small seeds, cracked and broken seed, and foreign materials. First grade peanuts can be used for cooking either by households or by food producers. They are also used as inputs for food industries and occasionally for export. Food produced from first grade peanuts can be used for cooking

or by the small foods industry. Large scale peanut processing plants for food do not exist due to the supply shortage of good quality peanut seeds, and the limited domestic market for peanut food products. Second and third grade peanuts are used for producing peanut oils and meal.

9.3 Technology in Peanut Drying, Shelling and Peanut Seed Crushing

Solar drying machines and forced hot air dryers are under research and development. Peanut shell threshing machines developed by Khonkaen University have been adopted by farmers, commercially produced and further improved by farm machine manufacturers. It was reported that more than 100 machines were distributed to farmers by government offices. Local farm machine manufacturers account for more than 15 units. Small machines for crushing and grinding peanut seeds have been designed to substitute manual crushing and motors. The peanut crushing and grinding machines use seeds at the rate 200 kilogram/hour (Winitch Chinsuwan, and Pinai Sawadiwong, 1989). The commercial adoption rate is unknown.

10. Export and Import Trends of Peanuts and Peanut Products

There are different forms of peanuts being imported into and exported from Thailand; unshelled peanuts, shelled peanuts, peanut oil, peanut meal, peanut food products and roasted peanuts. Analysis of long term trends of exports and imports of each product will indicate whether Thailand will produce peanuts and products sufficient for domestic consumption or not.

Net exports, which are defined as the export quantity less import quantity of peanuts with shell (in the form of boiled and dried pod peanuts), were positive from1994 to 1999, but became negative in 2000 as exports were less than imports by 1,297 tons of peanuts with pod (Table 15). For peanut seeds, net exports became negative by thousands of tons (Table 16). Net exports of peanut oil, peanut meal and other peanut products were also negative (Table 17-20). This implies that domestic production of peanuts is well below domestic demand. DOAE (2000) showed that the peanut deficit rose from 322 tons in 1993 to 3436 tons in 1999. In other words, the import of peanuts and products show a rising trend.

Thailand imports peanuts from Vietnam and China. Peanut was mainly imported from Singapore and Taiwan. Peanut residuals are imported from the USA. For exports, Malaysia is the major destination. Small amounts of vegetable oil are exported to the neighboring countries of Cambodia, Hong Kong, Australia.

11. Consumption Trends of Peanut Seeds and Oils

Thai people consume little peanut oil compared to soybean or palm oil. Peanut oil is used in ethnic Chinese foods just for the smell of roasted peanut. People are also aware of aflatoxin in the oil. Other kinds of vegetables are used instead. With respect to the amount of domestic consumption of peanuts in Thailand, the per capita consumption of peanut seeds and peanut oil in 1980 was 1.09 kilogram of seed/person/year and 0.13 kg of oil/person/year. However, for the year 2000, it was estimated the per capita peanut seed consumption was 1.49 kg/person/year, and at 1.08 kg/person/year for peanut oil consumption (Table21).

12. Problems of Peanut Production and Marketing

In 1983, Kasem Sirisukhodom of the Office of Agricultural Economic, MOAC, indicated that the sources of low pod yield were (1) shortage of good quality seed, (2) low levels of chemical fertilizers, (3) farmers did not know how to use pesticides when necessary. A study by the Department of Agricultural Extension also found that it was difficult for farmers to find good seeds because pests like Aphid and Dorylus orientalis Westwood destroyed pods. A lot of peanut pods were contaminated by aflatoxin because of high moisture content and inappropriate storing methods. A shortage of machines for harvesting, threshing and drying was also contributing to the problem. Farmers had no knowledge of suitable times and methods for keeping peanuts kept for seed.

In 1985, the Department of Agricultural Extension studied the peanut farmers' acceptance of new technology and the use of good seed. Peanut farmers perceived farm gate price variation as their main problem and the problems of production as secondary. The problems related to production are (1) water shortage, (2) the high price of chemical fertilizer, (3) shortage of good quality seed, (4) shortage of machinery and tools for land preparation, and (5) shortage of chemical inputs. The other study conducted by the Department of Agricultural Economics (DAE) indicated that aflatoxin contamination made consumers reduce peanut consumption. The spread of insects and diseases affected the yield inducing higher production cost. The domestic market has a strong demand for the local variety of peanuts (tick pod, with 2-3 seeds/pod, and red seed skin). However, the recommended seeds especially Tainan-9, has a small pod with 2 seeds and is suitable for vegetable oil. Excessive use of seed (20-25 kg of dry pod/rai), and high labor requirement in planting, caring, and harvesting are the causes of high production cost.

In 1987, the Department of Agricultural Extension (MOAC) reported on the technical and economic problems at farm level. A shortage of good seed, and the chemicals to protect peanut plants from insects and diseases, and the persistence of aflatoxin occurrence especially in wet season peanuts are all production related technical problems. The related economic problems include high production cost and low farm price, especially at the harvesting period. The Office of Agricultural Extension in the Southern region reported that shortage of good seed and variation in rainfall was farmers' main problems. Income from peanuts is low compared to other crops. The Department of Agriculture, the Department of Agricultural Extension and Khon Kaen University conducted a field survey in Srisaket, a province in a major peanut production area in the North-Eastern region. The study found that the problems of wet season peanuts were (1) shortage of labor compared to other cash crops (corn, pumpkin, cucumber, and rice), (2) insect and disease outbreaks, (3) excessive weeds. In the mid-wet season peanut

production, peanut farmers could not meet the suitable planting deadline because of a shortage of labor. The best time for planting peanut should be by August 15th, but this is also when the rice transplanting period takes place.

In 1989, Arun Patanothai, et al conducted a field survey in Lampang. Farmers faced the problem of growing peanuts on hill slopes. The problems were related to rust disease, too many weeds because farmers were occupied collecting bamboo shoots and rats, and the amount of labor for harvest. Farmers planting peanuts in upland areas face the following problems: (1) spread of insects: Empoasca sp., Caliothrips indicus (Bangnal), Flanklinella schultzei (Trybom), Megalurothrips usitatus (Bagnal), Scirtytothrips dorsalis Hood, and Thris palmi Karmy, (2) low fertility of land: shortage of phosphorus, potassium, calcium, and boron in soils, (3) shortage of water, (4) high moisture content in seeds, (5) low yield. In the same year, Chavalvuta Chainuwat of the Department of Agricultural Extension reported three major problems in peanut production (1) low yield, (2) high production cost, and (3) low quality output due to aflatoxin contamination.

In 1991, Sarun and others from Kasetsart University reported the problems of farmers in Chiangmai province, a province in northern Thailand. They reported that about 30 percent of farmers faced the problem of low germination rates of seeds and of insects destroying seed pods. They also reported that 66 percent of farmers had no problem with seed supply. Shortage of labor was the problem of 72 percent of farmers. Around 32 percent of farmers were confronted with pest and disease outbreaks. Ninety six percent of farmers experienced rainfall shortage.

In 1993, there were six studies reporting problems related to production price and marketing of peanuts. The Office of Agricultural Extension in The North, Department of Agricultural Extension, reported that the problems of peanut growers were (1) farmers' lack of post harvest techniques, which leads to aflatoxin contamination, (2) other cash crops such as baby corn, tomato yielding more cash income by comparison, (3) low government policy priority towards peanuts (especially compared to soybean), (4) farmers' inability to produce peanuts that have the physical features and quality required by market demand (demand for boiled fresh pod consumption and the demand for seed require different seed variety of peanuts), (5) diminishing domestic demand for seeds of vegetable oil as the factories use other substitutable oilseed inputs.

In 1993, the Office of Agricultural Extension in the Eastern region conducted a field survey on the situation of peanut production in 1991/92. The problems that farmers were confronted with were (1) low yield (277 kg of fresh pod/rai), (2) lack of knowledge in using fertilizer and pesticides, and various other problems such as high production cost, high chemical input price and high labor cost. The study hypothesized that these problems were the causes of low yield. In 1993, the Office of Agricultural Extension in the Eastern region showed peanut growers in the Western part of Thailand how to produce peanut using fresh pods, with little chemical fertilizer and pesticides. The total supply of output was not enough for the demand of peanut roasting factories. The Office of Agricultural Extension in the Central region indicated that farmers could not find places to buy good seeds, especially Sukhothai-38, a recommended variety.

In 1994, Ruendej Suksomboon, of the Department of Agricultural Extension, summarized the situation of peanut production in 1993. He indicated that the

cause of low yield was stemming from the shortage of good seeds, low level use of technology that could increase yields, low quality of output (especially aflatoxin contamination), and lack of knowledge about peanut storage.

Further output was not fitted for market demand: peanuts suitable for consumption as fresh pod peanuts were used for oil extraction, etc.. In the same year, Suktanya Kongngen and others of the Department of Agricultural Extension studied the peanut farmers' acceptance of new technology in irrigated areas of Nakorn Ratchasrima province in the North-Eastern region. They showed that farmers faced problems of disease and pests.

Reviewing the peanut production problems over 25 years reveals that the persisting problems affecting quantity and quality of peanuts are: (1) quality and shortage of seeds in the planting period, (2) pests and disease outbreaks, (3) aflatoxin contamination at the farm level due to harvesting practice. The persistent economic problems are high production costs (especially labor) and low farm prices in the harvesting period of wet season peanuts. The persistence of production and economic problems at the farm level shows that the methods to mitigate and solve those problems were not disseminated to peanut growers. The type and number of research studies undertaken may reflect the direction of research in responding to these problems.

13. Types and Number of Research Studies

The record by subject of the number of research studies presented at the annual Thai National Groundnut Meetings from 1983-2000, as shown in Table 22, reflects the direction and types of research that has been realized by researchers and peanut agencies. Based on the total number of studies from 1983-2000 (conducted in eleven fields) the most frequently researched areas were: variety improvements (163 studies), groundnut pathology (111 studies), agronomy and cropping system (94 studies), soil and fertilizer (86 studies) and groundnut entomology (82 studies). The lowest number of studies was in the field of peanut farm mechanization (13 studies). Though aflatoxin and seed technology have been two of the most persistent problems at the farm level, the amount of research done over the last 27 year in these fields was only 18 and 17 studies respectively. Rhizobium and mycorrhiza studies were concentrated over 1985–1987 and then declined to 5–6 a year. After 1994, there was no research on rhizobium and mycorrhiza. Most research work should be disseminated to peanut growers, but the rate of this occurring and the farmers' responses are not known. The results of research, however, may benefit peanut growers in the long term.

14. Government Policy and Plans

The Department of Agricultural Extension (DAE) designed a long term plan for peanut production extension and put it into the Five Year National Economic and Social Development Plan (1982–1986). The main objectives of peanut production extension were (1) to increase the quality of peanuts, (2) to increase peanut yields, (3) to increase peanut efficiency by the use of new technology, (4) to promote peanuts as a farmers' supplementary income crop and, (5) to promote peanut consumption as a source of protein in local areas. Each objective was supported by the operational plan that would be implemented by the Department of Agricultural Extension. More specifically, DAE expected the extension program to improve the quality of peanut seeds in terms of (1)

reducing aflatoxin in peanut seeds to 20 ppm or less, (2) reducing moisture content in peanut seeds to a level safe from aflatoxin contamination, (3) reducing foreign material in peanut output. Peanut growers were expected to work in groups and acquire knowledge about peanut production and marketing after the designed extension program was implemented. Yields of peanut production were also to be increased and farmers could earn higher income peanut growing as a supplementary crop. The total planted area and output should have been increased. An ex-post evaluation of the effectiveness of the plan in terms of achieving its objectives, however, did not appear at the end of the national plan.

In 1989, Chavalvutha Chainuwat of the Agricultural Extension presented the peanut production, marketing and extension policy. The extension policy remains on the same course as earlier policy: (1) to increase yield and reduce the cost of production by using good seed, technology and small farm machinery easy and suitable for farmers (2) to increase quality of peanuts, especially by reducing aflatoxin contamination by informing farmers to sufficiently dry peanuts (3) to increase dry season peanut production in irrigated areas.

In terms of the peanut market, the problem of farm gate price fluctuation was persistent. It was recommended that (1) information of production and marketing, both domestic and overseas, should be used for peanut production planning for the next season, (2) households should be encouraged to consume more peanut. Domestically produced peanut has problems of high moisture content, high level of aflatoxin, and small seeds. These characteristics reduce the competitiveness in the world market. The export performance of Thai peanuts could not be improved due to substandard seed quality and aflatoxin contamination.

In the Eighth National Economic and Social Development Plan, there are two main objectives regarding peanuts: (1) to increase quantity and quality of output, and (2) to improve quality to meet market demand and to reduce aflatoxin to meet safety standards. To reach the two main objectives, it is recommended that: (1) the areas suitable for peanut production be identified, (2) the recommended seeds be distributed to farmers by both government and private agencies, and farmers be encouraged to produce peanut seed for their own use, (3) the suitable technology be disseminated to farmers, and (4) the government provide credit to peanut growers. The quantitative objective in the Eighth Plan is to maintain the annual production area at 670,000 rais, and at the same time to make yields increase from 233 kg of dry pod peanut/rai in 1997 to 239 kg of dry pod peanut/rai in 2001.

The Eighth Plan also includes targets in peanut trade by (1) encouraging peanut growers to do business in unshelled peanut trade, (2) providing credit to peanut growers, and (3) providing international markets for AFTA, especially Indonesia and Malaysia. Peanut research and development in the Eighth Plan aims to (1) conduct research and search for peanut harvesting technology to reduce loss and the cost of peanut production, and (2) find ways to reduce aflatoxin contamination.

The inclusion of the peanut production and extension programs into the national plan shows that peanuts are an important crop. The main issues that concern DAE are (1) to increase yield, (2) to reduce production cost through the use of good seed and suitable farm technology, and (3) to reduce aflatoxin contamination.

15. Conclusions and Summary

Conclusions. Peanuts have been farmed in Thailand for at least 150 years. In 1998, domestic production, measured in dry pod peanuts, was about 135,000 tons. As domestic output could not meet domestic demand, Thailand had to import peanuts with pod, peanut seeds, peanut meal and peanut oil. The total imported peanut equivalent in dry pod peanuts in 1998 was estimated at 213,000 tons.

Thai people consume peanuts in different forms: Fresh, boiled peanuts, roasted, and cooked in many variations. Peanut seeds are a major contributor to the food industry. The supply of peanuts, however, is insufficient for a large scale peanut industry.

Per capita consumption of peanut seeds was highest in 1986 at the level of 1.93 kg per capita, steadily declining to 1.49 kg per capita by 2000. Likewise, the per capita consumption of peanut oil declined from 0.13 kg in 1980 to a current low level of 0.08 kg. This decline seems to reflect the growing awareness by the Thai people of the local peanut aflatoxin contamination problem.

1. Production process. Thai farmers treat peanuts as a cash crop, taking into account the comparative income from alternative cash crops such as corn, sugarcane, cassava and rice. The planted peanut area of Thailand, between the years 1975-98, has shown a declining trend of about one percent per annum, which means that farmers have diverted some land to other crops.

Peanuts are by no means a major crop in Thailand: The total planted area of peanuts to total farm holding land is less than 0.5 percent. In 1998, this amounted to 556,000 rai in the country (2.5 rais equal one acre, 6.25 rais equal one hectare). Regional distribution shows the heaviest concentration in the Northern region with 29 percent, while the Northeastern, Eastern, Central and Southern regions trail with 8, 3.4 2.5 and 0.9 percent of peanut growing land to total farm holding land, respectively.

2. Processing practice. Processing practice at the farm level determines yield and the quality of peanut seeds. Peanuts may grow as an inter-crop of corn or cassava, or as a single crop. The main production time for peanuts is the rainy season, but with this comes the problem of moist soil, making the wet season output vulnerable to aflatoxin contamination. Planting near the end of the wet season and dry season planting after rice and corn, of course reduce the risk from moisture and rain. But limited irrigation and the shortage of rainfall decrease both the planting area and yield. Further, planting production technology is poor as farmers can not access good quality seeds in time, and likewise, are too poor to afford chemical inputs.

Planting and harvesting is mainly done by labor. Farm tractors and peanut pod threshers are used by growers, and for harvesting, more advanced peanut pod stripping equipment is under development.

3. Prices, cost and revenue. For dry pod peanuts, the unit production cost has been increasing sharply. In 1976, the cost was 3.76 Baht per kg, while in 2000, it was at 10 Baht per kg (Year 2000, by comparison: 1976 exchange rate was 20.36 Baht/US$, while for 2000, it was 40.11). In 2000, the average farm gate price for peanuts with pods was 11.4 Baht per kg. and farmers had an average yield of 246 kg per rai.

The average amount of farm land for peanut-growing farmers is about 1,606 rais per farm. It largely determines the potential income from peanut farming. Some areas in the Northern region, still meeting comparative cost advantage criteria, can produce peanuts at a low cost and therefore can earn more income from peanut production.

The marketing of shelled and unshelled peanuts links farmers to the middlemen of the peanut processing factors and to consumers. Whether these markets are efficient is not subject of this study. A lot of problems, however, clearly lie at the farm level, especially the low farm price of the output during harvesting time.

4. <u>Planning, research and policy</u>. Considerable amounts of research have been conducted over the years on literally all problem areas of peanuts in the Thai food system, and the subject of peanut farming is even explicitly addressed in the latest National Economic and Social Development Plans (ref).

The problem with research seems not so much with conclusions, but that little of the findings, if any, seem to be given to the farmers. This is true as much for technical matters as for organizational and institutional aspects of production, processing and marketing.

Regarding policy, despite active government encouragement, Thai peanut production is still well below domestic demand, and continues to sink. Cause for this is most likely the vicious circle of undercapitalized production, output of unsatisfactory quality (mainly aflatoxin contamination) and poor harvesting period farm prices. Clearly, only a comprehensive policy will overcome this gridlock.

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Table 1: Percentage of Peanut Planting Area to Total Arable Land by Region of Thailand (1978-1995).

Unit: Hectare or as indicated

Region	Percentage of Areal Planted									
	1978		**1982**		1988		1993		1995	
	Farm holding Area	Peanut % Planted Area	Farm holding Area	Peanut % Planted Area	Farm holding Area	Peanut % Planted Area	Farm holding Area	Peanut % Planted Area	Farm holding Area	Peanut % Planted Area
Northeastern Region Total	7,888,190.72	4.33	8,456,621.92	6.48	9,732,399.20	6.88	9,218,557.44	6.42	9,257,467.68	7.93
Northern Region Total	3,904,066.08	54.75	4,412,416.48	62.40	5,443,324.48	30.36	4,624,778.08	27.73	4,674,679.20	28.29
Central Region Total	2,415,307.68	1.42	2,279,350.72	1.86	2,475,069.12	1.82	1,971,876.00	2.79	1,916,348.64	2.45
Western Region Total	768,246.08	0.69	795,691.52	0.82	1,165,034.72	0.69	840,481.92	0.84	840,652.48	0.85
Eastern Region Total	1,500,988.16	6.78	1,532,052.96	4.53	1,793,957.76	4.40	1,595,317.76	3.56	1,601,029.60	3.42
Southern Region Total	2,153,798.72	1.78	2,297,753.28	1.24	3,038,319.68	2.41	2,752,331.68	1.66	2,906,393.60	2.02
Whole Kingdom	18,630,597.4	0.57	19,773,886.9	0.62	23,648,105.0	0.52	21,003,342.9	0.46	21,196,571.2	0.47
Percent of farm holding area (1978=100)	100.00		106.14		126.93		112.74		113.77	

Source: Calculated from data in Appendix Table A10 and Table A11 .

Table 2: Percentage Distribution of Peanut Planted Area by Region (1973-1998).

Region	Percentage of Planted Area					
	1973/74 1973	1977/78 1977	1982/83 1982	1992/93 1992	1997/98 1997	1998/99 1998
Northeastern Region **Total**	27.13	16.57	23.28	27.79	34.59	35.04
Northern Region **Total**	48.34	64.89	61.23	52.36	43.37	43.70
Central Region **Total**	6.91	3.93	3.63	4.79	8.20	7.73
Western Region **Total**	1.40	1.04	1.25	1.64	2.44	2.37
Eastern Region **Total**	10.59	8.61	8.26	8.90	5.46	5.29
Southern Region **Total**	5.63	4.96	2.35	4.52	5.94	5.87
	100.00	100.00	100.00	100.00	100.00	100.00
Whole Kingdom	773,974	641,360	761,384	635,655	538,354	555,594

Source: Calculated from data in Appendix Table B1.

Table 3 : Percentage of Harvested Area of Peanuts by Region (1980-1998).

Province	Percentage of Harvested area				
	1980/81 1980	1984/85 1984	1989/90 1989	1994/95 1994	1998/99 1998
Northeastern Region					
Total	23.14	22.40	28.64	34.72	34.71
Northern Region					-
Total	55.90	54.77	50.83	46.55	43.96
Central Region					-
Total	4.06	3.69	3.58	5.82	7.55
Western Region					-
Total	1.59	2.06	1.63	1.40	2.28
Eastern Region					-
Total	10.03	10.67	9.37	7.00	5.91
Southern Region					-
Total	5.28	6.40	5.94	4.50	5.59
	100.00	100.00	100.00	100.00	100.00
Whole Kingdom	99,772.00	124,952.96	120,396.32	100,183.52	86,496.64

Source: Calculated from data in Appendix Table B2.

Table 4 : Percentage of Harvested Area to Planted Area of Peanuts, by Region (1980-98).

Province	Percentage of Harvested area				
	1980/81 1980	1984/85 1984	1989/90 1989	1994/95 1994	1998/99 1998
Northeastern Region Total	95.35	95.00	99.69	95.12	96.39
Northern Region Total	94.37	95.43	98.87	96.99	97.89
Central Region Total	90.59	94.39	99.49	98.44	95.05
Western Region Total	82.35	91.20	94.55	96.51	93.53
Eastern Region Total	98.53	93.36	99.62	95.20	96.43
Southern Region Total	97.05	99.09	98.03	95.83	92.64
Whole Kingdom	94.43	95.20	99.07	96.23	96.65

Source: Calculated from data in Appendix Table B3.

Table 5: Percentage Distribution of Peanut Output, by Region (1973-1998).

Province	Percentage of Production (tons)						
	1973/74 1973	1977/78 1977	1982/83 1982	1987/88 1987	1992/93 1992	1997/98 1997	1998/99 1998
Northeastern Region							
Total	28.45	15.90	19.52	25.49	29.05	33.43	33.51
Northern Region							-
Total	47.62	64.59	64.71	56.69	51.10	44.16	44.81
Central Region							-
Total	6.20	3.67	3.43	3.54	5.90	9.93	9.18
Western Region							-
Total	1.45	0.61	1.28	1.62	1.36	2.73	2.34
Eastern Region							-
Total	11.05	9.02	9.03	8.97	9.03	5.15	5.43
Southern Region							-
Total	5.23	6.22	2.03	3.69	3.56	4.61	4.73
	100.00	100.00	100.00	100.00	100.0	100.00	100.00
Whole Kingdom	146,500	105,558	145,323	161,539	136,893	126,497	135,316

Source: Calculated from data in Appendix Table B4.

Table 6 : Planted Area, Harvested Area, and Yield of Thai Peanuts (1971-2001).

Crop Year	Planted Area (rai)	Harvested Area (rai)	Yield in Dried Shell (ton)	Yield (kg/ Planted Area)	Yield (kg/Harvested Area)
1971/72	714,999	697,385	133,500	187	191
1972/73	742,842	673,839	152,800	206	227
1973/74	773,974	749,352	146,500	189	196
1974/75	814,038	779,038	160,900	198	206
1975/76	735,999	707,997	142,200	193	201
1976/77	761,000	742,984	151,500	199	204
1977/78	641,360	563,000	105,559	165	188
1978/79	660,330	622,000	127,283	193	205
1979/80	608,821	573,000	109,087	179	191
1980/81	658,099	624,000	128,797	196	207
1981/82	764,058	733,000	146,519	192	200
1982/83	761,384	734,000	145,323	191	198
1983/84	782,941	753,496	146,550	187	194
1984/85	820,294	780,956	172,084	210	220
1985/86	778,668	756,357	171,378	220	227
1986/87	790,180	780,707	169,187	214	217
1987/88	762,619	736,772	161,539	212	219
1988/89	771,387	736,603	163,541	212	222
1989/90	763,216	752,477	161,493	212	215
1990/91	759,554	734,000	161,114	212	220
1991/92	722,503	687,114	156,913	217	228
1992/93	650,724	628,341	136,863	210	218
1993/94	602,790	572,477	136,363	226	238
1994/95	650,671	626,147	150,329	231	231
1995/96	624,035	605,190	146,755	235	242
1996/97	618,782	595,522	146,703	237	246
1997/98	538,354	511,155	126,497	235	247
1998/99	559,316	540,604	135,316	242	250
1999/00	563,262	540,609	137,526	244	-
2000/01*	549,972	536,122	135,306	246	-

Note: *estimated values.

Source: Office of Agricultural Statistics of Thailand, Ministry of Agriculture and Cooperative.

Table 7: Five Year Average of Planting Area Output and Yield of Peanuts.

Year	Planted Area (rai)	Output Unshelled (tons)	Yield Unshelled (kg/rai)
1981-85	781,475	156,371	200.1
1986-90	768,652.20	163,375	212.54
1991-95	674,132.60	145,353	215.61
1996-98	585,937.20	136,280	232.58
Growth Trend 1975-98	-1.014	No trend	1.24

Note: Dry pod peanuts have a seed yield of 60 percent.

Source : Calculated based on data from the Office of Agricultural Economics, Ministry of Agriculture and Cooperative, Thailand.

Table 8: International Comparison of Average Yield of Thai Peanuts (1994-1998).

Unit: kgs of dry pod/rai

Year	Africa	North America	South America	Asia	USA	Thailand	World Yield
1994	127	430	291	231	471	240	205
1995	126	373	293	245	409	243	208
1996	131	400	369	264	476	247	221
1997	137	404	229	233	452	247	202
1998	132	424	343	234	478	250	208
Growth Rate (%)	1.6093	0.5173	0.8236	0.3454	1.2947	0.9797	0.0021
Mean (1994-1998)	130.60	406.20	305.00	242.80	457.20	245.40	208.80
Standard Deviation	4.393	22.521	53.981	13.160	28.839	3.911	7.259

Note: 2.5 rais = 1 acre 1 rai = 0.16 hectare kernel = 0.60 of dry pod yield.

Source: Office of Agricultural Economics, Ministry of Agriculture and Cooperatives, Agricultural Statistics of Thailand, Crop Year 1998/99 Table 48 p. 70-72.

Table 9: Account and Balance of Thai Peanuts with Shell (1977-2001).

Unit: tons

Year	Supply			Demand		
	Domestic Output	Imports	Total	Exports	Domestic Use	Total
1977	105,559	-	105,559	13,945	91,614	105,559
1978	127,283	25	127,308	20,371	106,937	127,308
1979	109,087	33	109,120	15,978	93,142	109,120
1980	128,797		128,797	3,081	125,717	128,797
1981	146,519	2	146,521	15,706	130,815	146,521
1982	145,323	-	145,323	18,748	126,575	145,323
1983	146,550	-	146,550	844	145,706	146,550
1984	172,084	20	172,104	6,791	165,313	172,104
1985	171,378	2	171,380	2,163	169,217	171,380
1986	169,187	-	169,187	3,982	165,205	169,539
1987	161,539	-	161,539	3,000	158,539	161,539
1988	163,541	1	163,542	1,293	162,248	163,542
1989	161,493	7	161,500	1,219	160,281	161,500
1990	161,114	12	161,126	819	160,307	161,126
1991	156,913	68	156,981	2,418	154,563	156,981
1992	136,863	8	136,871	1,713	135,159	136,871
1993	136,363	322	136,685	1,372	135,312	136,685
1994	150,329	576	150,905	3,522	147,384	150,905
1995	146,755	5,876	152,631	3,598	149,033	152,631
1996	146,703	9,614	156,317	2,285	154,032	156,317
1997	126,497	6,314	132,811	1,456	131,356	132,811
1998	135,316	3,956	139,272	1,016	138,256	139,272
1999	137,526	3,436	140,962	2,933	138,029	140,962
2000	135,306	36,974	172,280	1,233	171,047	172,280
2001*	135,026	36,000	171,026	1,200	169,826	171,026

Note: Imports and Exports data include peanuts without shell.

* data on March 2001.

Source: Office of Agricuteral Statistics of hailand, Ministry of Agriculture and Cooperative.

Table 10: Accounts and Balance of Thai Peanuts With Shell Including the Conversion of Peanut Residual and Oil Imports.

Unit: tons

Year	Supply			Demand					
	Domestic Peanuts With Shell	Imports	Total	Exports	Seeding	Consumption	Industry	Oil Production	Total
1980/81	128,797	15,458	144,255	3,386	11,846	82,771	15,152	31,100	144,255
1981/82	146,519	12,634	159,153	15,706	13,753	90,361	12,633	26,700	159,153
1982/83	145,323	5,158	150,481	18,884	13,705	84,873	5,019	28,000	150,481
1983/84	146,550	7,692	154,242	845	14,093	106,272	7,692	25,340	154,242
1984/85	172,084	6,803	178,887	6,792	14,765	125,347	6,783	25,200	178,887
1985/86	171,378	207	171,585	2,163	14,016	127,481	205	27,700	171,585
1986/87	169,187	92,538	261,725	3,982	14,223	128,192	92,538	22,790	261,725
1987/88	161,539	196,487	358,026	3,000	13,727	122,197	196,487	22,615	358,026
1988/89	136,541	252,839	416,380	1,293	13,885	125,468	252,838	22,896	416,380
1989/90	161,493	385,427	546,920	1,219	13,738	123,934	385,420	22,609	546,920
1990/91	161,114	408,394	569,508	819	13,672	124,078	408,383	556	569,508
1991/92	156,913	525,248	682,161	2,418	13,005	119,590	525,180	21,968	682,161
1992/93	136,863	206,371	343,234	1,713	11,705	104,292	206,363	19,161	343,234
1993/94	136,363	312,817	449,112	1,372	10,850	105,372	312,495	19,091	449,112
1994/95	150,329	313,783	464,112	3,522	11,712	114,625	313,207	21,046	464,112
1995/96	146,755	441,770	588,525	3,598	11,233	117,254	435,894	20,546	588,525
1996/97	146,703	354,430	501,133	2,298	11,138	122,356	344,816	20,538	501,133
1997	126,497	381,909	508,406	1,456	9,690	103,955	375,762	17,710	529,430
1998	135,316	282,718	418,034	1,016	10,068	109,244	278,762	18,944	418,034
1999	137,526	125,688	263,214	3,575	10,139	108,636	121,610	19,254	263,214
2000*	135,306	69,027	204,333	1,234	9,899	142,205	32,052	18,943	204,333
2001*	135,026	70,000	205,026	1,200	9,781	141,141	34,000	18,904	205,026

Note : - for seeding about 18 kg per rai

- for oil production about 14% of total yield
- peanut with shell : peanut without shell = 1 : 0.6
- peanut with shell: peanut w/o shell: without shell : residual : oil = 1 : 0.6 : 0.37

Source: Office of Agricultural Statistics of Thailand, Ministry of Agriculture and Cooperative.

Table 11: Record of Peanut Seed Improvement Activities and the Emergence of Recommended and Certified Peanut Lines in Thailand.

Year	Activities
1933-34	Agricultural station in Songkla province, in the Southern region, compries yield and other characteristics among traditional lines of Spanish type peanuts.
1934	Agricultural station in Tha-pra, Khon Kaen province, North-Eastern region of Thailand collects peanut accession from different parts of Thailand. The objective is to compare the characteristics of 27 lines of peanuts.
1938-1957	Agricultural Station in various parts of Thailand collected peanut lines. Those stations were;
	1. Agricultural station at Tha-pra, Khonkaen province, in the North-Eastern region.
	2. Agricultural Station on Maejo, Chiengmai province, in the Northern region.
	3. Agricultural Station at Srisamrong, Sukhuthai, Province (lower Northern region.)
1962	First two domestic peanut lines recommended by Department of Agriculture.
	Lines announced under the names of Sukhothai 38 and Lampang.
5 Oct. 1976	Peanut lines imported from Taiwan in 1972 certified by Department of Agriculture under the name of Tainan 9.
1958-1977	Foreign peanut lines imported from Taiwan, People's Republic of China, the Philippines and the United State of America for breeding and selecting better lines of peanuts.
1976	Imported peanut lines from Taiwan certified under the name of Tainan 9.
30 Sept. 1987	Peanut line selected from the import line of the Philippines in 1974 certified by
	Department of Agriculture under the name of Khonkaen 60-1.
	Peanut line selected from TMV 3 line in 1979 certified by Department of Agriculture under the name of Khonkaen 60-2.
14 Sept. 1988	Peanut line selected from the USA line (Under Peanut Collaborative Research Support Program under USAID and Khonkaen University (North-Eastern region) in 1983 certified under the name of Khonkaen-3.
15 Dec. 1994	First cross breed between Taiwan 2 and UF 71513-1 certified by Department of Agriculture under the name of Khonkae–4.
18 Mar. 1998	Cross breed of Tainan 9 and RCM 387 developed at field crop experiment at station in Kalasin province (North-Eastern region) certified by Department of Agriculture under the name of Khonkaen 5.

Source: Field Crop Research Station at Khonkaen Province, Department of Agriculture Field Crop Research Institute,
Ministry of Agriculture and Cooperatives
Peanuts (in Thai) June 1999.

Table 12: Characteristices of Peanut Seed Recommended and Certified by the Department of Agriculture.

Characteristices	Peanut Variety							
	Lampang (2505)	Sukhothai 38 (2505)	Tainan 9 (2519)	Khon Kean 60-1 (30 Sept. 2530)	Khon Kean 60-2 (30 Sept. 2530)	Khon Kean 60-3 (14 Sept. 2531)	Khon Kean 4 (15 Dec. 2527)	Khon Kean 5 (15 Mar. 2541)
Color of seed coat	pink	dark red	pink	pink	pink	pink, light orange	red pink	dark pink
Flowering period (days)	25-30	25-30	25-30	25-30	25-30	32-38	21-25	20-28
Harvesting period (days)	95-105	95-105	95-110	95-110	95-105	110-120	95-100	85-115
Pods/hole	22	23	27	23	20	19	22	24
Seeds/pod	2-4	2-4	2	2	2-4	2	2-4	2
Weight of 100 seeds (grams)	40.6	38.9	42.4	45.9	40.7	76.2	47.1	51.1
Seed in dry pod (%)	63.4	62.2	70.7	69.2	61.5	60	63.4	65.2
Yield (kg/rai)	279	247	260	273	266	378	270	304
Oil (%)	50.3	48.9	47.9	43.3	44.3	41.9	46.4	51.1
Protein (%)	22.3	27.1	28.1	28.2	27.4	24.8	28.7	25.3

Source: Khon Kean Field Crops Research Center, Institute of Agronomy Research
Department of Agriculture, Ministry of Agriculture and Cooperatives.

Table 13: Average Cost of Peanut Production in Thailand (1976 – 2000).

Year	Variable Cost (baht/rai)	Fixed Cost (baht/rai)	Total Cost (baht/rai)	Cost per Ton of Dry Pod Peanut (baht/ton)	Cost per Kg of Dry Pod Peanut (baht/kg)
1976/77	987.57	75.79	1,063.36	3,765.97	3.76
1977/78	744.57	63.80	808.37	4,451.10	4.45
1978/79	848.19	71.45	919.64	4,764.45	4.76
1979/80	980.16	100.47	1,080.65	6,037.20	6.04
1980/81	1,149.12	90.62	1,239.74	6,325.20	6.32
1981/82	1,127.96	63.80	1,191.76	6,207.10	6.21
1982/83	1,074.54	117.07	1,191.61	6,238.80	6.24
1983/84	1,059.10	117.30	1,171.64	6,290.90	6.29
1984/85	1,075.89	121.05	1,191.94	5,699.71	5.70
1985/86	1,063.15	119.06	1,182.21	5,373.68	5.37
1986/87	992.58	116.86	1,129.44	5,184.30	5.18
1987/88	925.96	120.20	1,046.16	4,934.72	4.93
1988/89	989.74	120.72	1,110.46	5,238.02	5.23
1989/90	1,067.69	124.22	1,191.19	5,622.22	5.62
1990/91	1,193.64	125.21	1,318.84	6,220.99	6.22
1991/92	1,338.07	132.85	1,470.92	6,778.43	6.78
1992/93	1,354.84	126.21	1,481.05	7,052.62	7.05
1993/94	1,385.68	125.53	1,511.21	6,686.77	6.69
1994/95	1,488.22	128.81	1,617.03	7,000.13	7.00
1995/96	1,630.98	128.81	1,759.79	7,488.47	7.49
1996/97	1,784.38	141.45	1,925.83	8,130.00	8.13
1997/98*	1,815.14	141.48	1,956.62	8,330.00	8.33
1998/99*	2,199.60	155.38	2,354.98	9,731.32	9.73
1999/00*	2,284.00	155.38	2,440.38	10,001.56	10.00
2000/01*	2,342.69	155.38	2,498.07	10,154.76	10.15

Note : *estimated values.

6.25 rais are equal to 1 hectare.

2.5 rais are equal to 1 acre.

Source: Office of Agricultural Economics, Ministry of Agriculture and Cooperatives (MOAC).

Table 14: Cost Structure of Peanut Production in Thailand (1980-1999).

Cost Item	1980/81 (1980)	1983/84 (1983)	1987/88 (1987)	1990/91 (1990)	1993/94 (1993)	1996/97 (1996)	1999/2000 (1999)
1. Variable cost	1,149.12	1,059.10	925.96	1,193.64	1,385.68	1,784.37	2,284.63
1.1 Labour cost	806.82	753.88	659.98	866.75	1,005.23	1,287.10	1,710.75
Land preparation	185.87	188.68	159.80	194.32	210.22	257.61	300.80
Seed preparation	133.27	138.84	113.39	150.00	176.30	242.58	280.24
Caring	160.92	138.29	97.62	143.58	172.40	224.78	301.07
Harvesting	326.76	288.17	289.89	378.85	446.31	562.13	828.64
1.2 Material cost	286.77	249.21	227.79	326.84	327.07	448.15	502.45
Seeds	220.03	201.13	188.37	227.35	271.14	372.76	363.03
Fertilizer	18.79	15.01	13.31	19.35	23.15	26.13	87.20
Insecticides and herbicides	31.36	9.79	16.45	16.75	20.85	24.49	23.95
Tools and other material	16.59	23.28	9.66	9.77	9.91	22.69	26.16
Maintainance cost of tools and machinery	0.81	1.75	1.53	1.93	2.02	2.08	2.11
1.3 Opputunity cost of capital	54.72	54.26	36.66	51.69	53.38	49.12	71.43
2. Fixed cost	90.62	117.30	120.20	125.21	125.53	141.45	155.38
Land rent	74.45	115.11	118.30	122.91	123.26	139.01	152.91
Depreciation of tools and machinery	1.95	2.19	1.90	2.30	2.27	2.44	2.47
4. Total cost (baht/rai)	1,239.74	1,176.40	1,046.16	1,318.85	1,511.21	1,925.82	2,440.01
5 Average cost (baht/kg)	6.32	6.30	4.93	6.22	6.69	8.13	10.00
6. Yield (kg/rai)	196	187	212	212	226	237	244

Source : Office of Agricultural Economics, Ministry of Agriculture and Cooperatives (MOAC).

Table 15: Net Exports of Peanuts With Shells (1970-2000).

Quantity: tons Value: 1,000 dollars

Year	Exports of peanuts withsShells		Imports of peanuts with shells		Net exports	
	QXWSP	VQXWS	QMWSP	VQWSP	Quantity	Vlaue
1970	-	-	-	-	-	-
1971	-	-	-	-	-	-
1972	-	-	-	-	-	-
1973	-	-	-	-	-	-
1974	-	-	-	-	-	-
1975	-	-	-	-	-	-
1976	-	-	-	-	-	-
1977	684.44	7,218.80	-	-	684.44	7,218.80
1978	1,002.94	9,471.70	-	-	1,002.94	9,471.70
1979	783.47	9,679.51	-	-	783.47	9,679.51
1980	150.63	2,987.70	-	-	150.63	2,987.70
1981	720.61	13,056.03	-	-	720.61	13,056.03
1982	-	-	-	-	-	-
1983	37.17	623.33	-	-	37.17	623.33
1984	18.43	188.70	0.85	3.51	17.58	185.19
1985	15.39	152.94	0.07	0.30	15.31	152.64
1986	16.07	163.24	-	-	16.07	163.24
1987	47.18	412.51	-	-	47.18	412.51
1988	28.00	366.09	0.02	2.51	27.98	363.58
1989	17.37	228.44	0.28	0.83	17.10	227.61
1990	16.10	178.67	0.04	0.59	16.06	178.08
1991	30.65	398.28	1.30	7.37	29.35	390.91
1992	49.55	468.61	0.06	1.44	49.49	467.17
1993	37.23	392.67	-	-	37.23	392.67
1994	131.33	984.68	-	-	131.33	984.68
1995	142.56	1,112.03	0.91	5.92	141.65	1,106.11
1996	88.39	641.82	15.11	105.79	73.27	536.03
1997	45.76	365.86	41.53	303.88	4.23	61.97
1998	24.20	215.93	29.26	390.08	-5.06	-174.14
1999	59.49	486.11	42.39	688.27	17.11	-202.16
2000	29.90	276.52	62.23	896.46	-32.32	-619.94

Note: Exchange rate (U.S. dollars) averaged from buying and selling.

Source: Department of Custom, Ministry of Finance.

Table 16: Net Exports of Peanuts Without Shells (1970-2000).

Quantity: tons Value: 1,000 dollars

Year	Exports of peanuts without shells		Imports of peanuts without shells		Net Exports	
	QXWOS	VQXWOS	QMWOS	VQMWOS	QXWOS	VQXWOS
1970	-	-	-	-	-	-
1971	-	-	-	-	-	-
1972	-	-	-	-	-	-
1973	-	-	-	-	-	-
1974	-	-	-	-	-	-
1975	-	-	-	-	-	-
1976	-	-	-	-	-	-
1977	-	-	-	-	-	-
1978	0.00	0.00	0.74	3.33	-0.74	-3.33
1979	0.00	0.00	0.97	4.84	-0.97	-4.84
1980	-	-	-	-	-	-
1981	0.00	0.00	0.05	0.23	-0.05	-0.23
1982	0.00	0.06	0.00	0.06	0.00	0.00
1983	-	-	-	-	-	-
1984	161.50	2087.98	0.00	0.00	161.50	2087.98
1985	38.60	676.04	0.00	0.00	38.60	676.04
1986	81.29	1214.24	0.00	0.00	81.29	1214.24
1987	41.69	580.57	0.00	0.00	41.69	580.57
1988	13.91	264.30	0.00	0.00	13.91	264.30
1989	18.07	370.56	0.00	0.10	18.06	370.46
1990	9.57	210.49	0.25	1.78	9.31	208.71
1991	38.54	638.48	0.82	3.98	37.71	634.50
1992	10.75	148.97	0.16	1.67	10.58	147.30
1993	10.22	132.29	7.63	43.04	2.59	89.25
1994	5.30	116.34	13.76	101.90	-8.46	14.44
1995	1.20	17.44	141.09	1152.71	-139.89	-1135.27
1996	1.12	20.93	218.77	1668.75	-217.65	-1647.82
1997	0.43	15.32	96.06	854.15	-95.62	-838.84
1998	0.24	12.71	39.91	516.78	-39.67	-504.06
1999	10.87	359.13	29.12	361.62	-18.25	-2.49
2000	0.51	12.83	515.73	8539.87	-515.23	-8527.05

Note : Exchange rate (U.S. dollars) averaged from buying and selling.

Source: Departmeny of Costom, Ministry of Finance.

Table 17: Net Exports of Peanut Oil (1970-2000).

Quantity: tons Value: 1,000 dollars

Year	Exports of Peanut oil		Imports of Peanut oil		Net Exports	
	QX	VQX	QM	VQM	Quantity	Vlaue
1970	0.00	0.00	0.38	3.05	-0.38	-3.05
1971	0.00	0.00	0.00	0.00	0.00	0.00
1972	0.00	0.00	0.02	0.37	-0.02	-0.37
1973	0.00	0.00	0.04	0.71	-0.04	-0.71
1974	0.00	0.00	0.27	5.33	-0.27	-5.33
1975	0.00	0.00	0.20	5.61	-0.20	-5.61
1976	0.00	0.00	0.14	3.56	-0.14	-3.56
1977	31.81	558.20	1.75	32.24	30.06	525.96
1978	7.37	120.22	0.26	8.85	7.11	111.38
1979	2.79	47.59	10.97	192.31	-8.18	-144.73
1980	28.12	529.70	0.30	12.02	27.81	517.68
1981	26.94	515.78	0.00	0.00	26.94	515.78
1982	9.75	137.50	9.75	137.50	0.00	0.00
1983	0.00	0.00	7.33	127.71	-7.33	-127.71
1984	0.00	0.00	0.00	0.16	0.00	-0.16
1985	1.58	35.81	0.00	0.00	1.58	35.81
1986	3.11	85.53	1.21	41.59	1.90	43.94
1987	20.34	562.95	0.00	0.00	20.34	562.95
1988	9.91	249.42	0.01	0.32	9.90	249.10
1989	0.01	0.27	0.61	28.16	-0.61	-27.89
1990	0.00	0.00	0.12	5.60	-0.12	-5.60
1991	0.01	0.56	0.06	2.58	-0.04	-2.02
1992	0.02	682.57	2.63	75.11	-2.61	607.47
1993	0.21	3.91	8.62	364.87	-8.42	-360.96
1994	0.31	7.90	18.16	540.72	-17.85	-532.81
1995	1.82	52.34	37.66	1276.91	-35.84	-1224.57
1996	0.21	10.23	52.30	1529.01	-52.09	-1518.78
1997	0.05	5.84	29.99	1037.02	-29.94	-1031.18
1998	0.00	3.30	10.19	607.97	-10.19	-604.67
1999	6.47	152.46	17.40	779.34	-10.93	-626.87
2000	1.59	31.57	22.81	935.18	-21.22	-903.61

Note: Exchange rate (U.S. dollars) averaged from buying and selling.

Source: Department of Custom, Ministry of Finance.

Table 18: Net Exports of Peanut Residue (1970-2000).

Quantity: tons Value: 1,000 dollars

year	Exports of peanut residue		Imports of peanut residue		Net Exports	
	QX	VQX	QM	VQM	Quantity	Vlaue
1970	-	-	-	-	-	-
1971	0.00	0.00	46.33	91.31	-46.33	-91.31
1972	0.00	0.00	211.54	486.33	-211.54	-486.33
1973	0.00	0.00	56.17	349.82	-56.17	-349.82
1974	0.00	0.00	93.62	397.67	-93.62	-397.67
1975	0.00	0.00	474.43	1,454.86	-474.43	-1,454.86
1976	0.00	0.00	1,434.05	4,895.08	-1,434.05	-4,895.08
1977	113.57	573.50	1,493.43	7,284.11	-1,379.86	-6,710.62
1978	130.03	606.42	413.71	1,608.85	-283.69	-1,002.43
1979	134.52	664.03	625.23	2,894.24	-490.71	-2,230.21
1980	5.38	36.78	272.09	1,329.09	-266.71	-1,292.30
1981	0.00	0.00	208.66	1,109.79	-208.66	-1,109.79
1982	80.83	455.85	80.83	455.85	0.00	0.00
1983	0.00	0.00	108.75	464.42	-108.75	-464.42
1984	0.00	0.00	103.40	579.56	-103.40	-579.56
1985	0.00	0.00	2.73	10.32	-2.73	-10.32
1986	0.00	0.00	1,267.93	5,443.54	-1,267.93	-5,443.54
1987	0.00	0.00	2,751.17	11,975.54	-2,751.17	-11,975.54
1988	0.00	0.00	3,602.10	18,364.09	-3,602.10	-18,364.09
1989	0.00	0.00	5,403.71	25,260.97	-5,403.71	-25,260.97
1990	0.00	0.00	5,750.52	29,219.22	-5,750.52	-29,219.22
1991	0.00	0.00	7,417.01	37,681.50	-7,417.01	-37,681.50
1992	0.00	0.00	2,926.23	15,913.95	-2,926.23	-15,913.95
1993	0.00	0.00	4,447.48	21,536.48	-4,447.48	-21,536.48
1994	0.00	0.00	4,487.77	23,405.88	-4,487.77	-23,405.88
1995	0.00	0.00	6,304.59	30,551.30	-6,304.59	-30,551.30
1996	0.00	0.00	4,902.81	30,679.65	-4,902.81	-30,679.65
1997	0.00	0.00	4,317.46	32,076.03	-4,317.46	-32,076.03
1998	0.00	0.00	2,412.98	22,342.17	-2,412.98	-22,342.17
1999	6.11	21.67	1,164.74	5,825.43	-1,158.63	-5,803.76
2000	0.00	0.00	287.67	1,980.82	-287.67	-1,980.82

Note: Exchange rate (U.S. dollars) averaged from buying and selling.

Source: Departmeny of Costom, Ministry of Finance.

Table 19: Net Exports of Modified Peanut Products (1970-2000).

Quantity: tons Value: 1,000 dollars

year	Modified peanuts		Modified peanuts		Net Exports	
	QX	VQX	QM	VQM	Quantity	Vlaue
1970	-	-	-	-	-	-
1971	-	-	-	-	-	-
1972	-	-	-	-	-	-
1973	-	-	-	-	-	-
1974	-	-	-	-	-	-
1975	-	-	-	-	-	-
1976	-	-	-	-	-	-
1977	-	-	-	-	-	-
1978	-	-	-	-	-	-
1979	-	-	-	-	-	-
1980	-	-	-	-	-	-
1981	-	-	-	-	-	-
1982	-	-	-	-	-	-
1983	-	-	-	-	-	-
1984	-	-	-	-	-	-
1985	-	-	-	-	-	-
1986	-	-	-	-	-	-
1987	-	-	-	-	-	-
1988	22.74	837.69	0.14	90.27	22.60	747.42
1989	41.98	2,041.64	1.86	119.70	40.11	1,921.94
1990	45.20	2,359.67	2.41	153.23	42.80	2,206.44
1991	41.96	2,204.13	2.59	188.67	39.36	2,015.46
1992	36.32	1,955.77	2.85	210.08	33.47	1,745.69
1993	31.73	1,655.44	4.25	306.63	27.48	1,348.81
1994	30.59	1,706.68	3.17	228.29	27.43	1,478.39
1995	42.99	1,890.17	3.34	233.09	39.65	1,657.08
1996	30.85	1,946.92	5.09	377.30	25.77	1,569.62
1997	32.91	2,296.77	4.19	369.12	28.73	1,927.65
1998	15.73	1,441.87	3.15	326.95	12.58	1,114.92
1999	21.34	1,771.50	3.48	369.95	17.87	1,401.55
2000	25.90	2,366.12	3.58	382.46	22.32	1,983.67

Note: Exchange rate (U.S. dollars) averaged from buying and selling.

Source: Departmeny of Costom, Ministry of Finance.

Table 20: Net Exports of Roasted Peanut Seeds (1970-2000).

Quantity: tons Value: 1,000 dollars

Year	Roasted peanuts		Roasted peanuts		Net Exports	
	QX	VQX	QM	VQM	Quantity	Vlaue
1970	-	-	-	-	-	-
1971	-	-	-	-	-	-
1972	-	-	-	-	-	-
1973	-	-	-	-	-	-
1974	-	-	-	-	-	-
1975	-	-	-	-	-	-
1976	-	-	-	-	-	-
1977	9.36	145.90	0.00	0.00	9.36	145.90
1978	18.71	290.64	0.24	26.37	18.48	264.27
1979	12.65	188.77	0.47	60.73	12.18	128.04
1980	5.94	101.22	0.10	8.36	5.84	92.86
1981	17.51	348.26	0.17	15.03	17.35	333.23
1982	0.25	24.06	0.25	24.06	0.00	0.00
1983	3.97	84.92	0.25	36.20	3.72	48.71
1984	11.05	248.07	0.26	36.75	10.79	211.32
1985	7.94	246.26	0.21	26.86	7.72	219.40
1986	17.10	640.56	0.22	33.13	16.88	607.43
1987	-	-	-	-	-	-
1988	-	-	-	-	-	-
1989	-	-	-	-	-	-
1990	-	-	-	-	-	-
1991	-	-	-	-	-	-
1992	-	-	-	-	-	-
1993	-	-	-	-	-	-
1994	-	-	-	-	-	-
1995	-	-	-	-	-	-
1996	-	-	-	-	-	-
1997	-	-	-	-	-	-
1998	-	-	-	-	-	-
1999	-	-	-	-	-	-
2000	-	-	-	-	-	-

Note: Exchange rate (U.S. dollars) averaged from buying and selling.

Source: Departmeny of Costom, Ministry of Finance.

Table 21: Per Capita Consumption of Peanut Seeds and Oil (1980-2000).

Year	Domestic Use of Peanuts (kg)	Domestic Use of Peanut Oil (kg)	Population (head)	Per Capita Consumption (kg/head)	
				Peanut seeds	Oil
1980	60,387,600	6,331,000	46,961,338	1.29	0.13
1981	71,011,800	5,340,000	47,875,002	1.48	0.11
1982	79,299,000	6,450,000	48,846,927	1.62	0.13
1983	80,419,800	5,793,000	49,515,074	1.62	0.12
1984	87,529,200	5,594,000	50,583,105	1.73	0.11
1985	100,962,600	6,111,000	51,795,651	1.95	0.12
1986	102,056,400	5,009,000	52,969,204	1.93	0.09
1987	98,317,800	4,498,000	53,873,172	1.82	0.08
1988	95,841,600	4,833,000	54,960,917	1.74	0.09
1989	97,423,200	5,035,000	55,888,393	1.74	0.09
1990	96,252,000	5,011,000	56,303,273	1.71	0.09
1991	95,202,000	4,878,000	56,961,030	1.67	0.09
1992	93,463,200	4,321,000	57,788,965	1.62	0.07
1993	81,012,000	4,451,000	58,336,072	1.39	0.08
1994	81,399,000	5,120,000	59,095,419	1.38	0.09
1995	90,279,000	5,453,000	59,460,382	1.52	0.09
1996	91,428,600	5,878,000	60,116,182	1.52	0.1
1997	91,332,600	4,870,000	60,816,227	1.5	0.08
1998	77,967,000	4,626,000	61,466,178	1.27	0.08
1999	81,888,600	4,688,000	61,661,701	1.33	0.08
2000	92,377,200	5,056,000	61,878,746	1.49	0.08

Source: 1. Data on peanut seed consumption and peanut oil consumption are from Table 10.

2. Population data gathered from Department of Local Administration, Ministry of Interior, Thailand.