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Commercial feasibility of
developing apiculture in

APPLIED SCIENTIFIC RESEARCH CORPORATION OF THAILAND

APPRAISAL REPORT NO. 25

COMMERCIAL FEASIBILITY OF DEVELOPING APICULTURE IN THAILAND

BY

NORMAN L. WAKE

NIPON KAMOLRATANAGUL

ECONOMIC EVALUATION GROUP

ASRCT, BANGKOK 1972

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By Norman L. Wake* and Nipon Kamolratanagul†

SUMMARY OF FINDINGS

1. Imports of beeswax into Thailand have averaged 17-30 tonnes annually valued at some 600,000-800,000 baht in recent years. This supplements a highly variable local production. The wax is used largely in candle manufacture. Import of honey is only about 5 tonnes annually.

2. Any serious attempt to expand local beeswax production would need to be based on the Italian bee, rather than the indigenous bees, and a market would have to be found for from 300 to 600 tonnes annually of honey which would arise along with the production of 20 tonnes of beeswax. Such an industry would gross between 2 million and 4 million baht per year.

3. Evidence is presented that this may be a not-too-formidable task and that the venture could be commercially viable. A pilot apiary would permit a firmer commercial assessment and indicate whether an ecologic survey of the Thai environment is worth-while.

4. Recent, as-yet-unconfirmed, reports indicate that the accidental introduction of an African species of honey bee into South America, is upsetting apiculture there and that the unwanted bee is spreading to North America. In the longer term, this could change the pattern of world trade in honey and beeswax and could be to Thailand's advantage.

INTRODUCTION

Beeswax and honey are both imported into Thailand; both are produced here and there has been, over the years, a small and discontinuous export of them.

The fact that, as Table 1 shows, import of beeswax into Thailand has averaged 600,000 baht annually since 1966, coupled with the fact that there is, at least, some local production, prompts the question as to whether more of the local demand could not be supplied indigenously.

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TABLE 1
THAILAND: BEESWAX IMPORTS 1960-70

Year	Quantity (kg)	Value (c.i.f.) (baht)	Av. value (c.i.f.) (baht/kg)
1960	23,633	433,320	18.62
1961	23,213	313,270	13.49
1962	23,272	428,158	17.96
1963	14,787	317,193	21.45
1964	7,025	163,869	24.05
1965	18,948	431,430	22.77
1966	14,570	421,065	28.89
1967	14,159	468,409	33.08
1968	17,030	623,905	36.64
1969	26,780	630,574	23.55
1970	29,522	803,814	27.23

Source: Department of Customs, Bangkok.

As an outcome of recent programme reviews within ASRCT, a request has been made for the Economic Evaluation Group to prepare an appraisal report on all waxes of relevance to Thailand. On the agricultural side, ASRCT scientists have expressed considerable interest in the prospects of local bee husbandry.

The present report examines the more readily available information on beeswax and honey and will form part of the overall appraisal of waxes in Thailand.

BACKGROUND

The bees of Thailand

There are three indigenous bees of importance in Thailand; the Italian bee has also been cultivated here.

The three indigenous bees are described in Appendix I; suffice it to say here that none of them appears to have any real possibilities as commercial producers of beeswax over and above that now produced.

The Little Honeybee, 'mim', (Apis florea) makes combs of only 30 to 60 grammes weight and is a forest bee apparently incapable of cultivation. The Giant Honeybee 'phung luang', (Apis dorsata) is almost solely responsible for the beeswax and honey now produced in Thailand but, like the Little Honeybee, is a forest bee and is, moreover, quite fierce and reputedly quite incapable of domestication.

The third indigenous bee, the Indian Bee, 'phung phrong', (Apis indica), has been cultivated here, in India, and elsewhere, but nevertheless, has a very low honey output (2 to 7 kg per hive compared with the Italian bee, 50-100 kg per hive). Moreover, its wax is said to be useless as a candle wax—the chief local usage.

Realistically, then, any serious attempt to find a large-scale apiary industry would appear to rest on the Italian bee, Apis mellifera.

In recent months a television news item was said to have shown 100 hives of Italian bees being kept at Si Racha, but no other details are available. A follow-up of the report is, of course, highly desirable.

Some years ago, Luang Samanwanakit, a lecturer at Kasetsart University, imported Italian bees and equipment from Australia and Taiwan and established an apiary in the University precincts largely for the purpose of demonstration, but after his retirement, the apiary lapsed, reputedly because of a combination of stock in-breeding, disease, and a scarcity of flowers.

Apart from the keeping of phung phrong at Ko Samui and near Chiang Mai, the apiaries of Italian bees at Si Racha and formerly at Kasetsart University, there appear not to be, nor to have been, any other attempts to establish an apiary industry in Thailand.

Production

The Royal Forest Department maintains annual records of beeswax production upon which royalty has been paid. The quantities, which vary greatly from year to year (doubtless due to seasonal factors), are shown in Table 2. It will be noted, however, that the exports of beeswax in 1957 and 1958 (Table 3), were greatly in excess of the recorded produc-

TABLE 2
 QUANTITIES OF BEESWAX UPON WHICH ROYALTIES WERE PAID

Year	Quantity (kg)
1943	817.36
1944	696.00
1945	1,512.60
1946	3,182.00
1947	3,873.83
1948	2,689.60
1949	13,706.00
1950	5,361.00
1951	90.00
1952	2,783.00
1953	2,816.00
1954	616.00
1955	2,195.00
1956	496.00
1957	102.00
1958	zero
1959	420.00
1960	227.00
1961	363.00
1962	424.00
1963	262.00
1964	2,651.00
1965	1,025.00
1966	181.00
1967	86.00
1968	-
1969	35.00
1970	238.00

Source: Annual reports of the Royal Forest Department, Bangkok.

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1968	-
1969	35.00
1970	238.00

Source: Annual reports of the Royal Forest Department, Bangkok.

TABLE 3
BEESWAX EXPORTS FROM THAILAND

Year	Quantity (kg)	Value (baht)
1957	14,724	88,162
1958	33,195	204,477
1959	2,535	12,922
1960	2,240	12,960
1961	*	*
1962	41	453
1963	*	*
1964	*	*
1965	*	*
1966	*	*
1967	80	700
1968	*	*
1969	*	*
1970	*	*

*Not recorded: presumably nil export.

Source: Department of Customs, Bangkok.

tion, implying that not all production is recorded. No records are kept of honey production.

The quantity of beeswax produced by the Indian Bee at Ko Samui and Chiang Mai is not recorded (nor is a royalty payable), but an observation about 8 years ago suggested that honey production on Ko Samui would not have exceeded 3 tonnes annually, and the wax production was probably well under a tonne. (Smith (1960) gives the ratio of honey to wax production as from 15:1 to 30:1 in commercial apiaries of Italian bees.)

Imports and exports

Imports of beeswax have been fairly constant in value over recent years (Table 4) and have averaged roughly 17-30 tonnes annually valued at some 600,000-800,000 baht. This relative constancy is rather remarkable considering the highly variable local production (Table 2). The low import in 1964 seems to have been due to a particularly favourable season

for beeswax in Thailand. Almost all the beeswax produced in Thailand since 1961 appears to have been used locally, according to Table 3. In 1970 beeswax imported into Thailand averaged 27 baht per kg, c.i.f. (Table 1).

Imports of honey have also been fairly constant at roughly 5 tonnes a year. Imported honey is believed to be table honey, as distinct from local honey, the chief use of which is medicinal. Honey exports are inconsiderable (Table 5).

PROSPECTS FOR EXPANDED APICULTURE IN THAILAND

The relevant considerations appear to be these:-

1. The recent relatively constant imports of beeswax (Table 1) provide at least a partial basis for the development of Thai apiculture.

2. The Italian bee, Apis mellifera, is the only bee worth considering as the basis of an expanded apiculture in Thailand. That it can form the basis of a commercially viable industry in the tropics has been clearly demonstrated, at least, in Mexico and in Singapore. Smith (1960) states that the Mexican venture rose to an output of about 2,000 tonnes of honey annually and was operated by two partners. In Singapore, Kiat (1954) developed an apiary producing about 5 tonnes of honey annually, all of which was marketed locally. While small, the Singapore enterprise indicates what can be done in a limited area, having some ecological similarities to Thailand.

3. If the industry were to produce 20-30 tonnes of beeswax annually (to replace imports), the corresponding quantity of honey to be disposed of, would be between 400 and 900 tonnes per year. From data published by Smith (1960), it seems that about 90% of the revenue in apiculture is derived from honey: considerable effort must therefore go into selling the honey if the venture is to succeed unless overseas markets can be found.

4. World trade in honey is some 70,000 tonnes annually, so that an additional 600 tonnes per year would be rather insignificant. Europe accounts for some 95% of world honey imports. European tastes demand a rather bland, delicately flavoured, honey. The type of honey which

TABLE 4
IMPORTS OF BEESWAX INTO THAILAND, 1967-70

Country	1967		1968		1969		1970	
	(kg)	(baht)	(kg)	(baht)	(kg)	(baht)	(kg)	(baht)
Israel	-	-	-	-	-	-	1,746	27,936
N. Borneo	443	19,431	-	-	-	-	-	-
India	3,299	56,083	118	2,006	4,284	68,544	-	-
Malaysia	398	17,162	-	-	1,016	17,273	-	-
Indonesia	840	14,280	5,154	87,614	13,109	211,674	18,074	332,082
Japan	300	11,232	-	-	1,957	47,142	810	49,150
W. Germany	2,400	95,575	3,700	177,913	3,250	168,713	4,300	191,656
U.K.	3,609	138,939	500	18,200	20	1,048	1,600	75,067
U.S.A.	1,706	73,745	3,285	195,992	312	24,629	1,334	72,066
Australia	147	7,548	206	11,200	102	6,057	-	-
New Zealand	1,017	34,414	-	-	-	-	508	18,870
Singapore	-	-	1,460	24,820	1,230	20,910	-	-
Spain	-	-	1,590	68,470	-	-	-	-
Switzerland	-	-	1,017	37,690	-	-	-	-
Morocco	-	-	-	-	1,500	64,584	500	23,987
Cambodia	-	-	-	-	-	-	650	13,000
Total	14,159	468,409	17,030	623,905	26,780	630,574	29,522	803,814

Sources: Department of Customs, Bangkok.

TABLE 5
THAILAND: IMPORTS & EXPORTS OF HONEY, NATURAL, CENTRIFUGED OR IN THE COMB 1960-70

Year	Imports		Exports	
	Quantity (kg)	Value (c.i.f.) (baht)	Quantity (kg)	Value (f.o.b.) (baht)
1960	2,653	49,861	*	*
1961	3,019	64,486	*	*
1962	3,225	67,324	*	*
1963	2,565	49,372	20	127
1964	2,994	68,828	246	2,777
1965	3,782	103,622	65	791
1966	2,800	61,177	*	*
1967	5,091	85,573	-	-
1968	4,788	100,910	-	-
1969	3,911	77,832	-	-
1970	4,516	91,837	360	3,625

*No data: presumably nil exports.

Source: Department of Customs, Bangkok.

Thailand could produce is, of course unknown, but even medium grade honey sells at 4 baht per kg which would gross 2.4 million baht annually for 600 tonnes.

5. Recent, as-yet-unconfirmed, reports (Morton, personal communication 1972) indicate that the accidental introduction of an African species of honey bee into South America, is upsetting apiculture there and that the unwanted bee is spreading to North America. In the longer term, this could change the pattern of world trade in honey and beeswax and could be to Thailand's advantage.

6. While Thai honey may bring a better price on the export market, there is no reason why, if necessary, the small local market could not be expanded. There is the case of Argentina, where local consumption of honey rose to 15,000 tonnes in 1965, tripling that of the previous year, as the result of a promotional campaign.

7. The major unknown factors as regards apiculture in Thailand are the probable costs of establishing an apiary (or apiaries) and the suitability of the Thai environment for the Italian bee especially in regard to predators and pesticides. Appendix II, based largely on "imported" data, and making some probably pessimistic assumptions, shows that a small profit could be made. The Si Racha operation, and/or establishment of a pilot apiary near Bangkok, could give much firmer information. Expansion to the 4000 or so hives required to supply 20 tonnes of beeswax per year would, of course, need an expert ecological appraisal. Beeswax and honey from such an industry would gross between 2 million and 4 million baht annually.

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APPENDIX I
THE BEES OF THAILAND*

The three indigenous bees of Thailand also occur in other countries of tropical Asia. They are:-

Phung luang (Apis dorsata) or the Giant Honeybee: this is the most productive bee of tropical Asia, but because of its fierce nature and preference for nesting high aloft, does not lend itself to bee-keeping. It is a large, far-ranging bee, building nests up to a metre or more across in tall trees and sometimes on telegraph poles or high buildings. It may build up to 50 nests in one tree, some nests providing 40 kg of honey. Favorite trees are yang, takhian, pradu and the taller mangroves. It is certainly the major producer of honey and possibly the sole producer of commercial wax in Thailand.

In international parlance the wax of phung luang is not truly a "beeswax" but is called "Ghedda wax" and has a lower acid value and a higher ester value. Smith (1960), quoting Warth (1947), gives the following comparison:-

	<u>Beeswax</u>	<u>Ghedda wax</u>
Specific gravity, 15.5°/15.5°C	0.955-0.970	0.956-0.973
Melting point, °C	62.0-65.0	60.4-66.4
Setting point, °C	61.0-62.5	56.0-62.0
Acid value	17.0-21.0	3.5-10.5
Saponification value	85.0-100	75.6-130.0
Ester value	70.0-80.0	69.0-123.0
Iodine value	5.0-13.0	4.5-12.6

Phung phrong (Apis indica) or the Indian Bee: this bee resembles the Italian bee in some of its habits but is smaller, and colonies are more apt to take flight than those of the Italian Bee. Unlike phung luang and phung mim, which build exposed nests, phung phrong builds nests in cavities such as hollow tree trunks, or the ceilings of houses. It is the only indigenous bee capable of cultivation and is (or was)

* Much of the information is from Samanwanakit (1955).

raised on Ko Samui and near Chiang Mai. It is said to be extensively cultivated in India, yielding from 4 to 16 pounds of honey per hive annually. In Thailand, boxes are provided for it and it builds a succession of combs dependent from the lid of the box. Its honey is sweet and aromatic, but its wax, according to the major producer of votive candles in Thailand, is unsuitable for his use. On Ko Samui it forages coconut flowers and areca nut (it may perhaps be raised mutualistically), but it also forages orange, pomelo, cotton, melon and other flowers.

Phung mim (Apis florea) or the Little Honeybee, also referred to simply as 'mim', is a small bee, the size of a house-fly. It builds exposed combs on bamboos and bushes, especially around Phetchaburi and Nakhon Pathom where it forages fan palms, especially. Its combs are hawked by itinerant vendors at the Week-end Market in Bangkok. It breeds rapidly and its honey is very sweet but otherwise somewhat insipid.

Thai authorities recognize that the value of bees as fertilizing agents is far greater than the value of wax and honey derived from them and attempts are made to preserve habitats favourable to bees. The Royal Forest Department exacts a 10% royalty on sales of forest-derived honey, i.e. mainly honey derived from phung luang.

APPENDIX II

FINANCIAL ASPECTS OF BEEKEEPING IN THE TROPICS

Smith (1960) provides a number of examples of the financial aspects of running apiaries in Tanganyika. The following example, based on Smith's data, has been adapted to conditions in Thailand, so far as this is possible.

It considers a 500-hive bee farm with one apiarist having the help of two unskilled assistants.

<u>Capital</u>	(baht)
Hives, 500 @ 750	375,000.-
Beehouses, 10 @ 15,000	150,000.-
Hive stands	22,500.-
Honey house and store	30,000.-
Extractor, power driven	3,600.-
Honey tanks, 6	2,700.-
Sundries	1,400.-
Lorry, 3-tonne	54,000.-
Sugar, 4,500 kg @ 3.50	15,750.-
Total capital	654,950.-
Say	655,000.-

<u>Receipts</u> (assuming 60 kg honey per hive per year)	(baht)
Honey, 30,000 kg @ 4 baht/kg	120,000.-
Beeswax, 1,000 kg @ 20 baht/kg	20,000.-
Total receipts	140,000.-

<u>Expenses</u>	(baht)
Cost of running lorry	18,000.-
Honey tins, 25-kg, 1,040 @ 10 baht	10,400.-
Cartons, 1,040 @ 5 baht	5,200.-
Transport of honey	12,000.-
Depreciation, 600,000 @ 5%	30,000.-
Depreciation on lorry, 54,000 @ 10%	5,400.-
Wages, 2 helpers each @ 300 baht per month	7,200.-
Miscellaneous expenses	<u>11,000.-</u>
Total expenses	<u><u>99,200.-</u></u>

Surplus 40,800 baht = 6% on capital.

Whilst a 6% return on capital may seem inadequate, particularly by Thai standards, it must be recalled that a number of implicit assumptions have been made which could well be too unfavourable in the Thai context.

First the cost of a hive in the example is the price of a single unit in England - the cost in Thailand for a 500-hive order may be much cheaper. Nor is it certain that beehouses are essential in Thailand—they are not used in many countries. The full-time use of a new lorry may also be avoidable.

Admittedly, no charge has been made for stocking the hives, it being assumed that the government would, initially at least, provide nucleus colonies either free or on low-cost terms from a central research station.

A local pilot project, of course, could settle much of the uncertainty which necessarily exists when "imported" data has to be used, as it has in this case, in assessing feasibility.