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Feasibility of saffron  
cultivation by the hill tribes

SEARCH CORPORATION OF THAILAND

APPRAISAL REPORT NO. 10  
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BY THE HILL TRIBES OF THAILAND

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By Norman L. Wake\* and Satchee Piyapongse\*

SUMMARY OF FINDINGS

1. Saffron appears to be a crop which merits close examination as a substitute for opium poppies.
2. Returns per rai for saffron approximate those for raw opium. Moreover, London market prices for saffron have been rising fairly rapidly over recent years due to rising costs in Spain, the major producing country. The comparison in favour of saffron may therefore be further enhanced.
3. World trade in saffron in 1966 involved about 150 tonnes. London price in December, 1967, was 800 shillings sterling per pound (equivalent to 5,104 baht per kilogramme) but this price probably refers to above-average-quality material. Spanish exports alone, in 1966, were valued at 100 million baht.
4. In 1966, Thailand imported 1,166 kilogrammes of saffron, almost wholly from India, at an average value of only 12 baht per kilogramme. Local production would therefore need to be aimed at the higher-quality export market, local demand apparently being for low-grade material.
5. Apart from an attractive export market, saffron also has some other favourable features - it grows at altitudes similar to the opium poppy; the two crops have similar planting calendars - a highly important factor for the Maeo economy. Furthermore, saffron plucking would not interfere with rice harvesting as poppy tapping has done.
6. At this stage, an expert horticultural appraisal seems to be warranted as well as a check on future price movements in the world market. Will the world price of saffron continue to rise?

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## INTRODUCTION

A great deal of attention has been given in recent years to the elimination of opium poppy cultivation in Thailand, but because of the place of opium production in the economies of the Hill Tribes, particularly the Maeo, the problem has been difficult. Prime desiderata for an alternative crop are that the product must be light in weight and high in value.

A crop which previous investigators appear to have overlooked is saffron. Saffron grows at elevations similar to the opium poppy and has a similar planting time - an important feature for the Hill Tribe economy. Saffron, moreover, is fairly highly priced - in December, 1967, Spanish saffron was quoted at sterling £ 40 per pound, equivalent to just over 5,104 baht per kilogramme (before devaluation).

In view of this, the Board of ASRCT decided that a study be made of the feasibility of saffron cultivation by the Hill Tribes.

The results of the study are set out below.

## BACKGROUND INFORMATION

### Dearth of data

Saffron is a minor crop in whatever country it is grown and thus rarely merits mention in standard text-books, periodicals, or crop reports. Moreover, exports are erratic and not all countries which participate in world trade classify the item separately.

However, as the result of numerous enquiries abroad, a fairly comprehensive picture has now been built up of world production and distribution.

### Characteristics of saffron

Saffron of commerce is the dried stigmas of the autumn crocus (Crocus sativus), sometimes including also the styles or tops of the styles. It appears either as "hay saffron" which is the unpressed stigmas of the flower or as "cake saffron" when the parts have been compressed.

As the labour involved in saffron cultivation is high and the yield small, the material is subject to much adulteration notably with "bastard saffron" (bastard safflower-Carthamus tinctorius), with other parts of the corolla of the crocus flower, with dyed vegetable matter of other origins and with a large range of substances including oil, water, corn-silk, and glycerine.

It is no longer official in the British Pharmacopoeia (1963) or United States Pharmacopoeia (1965) but Chopra et al. (1958) cites earlier British Pharmacopoeia Codex (1949) standards of quality as well as a table of the average composition of commercial saffron.

Saffron has been cultivated and used since early times. In ancient Greece, it was strewn as a sweet smelling herb and its water extract was the royal colour for robes. It has also long been used as a food flavour and colourant and is still so used, notably by Iranians and Spaniards who add it to rice. Its use as a cloth dye has been superseded by cheaper synthetic dyestuffs. Nevertheless, one part of saffron will colour 100,000 parts of water. Its use in Western medicine is apparently almost obsolete-Merck (1960) notes that in medicine, it was used formerly in exanthematous diseases, to promote eruption." It is still used in Asian medicine. Chopra et al. (1958) says of it, "as a stimulant and an aphrodisiac, it is considered to be a sovereign remedy, not to be excelled in virtue by the whole range of drugs in the materia medica." In Thailand, Sa-ngian Phongboonrod (1963) notes its use in melancholia, catarrhal effects in children, and as a circulatory stimulant.

Saffron is produced in Spain, France, Italy, Germany, Austria, the United Arab Republic, the Soviet Union, Algeria, and India. Spain produces the best saffron and dominates world trade but Madan et al. (1965) note that saffron from Algeria and the United Arab Republic "is in no way inferior to that of Spain." French and Italian Saffrons do not compete with that from Spain and, in India, Spanish saffron is quoted at prices higher than that from Kashmir.

#### Cultivation practices

Saffron requires a rich, well-drained, loamy or sandy soil. In Kashmir it grows around 1,600 metres. Cultivation methods differ — in Kashmir, it lasts from 10 to 15 years; in France it is uprooted and

re-planted every three years; in Italy it is grown as an annual crop. Propagation is by bulbs, which, in Kashmir, are transplanted in August-September (i.e. the planting time of opium poppy).

In Spain, animal manure is used during soil preparation and Madan et al. (1965) have shown that artificial fertilizers also help to boost yield.

#### Production of commercial saffron

The saffron plant is in bloom for only about 15 days — in Kashmir, from late October to early November. Flowers must be picked each morning and separation of stigmas must be completed each day. This requires handling of individual flowers, and as it requires over 4,000 flowers to yield one ounce of saffron, the labour entailed is considerable.

The market value of saffron depends heavily on the method by which the stigmas are dried. In Spain drying is done artificially and care taken to protect the product from dampness and light, but in Kashmir the flowers are sun-dried and lower grades separated by a sink-float procedure.

The maximum yield of dried saffron per acre in Kashmir is reported as 1.08 kg per rai. In Spain, France and other countries, yields of saffron of 1.45-2 kg per rai are normal; proper irrigation and use of suitable fertilizers account for the higher yield, according to Madan et al. (1965).

#### World Trade in saffron

##### Exporters

As mentioned earlier, exports of saffron are erratic and the picture of world trade is incomplete. Spain, however, is the main world supplier and supplies saffron to some countries which themselves export; the following table gives available data for 1966:-

<u>Country</u>	<u>Export</u> <u>kg</u>	<u>Import</u> <u>kg</u>
Spain	132,741.3	-
France	1,005.9	5,010.4
Italy	300.4	2,305.0
India	3,146.8	8.1

From the above table, it can be deduced that the amount of saffron entering world trade in 1966 was of the order of 150 tonnes. (This, of course, excludes countries whose statistics do not list the item separately; it is assumed, however, that such contribution is small.)

### Importers

Table 1 shows the major world importers of saffron in 1966 and their suppliers, so far as available statistics are explicit. (Data in Table 1 have been a transcript from abroad; a check is being made, as some unit values appear anomalous.)

In brief, countries which imported over one tonne of saffron were as follows:-

	Quantity <u>(kg)</u>	Value <u>(1,000's of baht)</u>
France	5,025.4	20,737.4
Fed. Rep. of Germany	3,918.6	15,330.9
Netherlands	6,908.6	409.7
Sweden	2,038.1	9,469.6
Switzerland	4,263.1	21,614.4
Aden	2,666.7	219.3
Hong Kong	2,148.6	6,133.5
Malaysia-Singapore	4,900.0	605.8
Pakistan	2,417.2	219.3
Saudi Arabia	3,497.2	502.0
Kenya-Uganda	16,505.4	496.2
U.S.A.	69,629.1	5,302.6

It is noteworthy that although saffron no longer has status in western medicine, occidental countries provide the largest markets for the material.

### Thailand as an importer of saffron

Table 2 shows that Thailand has had a chequered history of saffron import from 1964 to 1966 — quantity, source and unit value have varied wildly, making firm conclusions difficult. It is clear enough, however, that the higher-priced export market must provide practically the sole support, if local production is to succeed.

TABLE 1

## MAJOR IMPORTERS OF SAFFRON IN 1966: THEIR IMPORTS AND SUPPLY SOURCES

Importing country	Quantity (kg) and value (1000 baht) of import from										Total import	
	Spain		France		Italy		India*				Qty.	Value
	Qty.	Value	Qty.	Value	Qty.	Value	Qty.	Value	Qty.	Value		
Belgium-Luxemburg	617	2,573	-	-	-	-	-	-	-	-	617	2,573
Denmark	13	12	-	-	-	-	-	-	-	-	13	12
France	5,025	20,737	-	-	-	-	-	-	-	-	5,025	20,737
Finland	42	381	-	-	-	-	-	-	-	-	42	381
Fed. Rep. of Germany	2,916	12,077	1,002	716	-	-	-	-	-	-	3,918	12,793
Italy	784	346	-	-	-	-	-	-	-	-	784	346
Netherland	6,909	410	-	-	-	-	-	-	-	-	6,909	410
Portugal	27	104	-	-	-	-	-	-	-	-	27	104
Sweden	2,038	9,469	-	-	-	-	-	-	-	-	2,038	9,469
Switzerland	4,718	21,614	-	-	-	-	-	-	-	-	4,718	21,614
United Kingdom	602	2,850	-	-	-	-	-	-	-	-	602	2,850
U.S.S.R.	58	255	-	-	-	-	-	-	-	-	58	255
Dem. Rep. of Germany	298	1,223	-	-	-	-	-	-	-	-	298	1,223
Aden	2,310	213	-	-	-	-	-	357	6	-	2,666	219
Bahreïn	318	364	-	-	-	-	-	-	-	-	318	364
Ceylon	31	150	-	-	-	-	-	-	-	-	31	150
Hong Kong	2,149	6,133	-	-	-	-	-	-	-	-	2,149	6,133



Importing country	Quantity (kg) and value (1000 baht) of import from												Total import	
	Spain			France			Italy			India*			Qty.	Value
	Qty.	Value		Qty.	Value		Qty.	Value		Qty.	Value			
Japan	167	727	-	-	-	-	-	-	-	-	-	-	-167	727
Kuwait	477	756	-	-	-	-	-	-	-	-	-	-	477	756
Malaysia-Singapore	4,866	606	-	-	-	-	-	-	34	-	-	-	4,900	606
Pakistan	1,595	381	-	-	-	-	-	-	822	12	-	-	2,417	393
Saudi-Arabia	2,607	500	-	-	-	-	-	-	890	17	-	-	3,497	517
Kenya, Uganda Tanzania	16,505	501	-	-	-	-	-	-	-	-	-	-	16,505	501
S. Africa	423	629	-	-	-	-	-	-	-	-	-	-	423	629
Argentina	721	3,162	-	-	-	-	-	-	-	-	-	-	721	3,162
Mexico	158	415	-	-	-	-	-	-	-	-	-	-	158	415
Paraguay	204	1,033	-	-	-	-	-	-	-	-	-	-	204	1,033
Venezuela	31	69	-	-	-	-	-	-	-	-	-	-	31	69
United States	69,629	5,303	-	-	-	-	-	-	-	-	-	-	69,629	5,303
Other countries	6,502	4,766	-	831	-	300	987	-	62	-	-	-	6,864	6,584
Oman	-	-	-	-	-	-	-	-	681	6	-	-	681	6
Sudan	-	-	-	-	-	-	-	-	300	-	-	-	300	-
Total	132,740	97,759	1,002	1,547	987	300	987	3,146	41	137,188	100,334			

\* April 1965-March 1966.

TABLE 2

## THAILAND: IMPORTS OF SAFFRON

Country	1964			1965			1966		
	Quantity (kg)	Value c.i.f. (baht)	Unit value (baht/kg)	Quantity (kg)	value c.i.f. (baht)	Unit value (baht/kg)	Quantity (kg)	Value c.i.f. (baht)	Unit value (baht/kg)
India	183	9,154	50	3,157	52,034	16	1,165	13,980	12
Vietnam	873	8,730	10						
Spain	4	8,590	2,148	23	3,629	158	2	12,711	6,305
U.S.A.	1	615	615	2	2,932	1,466	1	1,257	1,257
Hong Kong				462	6,211	13			
Penang				36	5,806	161			

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Source: Department of Customs, Bangkok

## Prices

The Tropical Products Institute, London\*, quotes the following in relation to prices on the London market, for Spanish saffron:-

	1961	100/-	per lb c.i.f.	( = 638 baht/kg)
November	1964	300/-	per lb c.i.f.	( = 1,914 baht/kg)
March	1965	600/-	per lb c.i.f.	( = 3,828 baht/kg)
December	1967	800/-	per lb c.i.f.	( = 5,104 baht/kg)

One of the main reasons for these increases in price is the rising cost of peasant labour in Spain, now that there are increasing opportunities for more attractive and better paid occupations in industry and tourism.

The Tropical Products Institute\* also quotes a London merchant as suggesting a price of about 500/- per pound (3,190 baht/kg) compared with the current (December, 1967) price of 800/- per pound (5,104 baht/kg) for Spanish saffron. At this price a good quality saffron should find a market: "good quality" in this instance means that the product should have stigmas as unbroken as possible, a good aroma and a fairly red colour.

It should be noted that for the year 1966, Spain exported 292,031 pounds of saffron valued at sterling £ 1,735,100 or an average of 120 shillings sterling per pound (766 baht/kg). This is, of course, considerably less than the London market prices quoted by the Tropical Products Institute for the period, and it must be assumed that the bulk of Spanish saffron is not "good quality."

Of still greater significance, is that the average c.i.f. value for Indian saffron imported into Thailand in 1966 (India supplied some 99 per cent of Thailand's total import in 1966) was 12 baht per kilogramme or just under 2 shillings sterling per pound (Table 2). Again, it must be assumed that the quality of saffron used in Thailand is very low indeed (or that imports are under-valued).

## Prospects of saffron cultivation by the Hill Tribes

The return to the grower of raw opium, so far as can be ascertained, appeared to be about 800-900 baht per kilogramme and the yield somewhat

\* Personal communication, December 1967.

conservatively estimated at 1.3 kilogrammes per rai, giving a return per rai of 1,000 to perhaps 1,200 baht.

The best yields of saffron appear to be 8 - 11 pounds per acre, equivalent to 1.7 kilogrammes per rai. Assuming that the return to the exporter of saffron is the same as the c.i.f. value of saffron exported from Spain in 1966, i.e. 740 baht per kilogramme, the return per rai (on an exporter basis) is about 1,300 baht per rai.

Of course, the return to the farmer would be somewhat less, perhaps 1,000 baht per rai.

Nevertheless, taking into account that the price of saffron on world markets will probably continue to rise due to higher costs in the Spanish industry, and that we have assumed a price very much lower than London prices, it seems that saffron cultivation could not easily be dismissed as a substitute crop for opium poppies.

Apart from an attractive export market, saffron also has some other favourable features as a crop for the Hill Tribes. It grows at altitudes at which the opium poppy is now cultivated. Moreover it would seem to fit in well with the planting calendar of the Maeo (the main producers of opium amongst the Hill Tribes).

Saffron is planted from May to August, opium poppies in August. Saffron flowers are picked from late October to early November; poppy flowers were tapped from late December to early February. Thus, with saffron substituting for opium poppies, maize could still be planted in April and harvested in August. Maize is a highly important crop in the Maeo economy because it is fed to pigs—apparently the major source of first-class protein for the tribesmen.

More importantly, saffron plucking would not apparently interfere with rice harvesting as did poppy tapping, because saffron plucking finishes by mid-November.

These considerations are, of course, based on saffron cultivation practices abroad and assume that saffron would be replanted annually, as it is in Italy. The feasibility of such a regimen would need to be tested locally.

Both saffron and poppies require intensive labour concentration during

the flowering period. Saffron, however, flowers for only two or three weeks; opium poppies for as many months.

If saffron production is to be successfully undertaken in Thailand, it seems essential to ensure that the product is at least equal in quality and as free from adulteration as Spanish saffron, exports of which in 1966 were valued at 100 million baht.

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