

The Procurement Problems of the
Passion Fruit Industry of Kenya

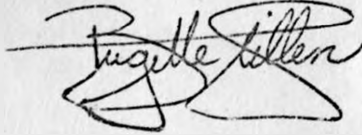
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A thesis submitted in part fulfilment for the
Degree of Master of Science in Agricultural
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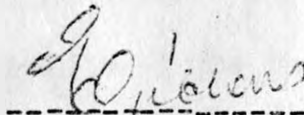
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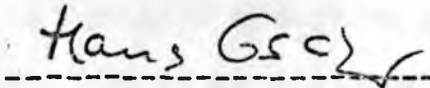
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ABSTRACT

The underlying causes of procurement problems of the passion fruit industry are investigated.

The background of passion fruit production and marketing is examined, including the history of the Kenyan industry.

The review of literature indicates that only limited studies of the economic aspects of passion fruit production in general have been published and studies specifically on the Kenyan industry are very rare. Reports by Lippmann, on Kenyan cultivation, contain important experimental information which is particularly relevant to the industry's production, marketing and procurement problems. The study objectives included finding out why Kenyan farmers have not grown the quantities of fruit for which the Thika processing plant, established in 1971 with a fresh fruit capacity of 14,000 tons per annum, was designed; how farmers could be persuaded to grow more fruit; to identify and examine production constraints; and, lastly, to offer some solutions to these problems.

The production and marketing system of passion fruit processed by the Kenya Fruit Processors Ltd. (K.F.P.) is studied. The services provided by the K.F.P., the area under cultivation and the number of farmers registered with the K.F.P., are also discussed.

In order to achieve the objectives, a combination field and desk research study was designed. Using non-random sampling, personal questionnaire interviews were conducted among 100 farmers: 60 Passion Fruit Growers, 20 Former Passion Fruit Growers and 20 Coffee Producers.

The most common complaint of growers was found to be the low ex-farm price.

The profitability of growing passion fruit is analysed, present average net returns are calculated, and the estimated average net returns - if Lippmann's recommendations are adopted - are given.

Producers regard Brown Spot Disease as the major problem in passion fruit cultivation, followed by the lack of posts required for trellising the vines.

The profitability of growing passion fruit compared to the alternatives of coffee and pyrethrum, is analysed.

The main conclusions include:

1. closer contact between H.C.D.A./K.F.P. field staff and growers should be developed,
2. a growers' association should be seriously considered,
3. an intensive education programme should be undertaken to teach farmers the most efficient husbandry methods,
4. the Kenyan Government should give a higher priority to the development of research on passion fruit production and marketing,

and

- 5. the possibilities for the Kenyan Government and its passion fruit producers on the one hand, and Governments and producers of countries like Brazil on the other hand, to work closely, should be investigated.

(a) Introduction

In Kenya, the passion fruit industry is a relatively recent development. It was introduced to the country in 1974 by the Kenya Agricultural Research Institute (KARI) in collaboration with the International Institute of Tropical Agriculture (IITA). The industry is currently producing about 5,000 tonnes of fruit annually, valued at KSh 100 million.

The passion fruit industry in Kenya is a potential area for further development. Production has increased from 1,000 tonnes in 1974 to 5,000 tonnes in 1978. The industry employs over 5,000 people and has a turnover of KSh 100 million annually. The industry is currently producing about 5,000 tonnes of fruit annually, valued at KSh 100 million. The industry is currently producing about 5,000 tonnes of fruit annually, valued at KSh 100 million.

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CHAPTER 1

BACKGROUND

(a) Introduction

In Kenya, food processing is the most important industry in terms of production and employment. In 1974, the sector employed 24,342 people and produced an estimated annual output of K£ 146.4 million (1, p.142).

The passion fruit juice processing industry is a potential area for further development. Production has increased from 805 tons of fresh fruit in 1969 to 2,551 tons in 1975. The industry employs over 5,000 people (of whom about 4,500 are registered growers). (See Table 4.1.) Over 90% of Kenya's passion fruit production is exported in the form of processed juice (29) and the industry is a valuable and increasing foreign exchange earner. The anticipated 1976 export sales are expected to exceed K £ 300,000 (29).

The most critical problem facing the food processing industry as a whole is the question of gross under-utilization of plant capacity. It is not unusual for factories to be running at only 40% of capacity (1, p.148).

The passion fruit industry shares this dubious distinction: the Kenya Fruit Processors' Thika plant is currently processing passion fruit at 50% capacity.

Although this is a serious problem, this figure is a considerable improvement over 1975, when the factory was operating at only 25% capacity.

This study is intended to find out why the industry is having difficulties in obtaining supplies.

Good marketing must be founded on efficient production, tailored to identified market requirements. Since the producers of passion fruit are not achieving efficient production as regards quantity, quality or price, marketing efficiency is poor. Indeed, the farmers as a group are contributing very little to each other's success in crucial areas such as negotiating prices and other conditions, or promoting production efficiency. They are certainly not enjoying mutually beneficial discussions with their customer or brother suppliers in Kenya, let alone their opposite numbers in countries like Brazil.

(b) History of the Kenyan passion fruit industry

The production of passion fruit for its juice¹ commenced in Kenya in the early 1930's in Kisii District (Nyanza Province). In 1932, a juice extraction factory was established in Sotik, for which the surrounding European settlers, all farmers of upwards of 30 acres (19, p.102), supplied the fruit. Over the next decade, the area under passion fruit steadily increased. By 1944, the factory was producing about 120,000 litres of juice annually² and was exporting nearly all its output, mainly to Australia, South Africa and the United Kingdom.

During the fifties, Australia and South Africa themselves embarked on passion fruit cultivation. New markets were not obtained by the Sotik processor and, consequently, the demand for Kenyan juice dropped. Due to the combined factors of decreased demand on the world market and a particularly severe attack of Brown Spot Disease (*Alternaria passiflora*), Kenya's annual production had fallen to 17,000 litres by 1955 (24, p.1).

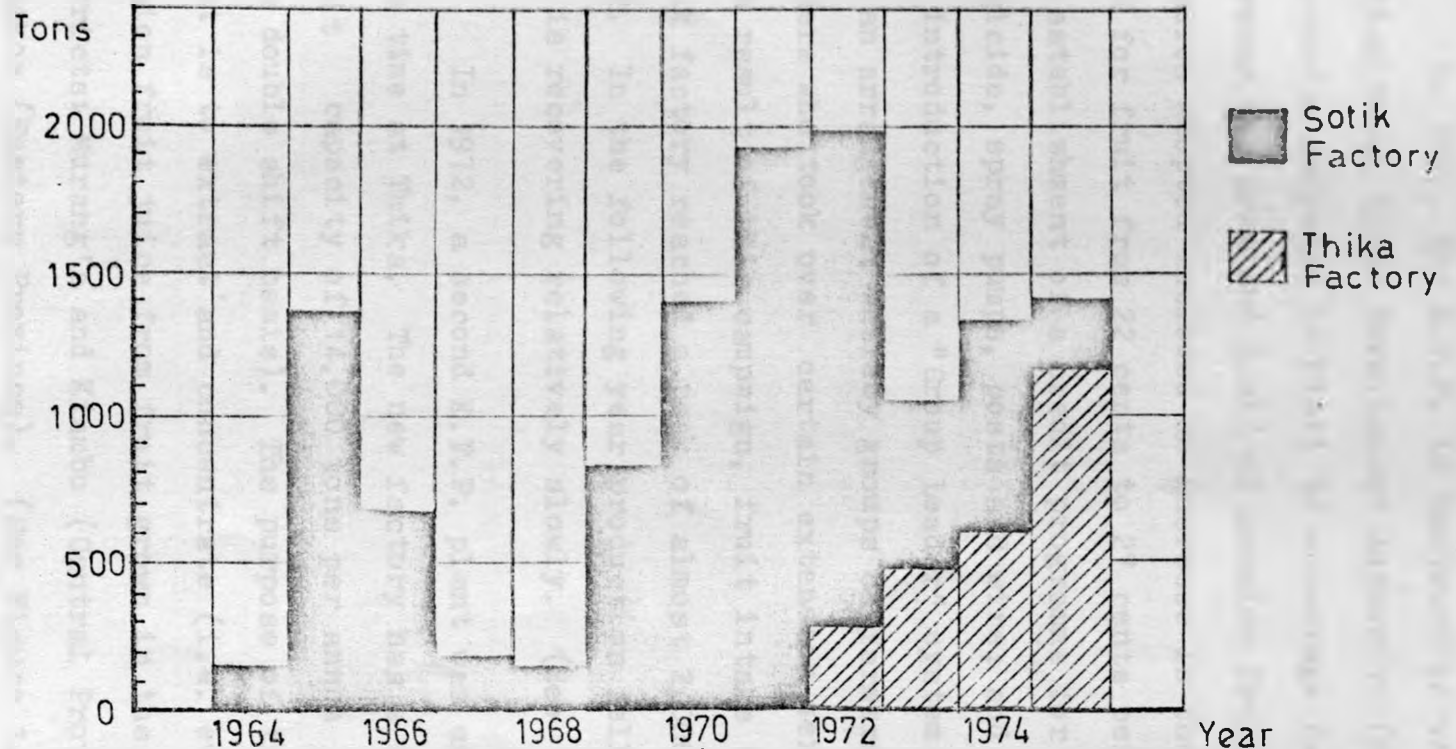
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1. The purple skinned variety of passion fruit (*passiflora edulis sims*) is used by the Kenya Fruit Processors Ltd. (K.F.P.) for juice production.
 2. Information on the area under cultivation by 1944, was not available.

Towards the end of the 1950's, the European settlers were beginning to leave and the African farmers started to grow passion fruit to supply the Sotik factory. However, for various reasons including, in 1965, a one-third drop in the price paid by the factory for fruit³, coupled with outbreaks of Brown Spot Disease⁴, quantities delivered to the factory fluctuated severely and reached an all time low in 1967/68 (see Figure 1.1).

In 1965, the Sotik factory was purchased and modernized by Cottee Ltd. of Australia. Only two years later, control of the business changed again when Passi Ltd. of Switzerland purchased 65% of the shares. The remainder were acquired by the Kenyan Government, through the Agricultural Development Corporation (A.D.C.) (14, p.1). This ownership structure appears to be proving satisfactory to both shareholders. The company trades as Kenya Fruit Processors Ltd. (K.F.P.), but Passi Ltd. handles all exports, which represent 90% of the factory's production⁵ (29).

-
3. The local farmers' price was slashed following a serious misjudgment about the contemporary world market situation for passion fruit.
 4. Since 1960, the passion fruit crop has sustained three outbreaks of the disease. The last major epidemic occurred in 1966 and wiped out all but 30 acres in the Kisii/Sotik area (18, p.6).
 5. The countries to which passion fruit juice is exported include the United States, Canada, Austria, Denmark, United Kingdom, France, Germany, Holland, Italy, Yugoslavia, Portugal and Sweden (15, p.4).

Figure 1. 1: Passion Fruit Intake at Sotik and Thika Processing Plants .Kenya,
1964 --1975



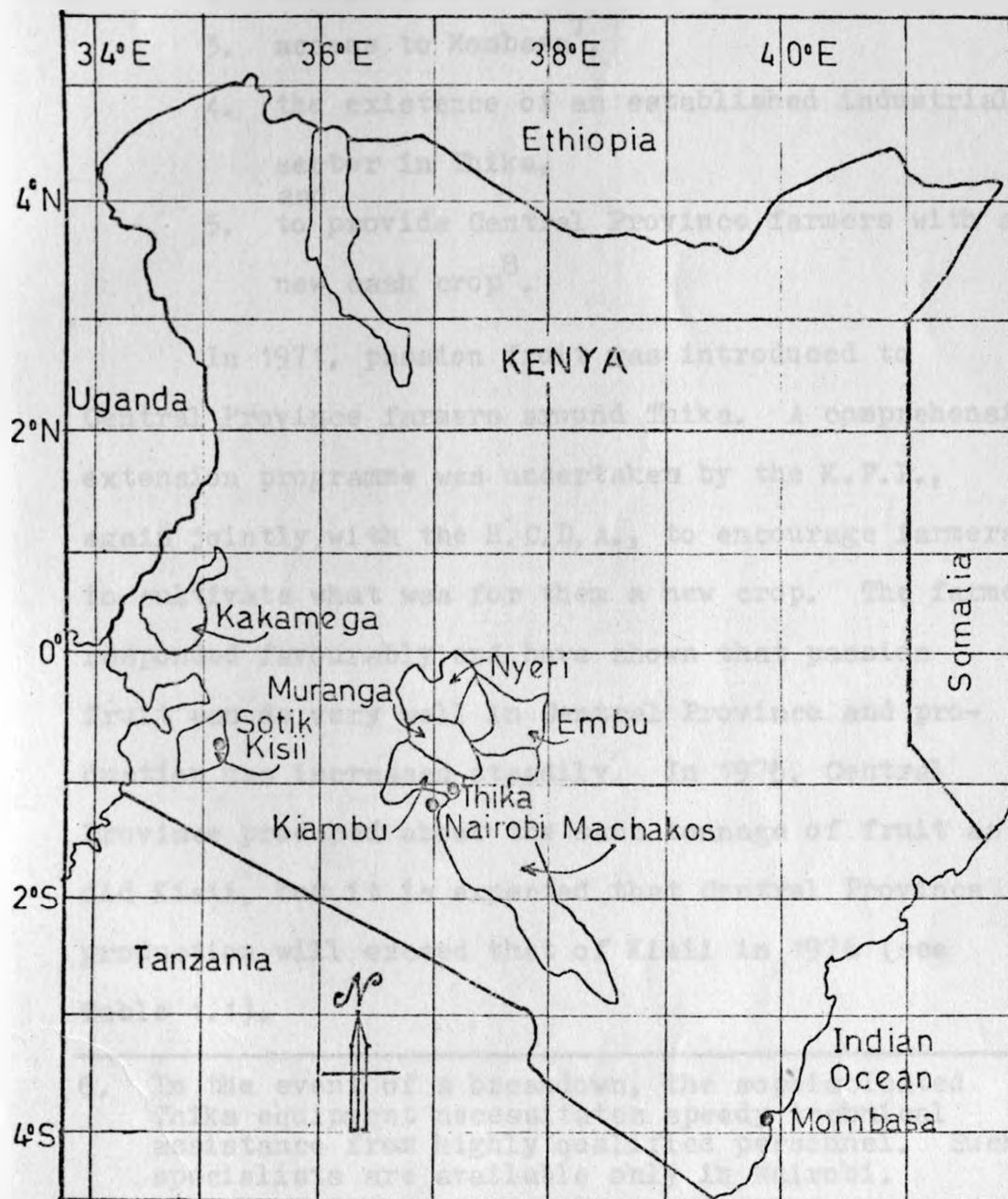
Source: Adapted from Ministry of Agriculture and Kenya Fruit Processors' Records.

In 1967, the K.F.P. in conjunction with the Horticultural Crops Development Authority (H.C.D.A.) launched a campaign in Kisii to encourage farmers to increase the area and yield of passion fruit. The measures adopted included an increase in the price paid for fruit from 22 cents to 27 cents per kg.; the establishment of a credit programme for supplying fungicide, spray pumps, posts and wire; and lastly, the introduction of a "Group Leader" system. This was an arrangement whereby groups of farmers nominated leaders who took over certain extension service duties. As a result of this campaign, fruit intake to the Sotik factory reached a peak of almost 2,000 tons in 1972. In the following year production fell steeply and is recovering relatively slowly. (See Figure 1.1.)

In 1972, a second K.F.P. plant was established, this time at Thika. The new factory has a fresh fruit capacity of 14,000 tons per annum (working on a double shift basis). The purpose of the new plant is to extract and concentrate (i.e. evaporate) passion fruit juice from fruit grown in the surrounding districts: Murang'a and Kiambu (Central Province) and Machakos (Eastern Province). (See Figure 1.2.) In addition, the factory concentrates juice manufactured at Sotik.

The main considerations in deciding on the Thika location for the new plant were:

Figure 1.2 : The Passion Fruit Growing Districts of Kenya, 1976



SOURCE : National Atlas of Kenya

1. to decentralize production away from Kisii, in order to decrease the reliance on the erratic Kisii output,
2. the proximity to Nairobi⁶,
3. access to Mombasa⁷,
4. the existence of an established industrial sector in Thika, and
5. to provide Central Province farmers with a new cash crop⁸.

In 1971, passion fruit was introduced to Central Province farmers around Thika. A comprehensive extension programme was undertaken by the K.F.P., again jointly with the H.C.D.A., to encourage farmers to cultivate what was for them a new crop. The farmers responded favourably and have shown that passion fruit can do very well in Central Province and production has increased steadily. In 1975, Central Province produced about the same tonnage of fruit as did Kisii, but it is expected that Central Province production will exceed that of Kisii in 1976 (see Table 1.1).

-
6. In the event of a breakdown, the sophisticated Thika equipment necessitates speedy technical assistance from highly qualified personnel. Such specialists are available only in Nairobi.
 7. Since 90% of the K.F.P.'s production is exported via Mombasa (29), it is economic to site the plant within easy reach of this port. Thika has good rail links to Mombasa and is considerably closer to that port than is Sotik. (See Figure 1.2.)
 8. The Kenya Government through the A.D.C. owns 35% of the K.F.P.'s shares. It is Government Policy to diversify the sources of farmers' incomes.

TABLE 1.1: Passion Fruit Production in Kenya, 1969-1975

| AREA | Tons | | | | | | |
|--|------|-------|-------|-------|-------|-------|-------|
| | 1969 | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 |
| NYANZA PROVINCE (i.e. KISII DISTRICT) | 805 | 1,382 | 1,925 | 1,961 | 1,111 | 1,306 | 1,393 |
| CENTRAL PROVINCE AND MACHAKOS DISTRICT | N.A. | N.A. | N.A. | 270 | 470 | 691 | 1,158 |
| T O T A L | 805 | 1,382 | 1,925 | 2,231 | 1,581 | 1,997 | 2,551 |

Source: Adapted from Integrated Agricultural Development Project, Passion Fruit, 1974. Ministry of Agriculture, Kenya.

and
Integrated Agricultural Development Project, Passion Fruit, 1976.
 Ministry of Agriculture, Kenya.

Despite the encouraging results in Central Province, passion fruit processing still accounts for only 50% of the plant's capacity⁹ (29), and this is easily the most serious problem facing the company. In order to keep the plant running, the K.F.P. concentrates pineapple juice from the neighbouring factory of Delmonte Ltd., an associated company of the multinational company of Delmonte Ltd.¹⁰.

The K.F.P. uses highly specialized equipment, the Aroma Recovery Unit, which removes the aroma before concentrating the juice. After the juice is concentrated, the aroma is piped back into the juice. The only similar machinery in the world is in Brazil. Both machines are patented by Passi Ltd.

Production in Kisii District fell drastically after 1972 and showed only modest increases in 1974 and 1975. With such a small throughput (see Figure 1.1 and Table 1.1) it is becoming increasingly difficult for the K.F.P. to absorb the high transportation costs involved in supplying the Sotik factory and then hauling the extracted single strength juice to Thika for purposes of concentration.

-
9. Full capacity is taken as 14,000 tons per annum.
 10. The pineapple processed by K.F.P. consists of fruit produced by Delmonte, but which is beyond Delmonte's canning requirements. The K.F.P. produces and exports concentrated pineapple juice. Passi Ltd. has exclusive rights for pineapple concentrate sales in Western Europe. (29).

The export of passion fruit juice is a consistent foreign exchange earner (see Table 1.2), and from the national standpoint it is important to ensure that the K.F.P. has sufficient raw material to keep it running economically: over 90% of the company's production is exported (29). Kenya is the world's largest producer of passion fruit juice (16, p.3) and exports for 1976 are expected to exceed K£300,000 (29).

Table 1.3 shows passion fruit production targets and actual production levels as estimated by the Ministry of Agriculture. The targets for 1974 and 1975 were not reached, and, therefore, the production targets were revised downwards in 1975. The main objective of this research is to find out why farmers have not grown the expected quantities of passion fruit (i.e. why the targets were not reached).

TABLE 1.2: Passion Fruit Juice Exports by Volume and Value, Kenya, 1971-1975

| YEAR | 1971 | 1972 | 1973 | 1974 | 1975 |
|--|---------|---------|--------|---------|---------|
| TOTAL SINGLE STRENGTH JUICE (IN TONS) | 650 | 780 | 490 | 655 | 833 |
| FOREIGN EXCHANGE EARNINGS (K. £) | 106,000 | 141,000 | 93,550 | 120,000 | 162,500 |

Source: Adapted from Kenya Integrated Agricultural Development Project, Passion Fruit, 1976. Ministry of Agriculture, Kenya.

TABLE 1.3: Fresh Passion Fruit, Targets and Actual Production, Kenya, 1974-1977

| YEAR | Tons | | | |
|----------------------------------|-------|-------|-------|--------|
| | 1974 | 1975 | 1976 | 1977 |
| TARGETS PREPARED IN 1971 | 3,500 | 4,500 | 7,500 | 10,000 |
| REVISED TARGETS PREPARED IN 1975 | - | - | 4,000 | 5,500 |
| ACTUAL PRODUCTION | 1,997 | 2,551 | - | - |

Source: Adapted from Integrated Agricultural Development Project, Passion Fruit, 1974. Ministry of Agriculture, Kenya

and
Integrated Agricultural Development Project Passion Fruit, 1976. Ministry of Agriculture, Kenya.

CHAPTER 2

LITERATURE REVIEW

Only very limited studies of economic aspects of passion fruit have been published in respect of Kenya, or, indeed the rest of the world. The few studies which have been conducted are nearly all production oriented and theoretical in nature. The information on marketing aspects is confined to Mott's publication of 1969, The Market for Passion Fruit Juice (28). In 1968, Kenya's production was only about 150 tons of fresh fruit (24, p.3), but by 1975 it had reached 2,551 tons (16, p.2). (See Figure 1.1 and Table 1.1.) Due to Kenya's small share of the world market in the late 1960's Mott's neglect of economic and marketing aspects in this country is hardly surprising.

Valuable information continues to flow from the passion fruit experimental trials at Motamanywa in Kisii District, notably reports by Lippmann (20, 21, 22, 23, 24, 25, 26, 27). This data is, strictly speaking, scientific and experimental in nature. Problems encountered in passion fruit cultivation are investigated mainly from the production angle and in controlled, ideal conditions, far removed from the realities and difficulties encountered by small-scale farmers. Nevertheless, this experimental work is undoubtedly helping to improve yields and quality and reduce unit costs, so it is of great economic importance. Due to their

significance, Lippmann's findings will later be compared with those of this study (see Chapter 7, Section II) in order to determine the validity of his experimental results when applied to actual farm situations.

In 1973, a preliminary study entitled Passion Fruit Cultivation in Kenya was carried out by Vogel (18) for the Kenyan Government. The main objective was to determine what problems farmers encounter in passion fruit production and to outline a suitable research programme. Although this report also contains some useful source material, it also concentrates heavily on production aspects of the industry.

The above studies comprise virtually the only published literature on scientific or economic work done on passion fruit in Kenya. No research appears to have been done on the specific, practical problems encountered by small-scale, or indeed any other, farmers in the production and marketing of passion fruit in Kenya. The present study is intended to go some way in filling this gap by shedding some light on the practical problems of production and marketing, and examining some of the constraints facing small-scale passion fruit farmers.

CHAPTER 3

OBJECTIVES OF THE STUDY

(a) Objectives

The basic objectives of this study are:

1. to ascertain why farmers have not grown the quantities of passion fruit for which the Thika processing plant was designed,
2. to find out how farmers could be persuaded to grow more passion fruit,
3. to identify and examine the problems which farmers encounter in passion fruit production, and
4. to offer some solutions to these problems.

These objectives were analysed from three angles:

1. the farm production problems involved in the growing of passion fruit,
2. the economic aspects of cultivation (i.e. from the farmers' point of view), and
3. the problems involved in the movement of fruit to the factory.

(b) Questions to be answered

By tackling the objectives from the above angles, it was hoped that answers would be received for each category. Under the production aspect, questions relating to the initial capital investment necessary to begin passion fruit production, the existing constraints which prevent farmers from increasing their acreage and the risks involved in cultivation were to be answered¹¹. The economic factors of growing passion

11. Brown Spot Disease is suspected of being a major constraint in the production of passion fruit in Kenya. (See Footnote 4.)

fruit were intended to provide answers pertaining to the profitability¹² of growing passion fruit as compared to other crops, the prices received for passion fruit from the K.F.P. as compared to the prices received on the local market, and the payment system operated by the K.F.P. In order to provide answers to these questions, primary data were collected in the field. Later, Lippmann's recommendations for producers will be compared to the survey results to determine what effect the implementation of his proposals is likely to have on producers' average net returns. The third category was to offer enlightenment on the problems involved in the actual collection of fruit, and shed light on any organizational deficiencies. Furthermore, the subjects of spoilage and rejected fruit were also studied under this heading.

The actual questions to be answered as a result of this study can be formulated as follows.

1. What is the initial capital investment necessary to begin producing one acre of passion fruit?
2. Do farmers make use of the Inputs Loan Scheme operated jointly by the K.F.P. and the H.C.D.A.?
3. What constraints deter farmers from increasing their passion fruit acreage?
4. What risk factors, peculiar to passion fruit growing, are involved in its production?

12. "Profitability" refers to gains realized by farmers for a given crop after all the costs (direct and indirect) of that crop are set off against all the benefits (direct and indirect) of that crop.

5. What are the average net returns from passion fruit cultivation?
6. Are other crops more profitable for the farmer than passion fruit?
7. Do farmers receive a higher price for passion fruit on the local market, than they do from the K.F.P.?
8. What is the marketing system for passion fruit as operated by the K.F.P.?
9. Are farmers satisfied with the paying-out system operated by the K.F.P.?
10. Do farmers have any serious problems regarding the collection of fruit?
11. How much fruit is lost due to spoilage and rejection by the K.F.P.?

CHAPTER 4

THE PRODUCTION AND MARKETING SYSTEM OF PASSION FRUIT PROCESSED BY THE K.F.P.

In March, 1976, 4,477 small-scale passion fruit farmers were registered and regular suppliers of fruit to K.F.P. The producing areas include the well-established growing regions of Murang'a and Kiambu in Central Province, and Kisii District in Nyanza Province. Furthermore, passion fruit is now grown in Machakos and Embu (Eastern Province) and Kakamega (Western Province). (See Figure 1.2.) The last two areas (Embu and Kakamega) came into production in 1976. As can be seen from Table 4.1, both the acreage under cultivation and the number of farmers registered with the K.F.P. almost doubled during 1976.

(a) Services provided by the K.F.P.

The K.F.P. operates an integrated system of farm and factory production and marketing, which is probably unique in Kenya. The company provides a complete range of services to growers as follows.

1. Farmers are supplied with high quality seedlings, free of charge, from the K.F.P. nurseries.
2. Inputs such as posts, wire and chemical spray¹³ are distributed by K.F.P. on behalf of the H.C.D.A. The cost of these inputs is subsequently deducted at the rate of 4 cents per kg. from sums which fall due in respect of passion fruit supplied.

13. A chemical spray, Dithane M-45, is distributed to farmers to combat Brown Spot Disease. Farmers pay KShs.30.30 per kg. when bought from the H.C.D.A. through the K.F.P.. The price when bought through a farmers' supply centre is KShs.33.50 per kg. (10, p.1)

TABLE 4.1: Acreages and Numbers of Suppliers of Passion Fruit to K.F.P., Kenya, 1975 and 1976

| ACRES UNDER PASSION FRUIT CULTIVATION ¹ | | | | NUMBER OF GROWERS | | |
|--|---------------------|---------------------|---------------------------------------|-------------------|-------|---|
| AREA | 1975 (TRELLISED) | 1976 (TRELLISED) | DUE TO BE TRELLISED DURING 1976 | 1975 | 1976 | NOT YET REGISTERED ² (DUE TO BE TRELLISED DURING 1976) |
| NYANZA PROVINCE (i.e. KISII DISTRICT) | 214 | 225 | 225 | 857 | 902 | |
| CENTRAL PROVINCE (i.e. MURANG'A, AND KIAMBU DISTRICTS) | | | | | | |
| EASTERN PROVINCE (i.e. MACHAKOS DISTRICT) | 354 | 893 | 600 | 1,417 | 3,575 | |
| EASTERN PROVINCE (i.e. EMBU DISTRICT) | — | — | 300 | — | — | |
| WESTERN PROVINCE (i.e. KAKAMEGA DISTRICT) | — | — | 300 | — | — | |
| T O T A L | 568 | 1,118 | 1,425 | 2,274 | 4,477 | 5,700 ¹ |

1. These are estimated figures.

2. These farmers are not yet registered with the K.F.P.: it is the procedure for farmers to register when the vines commence producing fruit.

Source: K.F.P. Records.

3. Also on behalf of H.C.D.A., the K.F.P. maintains separate credit and debit accounts for every farmer.
4. Fruit is collected weekly from farmers.
5. Each farmer is paid monthly for the previous fruit deliveries. The K.F.P. price to farmers is 40 cents per kg. of fruit.¹⁴
6. The K.F.P. provides a specialist field advisory staff who help farmers with production problems.
7. An experimental station is maintained at Motamanywa, in Kisii District, to investigate all aspects of passion fruit cultivation. This research station is managed jointly by the K.F.P. and the German Agricultural Team (G.A.T.).

Until 1973, the K.F.P. operated a "Group Leader" system in Kisii District. Each Group of about 40 farmers elected their leaders. These unpaid Group Leaders were trained by the K.F.P. to liaise between farmers and field advisory officers. The Group Leaders used to visit and advise farmers regularly, and they referred the more difficult problems to the field officers. The Group Leaders found their duties too burdensome and time-consuming and, consequently, the system fell into disuse in 1973¹⁵. The fact that Group Leaders were unpaid undoubtedly contributed to the collapse of this scheme.

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14. Until March, 1976, the K.F.P. paid 35 cents per kg. for fruit not sprayed with a fungicide and 40 cents per kg. for treated fruit. However, research carried out at Motamanywa indicated that spraying the vines has no effect on the quality of the fruit (26, p.10). Consequently, the price paid for both kinds of fruit is now 40 cents.
 15. Many Kisii farmers are of the opinion that the "Group Leader" system was discontinued at the insistence of the K.F.P. Since the new plant was established at Thika, the Kisii farmers feel relegated to second place and have been carrying a "chip on their shoulders". The suspension of the system and its effects on the Kisii farmers will be dealt with in Chapter 8.

(b) Fruit collection

Producers within a 1.5 mile radius¹⁶ deliver their fruit to collection points whence it is collected by the K.F.P. The vehicles used are mainly 5 ton open-backed lorries, with high sides. Farmers bring the fruit in hessian sacks and these are weighed on a balance scale suspended from a cross-beam of the lorry. Receipts are issued for the quantity of fruit delivered, and the empty sacks returned to the producers. There are no bins or containers in the truck for the fruit: it is simply dumped loosely into the back of the vehicle.

The fruit from Central Province is delivered to the Thika processing plant where the juice is extracted and concentrated. The fruit from Kisii is collected from farms and delivered to the Sotik factory. The single strength juice¹⁷ is extracted in Sotik and stored in a refrigeration unit until hauled to Thika by lorry in polystyrene tanks. The weekly transportation of the juice is carried out at night to reduce heat spoilage. Once in Thika, the juice is concentrated and packed in polythene-lined 0.079 cu. m. metal drums¹⁸ and kept in

16. See Chapter 8, Section (c).

17. Juice, as extracted, is termed "single strength" juice. When the juice is concentrated, it is referred to as "double strength" juice. For the sake of comparisons, all juice quantities have been converted to single strength equivalents. (See Chapter 5, Section (h).)

18. The K.F.P. is currently experimenting with cheaper and lighter drums, but it is not yet known whether plastic is effective in preserving the quality of the juice.

cold storage until exported. The packed juice is sent by rail (in refrigerated wagons) to Mombasa, and from there by refrigerated ships to its destination¹⁹.

(c) Payment system

Suppliers are paid for each month's deliveries at the beginning of the following month. There are 114 pay-out centres in Central Province and Machakos District serving 3,575 growers. In Kisii District, 45 centres cater for 902 producers. At the beginning of each month, two pay-out crews (one for Central Province and one for Kisii) leave Thika with the farmers' pay envelopes. At each pay-out centre, producers collect their monies after proving their identity by means of name and K.F.P. registration number. Delivery receipts are shown in cases of doubt as to the farmer's identity, or where there is a query as to the amount due.

(d) Acreage

As can be seen from Table 4.1, the area under passion fruit cultivation, 1,118 acres, will be supplemented by an additional 1,425 acres due to be trellised during 1976 (29). The 1976 acreage, by May, was almost 97% more than the total figure for 1975 due to the new vines which have come into production in the present year²⁰. Central Province will probably overtake Kisii production in 1976 (29).

19. The K.F.P.'s local sales of passion fruit juice, which account for only about 10% of its production (29), are preserved with sulphur dioxide and packed into retail-sized tin cans.

20. It takes 9 to 12 months for seedlings to start producing fruit. During this time, the plant is trained and trellised.

(e) Exports

The K.F.P. has been fortunate in that the export market has recently developed in its favour. Passi Ltd. is the world's major importer of passion fruit juice, and has been instrumental in developing the European consumer market (16, p.3). Brazil supplies a large proportion of Passi's juice requirements²¹, in direct competition with Kenya. During 1976, however, Brazil is understood to be concentrating most of her production efforts on developing her expanding domestic juice market (29). If this is, in fact the case, reduced quantities of juice will be available from Brazil on the world market. Efforts to ascertain details about the supply and stock positions of producers like Australia and South Africa were not successful.

Due to Kenya's steep increase in production, the K.F.P. will now be able to supply Passi with the necessary quantity of passion fruit juice. Presumably, if Kenya can supply Passi with a regular and predetermined quantity of juice, Passi will in future buy considerably more (if not to say exclusively) from Kenya (29).

21. It was not possible to obtain figures on the exact shares that Brazil and Kenya contribute to Passi's juice imports. The Kenya Integrated Agricultural Development Project, Passion Fruit, 1976, states that Brazil contributes a "considerable" share (16, p.3).

According to the UNCTAD reports on The Market for Horticultural Products from Kenya in Selected European Countries (33, 34, 35, 36, 37), Germany is currently the largest European consumer of passion fruit juice, with an estimated annual consumption of between 2,000 and 3,000 tons of single strength juice. The market is expected to continue expanding. Germany draws its juice supplies mainly from Kenya, Brazil, Taiwan, Venezuela, Argentina and South Africa²². Whether or not Kenya will be able to increase its market share depends mainly on the price factor (34, pp.71-72).

Swiss and Swedish total consumption is considerably lower than Germany's, the annual importation of each being between 150 and 200 tons of single strength juice. Neither of these markets is expected to expand significantly and, therefore, the only way Kenya can increase her market shares will be to lower her price (35, p.47; 36, p.97).

Several attempts have been made in the past decade to break into the United Kingdom market. However, none of these endeavours proved successful: apparently the British do not, so far, find the flavour palatable (37, pp.215-216; 219-220).

The domestic passion fruit juice requirements of the United States are satisfied from Hawaii, while Australia supplements her domestic production with imports from New Guinea (28, p.7). From the limited data

22. Figures for the relative shares of the market of the various suppliers were not available.

available, it would appear that Kenya's most promising market is Germany. However, promotional efforts, in early 1976, have resulted in new export markets being tapped in Italy and Spain.

(f) By-products

The peel of the fruit is used as manure, and for sheep and cattle feed. However, the K.F.P. allows farmers to collect husks free of charge.

The seeds are sold to Nairobi Oil Seed Mills for purposes of oil extraction, and the residue is used to make animal feed cakes. The K.F.P. has only begun selling the seeds since January, 1976, and by April of the same year had already received K£1,000 for this previously discarded by-product.

CHAPTER 5

METHODOLOGY

(a) Available methods of data collection

Having set out the objectives of the study and the questions to be answered, the most appropriate methods of collecting the necessary data needed to be decided. There are five main methods of data collection available for studies of the present kind:

1. secondary source information,
2. questionnaire interviews conducted by post,
3. questionnaire interviews conducted by telephone,
4. personal questionnaire interviews,
and
5. personal observation.

The costs incurred in gathering the necessary information had to be met from an extremely limited research budget and supplemented by the author's very limited personal resources. Furthermore, the thesis to be written on the basis of information gathered had to be submitted by a given dead-line. Any method, therefore, which was either costly or time-consuming had to be rejected.

The necessary secondary data was collected from sources which included the Ministry of Agriculture, the Horticultural Crops Development Authority (H.C.D.A.), Central Statistics Bureau, German Agricultural Team (G.A.T.) and the K.F.P. However, the information that could be gathered in this manner was limited

because very few separate statistical and other data are maintained. Therefore, it was necessary to adopt other methods to supplement the information acquired in this way.

The idea of conducting questionnaire interviews by post and/or telephone was rejected for obvious reasons: the farmers to be interviewed were all poor, mainly illiterate small-scale farmers, none of whom have telephones. In any case, mail and telephone interviews produce biased information and are expensive. In both cases the response rates were likely to be extremely low, possibly well under 5%.

The observation method also had to be eliminated since this type of data collection is more suitable for consumer rather than producer research and in any event, such methods also tend to be both costly and time-consuming.

The personal interview questionnaire method was adopted for various reasons. Although it is realized that this method has the disadvantage of needing to be translated into the vernacular (in this case Kikuyu and Kisii), it nevertheless offers a number of advantages in that a definite set of questions:

1. reduces the chances for the interviewer to influence the process, thereby decreasing the chances of bias being introduced in this manner,
2. contributes to reliability in that the questions to be asked are clearly stated and the same questions are asked of each farmer,

3. facilitates the setting up of a properly constructed sample,
and
4. allows for easy tabulation and processing of the data gathered in this way.

The author conducted all interviews. Mr. Douglas Kahuthia (District Agricultural Crops Development Officer) kindly acted as translator for the Central Province interviews. Mr. Thomas Ongosi (Senior H.C.D.A. Field Representative) generously performed this service in Kisii District.

The personal interview questionnaire method is relatively inexpensive and requires only limited time. Since both financial and temporal constraints were of considerable importance, this further justified the use of the personal interview method.

(b) Questionnaire design

During October, 1975, interviews were carried out with various competent authorities including the General Manager of the K.F.P. and headquarter and field staff of the Ministry of Agriculture and the H.C.D.A. The information obtained was then used as a background to the preparation of questionnaires to be used to carry out the objectives of the survey.

Originally, it was intended to interview 20 pineapple growers in Central Province in order to compare the profitability of growing pineapples with that of passion fruit. There was a widely held belief

that pineapple production was the main competitor of passion fruit cultivation. Discussions with local officials and field staff of the Ministry of Agriculture showed that this view was erroneous. It was, therefore, decided that 20 coffee growers should be interviewed instead of the pineapple growers since competent authorities considered that coffee offers easily the greatest competition to passion fruit. Three questionnaires were drawn up: one for "Present Passion Fruit Growers", one for "Former Passion Fruit Growers", and one for "Coffee Growers".

The pilot questionnaires were tested on 9 farmers (5 "Present Growers", 2 "Former Growers" and 2 "Coffee Growers") in January, 1976, after which they were amended. Special care was taken to ensure that the wording of the questions was simple, clear, concise, unambiguous and direct. The final questionnaires are reproduced as Appendices A, B and C.

(c) Sample design

K.F.P. growers are responsible for over nine tenths of Kenya's passion fruit crop and only limited and poor quality records exist for non-K.F.P. producers. Accordingly, for the purposes of this survey, the population of Present Passion Fruit Growers was regarded as those

farmers who grow passion fruit for the K.F.P.²³. A total of 4,477 growers, most of whom²⁴ are small-scale farmers²⁵, supply fruit to the K.F.P.

The population of Former Passion Fruit Growers consists of all those farmers who grew passion fruit commercially for the K.F.P. for one or more seasons, and subsequently discontinued its cultivation. There is no means of ascertaining the size of the population, since no records are kept by the K.F.P. of farmers who have ceased to deliver to the factory.

The population of coffee growers comprises all those farmers who grow coffee on a commercial basis.

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23. This is justified on the grounds that the K.F.P. is the only Kenyan exporter of passion fruit juice and exports 90% of its production. Although only 10% is sold domestically, this represents 50% of the local juice sales (29). Therefore, over 90% of all Kenyan passion fruit juice sales are controlled by the K.F.P. Since the proportion of fresh fruit to juice extracted is approximately constant at a ratio of 3:1, it is fair to assert that over 90% of the fruit grown in Kenya is bought by the K.F.P. Consequently, it is reasonable to regard the universe of passion fruit growers as those farmers growing for the K.F.P.
24. All suppliers of passion fruit are "small-scale" farmers except for five "large-scale" farmers (29).
25. For the definition of "small-scale" farmers see Chapter 5, Section (h).

(d) Districts surveyed

Central Province and Kisii District are the major passion fruit producing areas of Kenya, and these are producing approximately equal amounts of passion fruit. Accordingly, it was decided to conduct half the interviews in Central Province and half in Kisii District. Although bias may easily occur with small sample units, it was nevertheless necessary to restrict the total number of interviews to one hundred due to the limiting factors already mentioned²⁶. The interviews were allocated as shown in Table 5.1.

It was necessary to interview passion fruit growers in both Central and Nyanza Provinces because Kisii passion fruit farmers have been established since the early 1960's, whereas the Central Province growers have only been in production since 1972. Bearing this in mind, it was quite possible that Kisii farmers experience different problems with regard to passion fruit production and marketing than their recently established counterparts in Central Province.

(e) Sample selection

Due to the combined constraints of limited time available to finish the survey and a small budget, the notion of complete random sampling had to be discarded.

26. The thesis had to be submitted by May 31, 1976 and the research budget was limited to KShs. 3,645.00.

TABLE 5.1: Distribution of Interviews conducted with 100 Farmers, Kenya, 1976

| GROWERS INTERVIEWED | <u>NYANZA PROVINCE</u> | | | <u>CENTRAL PROVINCE</u> | | | TOTAL NUMBER OF INTERVIEWS |
|------------------------------|------------------------|----------------------|-------|-------------------------|----------------------|-------|----------------------------|
| | K.F.P. PAY-OUT ROUTE | NUMBER OF INTERVIEWS | TOTAL | K.F.P. PAY-OUT ROUTE | NUMBER OF INTERVIEWS | TOTAL | |
| PASSION FRUIT GROWERS | 1 | 7 | - | 1 | 6 | - | - |
| | 2 | 8 | - | 2 | 6 | - | - |
| | 3 | 3 | - | 3 | 6 | - | - |
| | 4 | 12 | - | 4 | 6 | - | - |
| | - | - | - | 5 | 6 | - | - |
| | - | - | 30 | - | - | 30 | 60 |
| FORMER PASSION FRUIT GROWERS | - | - | 10 | - | - | 10 | 20 |
| COFFEE GROWERS | - | - | 10 | - | - | 10 | 20 |
| T O T A L | - | - | 50 | - | - | 50 | 100 |

Source: Field Survey 1976

It was decided to design the sample as randomly as time and finances permitted and to use convenience sampling where random sampling was no longer feasible. After considering various alternatives it was decided to utilize the K.F.P. paying-out routes²⁷ and interview farmers at the pay-out centres. In Central Province there are 5 paying-out routes: Karatina, Kiambu, Githunguri, and Murang'a A and B. Since 30 interviews with passion fruit producers were to be conducted in Central Province, 6 were conducted in each area. Within each area convenience sampling was used since it was necessary to keep pace with the K.F.P. vehicle.

The number of interviews at each paying-out centre corresponded closely with the number of farmers collecting money, since as many interviews as possible were conducted during time spent in paying-out. Therefore, where a large number of farmers were paid, a corresponding number of interviews were conducted and vice-versa. However, at centres where less than 15 farmers were being paid, no interviews were conducted because of the time constraint.

A similar process was adopted for Kisii District. The management of K.F.P. kindly provided the use of a vehicle for this range of interviews. There were 4 paying-out routes. In this case, although efforts were

27. The paying-out route is the one used by the K.F.P. staff when paying farmers the previous month's produce.

made to conduct approximately the same number of interviews on each route, this proved impossible: 7 interviews were conducted on the first route, 8 on the second, but only 3 on the third due to the fact that very few farmers turned up to be paid. These farmers, apparently, did not know that the K.F.P. vehicle was paying that day. The fourth route consisted of two extremely large pay-out centres, and, consequently, 7 interviews were conducted at the first (and largest) centre, and 5 at the second. (See Table 5.1.)

The 10 interviews with Former Passion Fruit Growers in each area (i.e. Nyanza and Central Provinces) were conducted on the basis of convenience sampling. In Central Province, the District Horticultural Crops Development Officer kindly selected and arranged for the 10 Former Passion Fruit Growers to be interviewed. Since passion fruit is a new cash crop for Central Province, it was very difficult to find 10 farmers who had discontinued its cultivation. In Kisii, the task of finding 10 former passion fruit growers was considerably easier, since there is, in this district, an abundance of farmers who have uprooted their vines in recent years. The passion fruit collection vehicle²⁸, on two successive days, called on farmers along the route and asked for former growers to agree to be interviewed.

28. The passion fruit collection vehicle is the K.F.P. truck which collects passion fruit once a week.

The interviews among coffee growers were conducted at the offices of various farmers' coffee co-operative societies. In Central Province these were conducted at two such societies: 2 interviews at the Gatukuyu Farmers' Co-operative Society and 7 interviews at the Murang'a Farmers' Co-operative Union. In Kisii, the Kitutu passion fruit collection route was followed: when a farm was passed where coffee was seen to be growing, that farmer was interviewed. Five interviews were carried out in North Kitutu Location and 5 in Central Kitutu Location. In these cases, as indeed in all others, the readiness of farmers to be interviewed was remarkably good and all gave willing co-operation.

Although there is an obvious risk of bias being introduced by convenience sampling, it must be remembered that the severe constraints imposed by the lack of adequate financial resources, the large area to be covered and the time constraint all combined to make a random sample completely impracticable. Nevertheless, it is believed that convenience sampling did not produce serious bias since the farmers in the two areas concerned were homogeneous within each area²⁹. The assumption of homogeneity is further supported by the results of the survey.

29. The farmers were homogeneous in the sense that farm technology, farm size and farm enterprises were similar in a given area.

(f) Timing of the survey

The survey was carried out between January 18, and March 17, 1976. Since the deadline for submitting the thesis was prescribed by the University authorities, there was no choice about the timing of the survey. It must, therefore, be realized that the timing may have produced some bias. However, since passion fruit is harvested continuously throughout the year³⁰, the timing would not have affected the results of the survey as much as it might have done if say, passion fruit were harvested annually or biennially.

(g) Tabulation of questionnaire replies

Although 60 Passion Fruit Growers, 20 Former Passion Fruit Growers and 20 Coffee Farmers were interviewed, the tabulated totals do not always equal these figures. This is because in some cases the farmers were not able to respond to all the questions. In other instances, it was possible to give more than one answer to the question.

Where there are significant differences between Nyanza Province and Central Province, these figures have been presented separately. Due to rounding in the tables derived from the survey results, percentage totals frequently do not equal 100.00.

30. Passion fruit is harvested continuously throughout the year but it has two peaks: the larger occurring from November to February and a smaller one from June to August.

(h) Definitions

The term "small-scale" farmers refers, in the present context, to farmers who occupy less than 20 acres of land.

All calculations are in Kenya shillings, and weights are in kilograms and metric tons.

When reference is made in the text to "Central Province" and "Nyanza Province", allusion is being made to the passion fruit growing areas of those regions. Since Kisii District was the only passion fruit producing area in Nyanza Province at the time of the survey, the terms "Nyanza Province" and "Kisii District" are used interchangeably in the text.

CHAPTER 6

RESULTS OF THE SURVEY: GENERAL FINDINGS

(a) Price

A common complaint of the farmers was the low price received for fruit: 46 of the 60 growers interviewed (i.e. 77%) regard this as a major problem. (See Table 8.2.) The matter was aggravated by some confusion at the end of 1975: the Kisii producers claim that the person paying out the monthly payments informed the farmers that prices would be increased on January 1st, 1976. As a result, a number of growers increased their acreage of fruit. The anticipated rise in price, however, did not materialize and the farmers were understandably bitter.

The problem of low prices may well be solved by increasing yield per acre, decreasing input costs and reducing or eliminating unnecessary deductions due to poor fruit quality. The implementation of Lippmann's recommendations would also increase average net returns for passion fruit. (See Chapter 7, Section II.)

(b) Local market

The 30 Kisii growers interviewed said that they sold all fruit to the K.F.P. In Central Province, 25 farmers sold exclusively to the K.F.P., 4 sold partly to K.F.P. and partly on the local market, and 1 sold solely on the local

market³¹. All 5 producers who sold on the market said they did so because of the higher prices which are paid immediately in cash.

Table 6.1 indicates what determines producers' choice of market outlet. Out of the 60 farmers interviewed, 43 (i.e. 72%) said that having an assured market is the deciding factor.

The reasons why farmers sell to the factory were neatly summed up by one Central Province farmer.

1. At the local market a daily entrance fee has to be paid.
2. At the market it is necessary to spend the entire day selling while the farm is neglected.
3. The K.F.P. accepts all sound fruit offered.

The local market price for passion fruit is usually considerably higher than the price paid by the factory. In Central Province, all 5 farmers gave the same price information about the local market for passion fruit. They stated that the average price for the fruit was 80 cents per kg. The lowest price was 60 cents per kg. and the highest was 1.20 per kg. The price peak was said to occur in October to December.

All these 5 farmers who sold on the local market did so at the same market, i.e. Karatina. Karatina market was also the K.F.P.'s collection point for the surrounding area. This would suggest that the proximity of a major

31. This farmer had been selling all his fruit on the local market since he started production in 1974, despite the fact that he owed the H.C.D.A. KShs.90.00 for wire. He stated that no attempt had been made by the H.C.D.A. to compel him to repay the loan.

TABLE 6.1: Factors determining Passion Fruit Farmers' Choice of Outlet, Kenya, 1976

| MARKET OUTLET | K.F.P. | | | | LOCAL MARKET | | | | TOTAL | |
|---|-------------------|----------------------|-------------------|----------------------|-------------------|----------------------|-------------------|----------------------|------------------------------|----------------------|
| AREA | NYANZA PROVINCE | | CENTRAL PROVINCE | | NYANZA PROVINCE | | CENTRAL PROVINCE | | NYANZA AND CENTRAL PROVINCES | |
| REASONS WHICH DETERMINE THE CHOICE OF MARKET OUTLET | NUMBER OF REPLIES | PERCENTAGE FREQUENCY | NUMBER OF REPLIES | PERCENTAGE FREQUENCY | NUMBER OF REPLIES | PERCENTAGE FREQUENCY | NUMBER OF REPLIES | PERCENTAGE FREQUENCY | NUMBER OF REPLIES | PERCENTAGE FREQUENCY |
| ASSURED MARKET | 24 | 80.00 | 19 | 55.88 | - | - | - | - | 43 | 58.11 |
| PROMPTNESS OF PAYMENT | - | - | 2 | 5.88 | - | - | 5 | 50.00 | 7 | 9.46 |
| LOYALTY | 3 | 10.00 | 3 | 8.83 | - | - | - | - | 6 | 8.11 |
| PRICE LEVELS | - | - | - | - | - | - | 5 | 50.00 | 5 | 6.76 |
| TO PAY OFF LOAN | - | - | 4 | 11.77 | - | - | - | - | 4 | 5.41 |
| USE THE ONLY OUTLET AVAILABLE | 2 | 6.67 | 1 | 2.94 | - | - | - | - | 3 | 4.05 |

TABLE 6.1: Contd.

| | | | | |
|------------------------------|----|--------|----|--------|
| HABIT | 1 | 3.33 | 1 | 2.94 |
| BULK PAYMENT AT END OF MONTH | - | - | 2 | 5.88 |
| PRICE STABILITY | - | - | 1 | 2.94 |
| COLLECTION SERVICE | - | - | 1 | 2.94 |
| T O T A L | 30 | 100.00 | 34 | 100.00 |

Source: Field Survey 1976

| | | | | | |
|---|------|----|--------|----|--------|
| - | - | - | - | 2 | 2.70 |
| - | - | - | - | 2 | 2.70 |
| - | - | - | - | 1 | 1.35 |
| - | - | - | - | 1 | 1.35 |
| 0 | 0.00 | 10 | 100.00 | 74 | 100.00 |

market to the collection point influences whether the growers sell on the market or to the K.F.P. That is, it would appear that the closer a major market is to the collection point, the more likely farmers are to sell on the market. This underlines the importance of the collection service, since it seems to be the distance from the farm, and, therefore, the transportation cost, which determine to whom the producers sell.

Although all the Kisii farmers interviewed claimed that they sold no fruit on the local market, it was found that the average price in Kisii District was also 80 cents per kg.³².

A major reason for the high price for passion fruit on the local market compared to the 40 cents per kg. paid by the K.F.P. may be the scarcity of the fruit created by the K.F.P.'s large-scale buying.

(c) Utilization of the H.C.D.A. Credit Inputs Scheme

As can be seen from Table 6.2, only 9 out of 30 farmers (i.e. 30%) questioned in Kisii, said they profited from the Inputs Scheme. In Central Province, 22 out of 30 (i.e. 73%) took advantage of the facility. Of the 31 farmers who took out loans, 30 did so for wire only and 1 for posts and wire. The growers in Central

32. This was found by asking the price of the fruit at 5 of the local Kisii markets. All 5 charged 80 cents per kg., and said the price did not fluctuate. The fruit retailers were suspicious and reluctant to give any information. Consequently, it may not be true that prices do not fluctuate.

TABLE 6.2: Utilization of the H.C.D.A. Inputs Credit Scheme, Kenya, 1976

| SOURCE OF INITIAL INVESTMENT CAPITAL AREA | LOAN PLUS SAVINGS | | | SAVINGS ONLY | LOAN ONLY | TOTAL |
|--|-------------------|--------------------|-------|--------------|-----------|-------|
| | FOR WIRE | FOR POSTS AND WIRE | TOTAL | | | |
| NYANZA PROVINCE | 9 | 0 | 9 | 21 | 0 | 30 |
| CENTRAL PROVINCE | 21 | 1 | 22 | 8 | 0 | 30 |
| T O T A L | 30 | 1 | 31 | 29 | 0 | 60 |

Source: Field Survey 1976

Province are very anxious to obtain posts but the H.C.D.A. says they are not available³³ (29). The Central Province producers, therefore, found it necessary to use inferior quality, locally obtained, posts. On the other hand, posts are in stock at the Sotik factory, but few, if any, Kisii farmers are ordering them. Either they do not know how to go about requisitioning them, or they prefer to substitute cheaper, untreated and, therefore, less durable posts, cut from the forest. (See Chapter 6, Section (b).)

Out of the 60 farmers interviewed, 29 (i.e. 48%) started their passion fruit plantations entirely from their own savings; no farmer relied solely on a loan from H.C.D.A. or others to initiate production.

Since only just over half the farmers interviewed made use of the Loans Scheme, this may well be a further indication of their poor horticultural training and the low level of communication between farmers, field staff and factory. Three farmers in Kisii and 1 in Central Province stated that they were not aware of the Loans Scheme.

33. The H.C.D.A. supplies the posts and wire, and the K.F.P. distributes them.

(d) Motivation for starting passion fruit production

Although 46 out of 60 growers (i.e. 76%) complained that the price paid by the K.F.P. for the fruit is too low, 37 out of 60 (i.e. 61%) said that the reason they grew passion fruit rather than other cash crops was that passion fruit cultivation was more profitable. (See Table 6.3 and 8.2.) Of the Kisii farmers, 22 out of 30 (i.e. 73%) said the price was too low, but all the producers interviewed (i.e. 100%), stated that they grew passion fruit because it was profitable. In Central Province, 10 out of 30 farmers (i.e. 33%) grew passion fruit because it was a newly introduced cash crop, and they wanted to give it a trial.

(e) Propagation of the orchards

Of 60 farmers interviewed, only 9 raised their plants from seeds; the remaining 51 followed the Ministry of Agriculture's recommendation of raising from seedlings supplied by K.F.P. or the Ministry of Agriculture. This is further evidence of lack of horticultural training on the part of those farmers growing from seeds. Plants propagated from seeds take about 18 months to bear fruit, whereas those raised from seedlings begin to bear fruit after 9 months (20, p.4).

(f) Average acreage

The recommended spacing for passion fruit vines is three yards between the plants and two yards between

TABLE 6.3: Why Passion Fruit is grown rather than Other Cash Crops, Kenya, 1976

| REASONS | NYANZA PROVINCE | | CENTRAL PROVINCE | | NYANZA AND CENTRAL PROVINCES COMBINED | |
|---------------------------------------|-------------------|----------------------|-------------------|----------------------|---------------------------------------|----------------------|
| | NUMBER OF REPLIES | PERCENTAGE FREQUENCY | NUMBER OF REPLIES | PERCENTAGE FREQUENCY | NUMBER OF FARMERS | PERCENTAGE FREQUENCY |
| MORE PROFITABLE THAN OTHER CASH CROPS | 30 | 100.00 | 7 | 21.88 | 37 | 59.68 |
| DECIDED TO TRY NEW CASH CROP | - | - | 10 | 31.25 | 10 | 16.13 |
| REGULARITY OF PAYMENT | - | - | 6 | 18.75 | 6 | 9.68 |
| ASSURED MARKET | - | - | 3 | 9.37 | 3 | 4.84 |
| EASY TO GROW | - | - | 2 | 6.25 | 2 | 3.23 |
| OTHER REASONS | - | - | 4 | 12.50 | 4 | 6.45 |

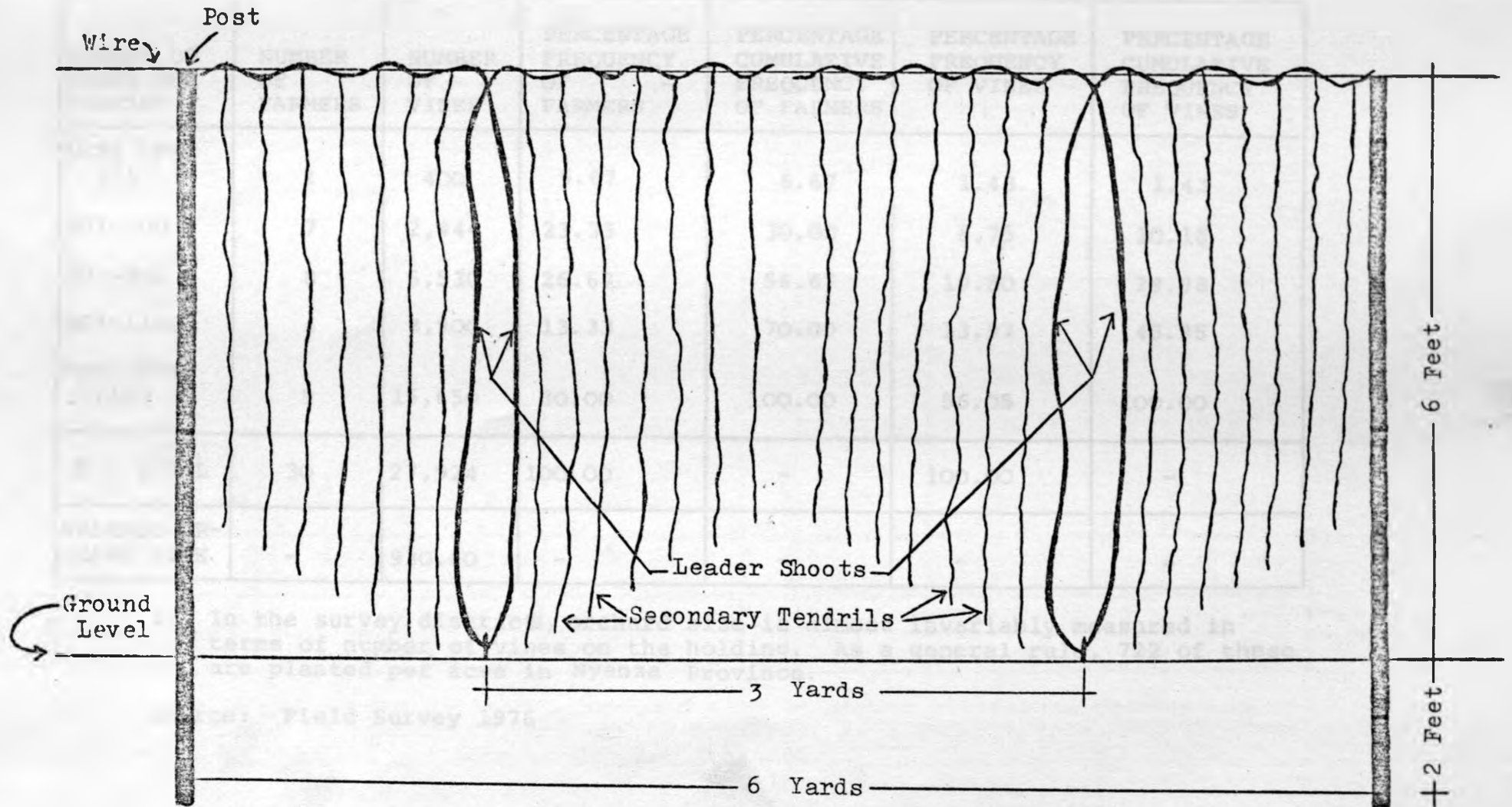
Source: Field Survey 1976

the rows (4). This results in about 800 vines per acre. It has been found that in Central Province, the average number of vines per acre is 700, but in Nyanza Province it is 722 (29). If the recommended spacing is followed, 380 posts are required per acre. In addition, 72 kgs. of wire are needed to string across the tops of the posts (29). The vines are trained up to the wire, and then along it. Lateral shoots are then trained to grow down to the ground. (See Figure 6.1.)

The results of the survey show that farmers in Central Province tend to have smaller passion fruit plots than in Kisii. As can be seen from Table 6.4, 50% of the farmers in Central Province grow less than 201 vines, whereas in Kisii only 6% grow less. The average orchard size was 930 plants in Kisii (i.e. 1.29 acres) and 542 in Central Province (i.e. 0.77 acres). The combined average for Kisii and Central Province was 737 vines (i.e. 1.04 acres).

These findings differ from the figures supplied by the K.F.P. The company estimates that the average number of vines in the two producing regions is the same, and that this is between 119 and 178 plants per farmer (29). The fact that the survey sample size was small relative to the total number of growers could account, only in part, for the very large difference in the results. It is difficult to believe that the very serious discrepancy is due solely to this factor.

Figure 6.1: Trellising of Passion Fruit Vines - a Cross-Sectional Sketch of the Most Commonly Practiced System, Kenya, 1976



Source: Field Survey 1976

TABLE 6.4: Comparative Orchard Sizes¹ in the two main Passion Fruit Producing Areas: Nyanza Province, Kenya, 1976

Part I

| NUMBER OF VINES PER HOLDING | NUMBER OF FARMERS | NUMBER OF VINES | PERCENTAGE FREQUENCY OF FARMERS | PERCENTAGE CUMULATIVE FREQUENCY OF FARMERS | PERCENTAGE FREQUENCY OF VINES | PERCENTAGE CUMULATIVE FREQUENCY OF VINES |
|-----------------------------|-------------------|-----------------|---------------------------------|--|-------------------------------|--|
| LESS THAN 201 | 2 | 400 | 6.67 | 6.67 | 1.43 | 1.43 |
| 201-500 | 7 | 2,444 | 23.33 | 30.00 | 8.75 | 10.18 |
| 501-800 | 8 | 5,530 | 26.67 | 56.67 | 19.80 | 29.98 |
| 801-1,100 | 4 | 3,900 | 13.33 | 70.00 | 13.97 | 43.95 |
| MORE THAN 1,100 | 9 | 15,650 | 30.00 | 100.00 | 56.05 | 100.00 |
| T O T A L | 30 | 27,924 | 100.00 | - | 100.00 | - |
| AVERAGE OR-CHARD SIZE | - | 930.80 | - | - | - | - |

1. In the survey districts, orchard size is almost invariably measured in terms of number of vines on the holding. As a general rule, 722 of these are planted per acre in Nyanza Province.

Source: Field Survey 1976

TABLE 6.4: Comparative Orchard Sizes¹ in the two main Passion Fruit Producing Areas: Central Province, Kenya, 1976

Part II

| NUMBER OF VINES PER HOLDING | NUMBER OF FARMERS | NUMBER OF VINES | PERCENTAGE FREQUENCY OF FARMERS | PERCENTAGE CUMULATIVE FREQUENCY OF FARMERS | PERCENTAGE FREQUENCY OF VINES | PERCENTAGE CUMULATIVE FREQUENCY |
|-----------------------------|-------------------|-----------------|---------------------------------|--|-------------------------------|---------------------------------|
| LESS THAN 201 | 15 | 1,944 | 50.00 | 50.00 | 11.94 | 11.94 |
| 201-500 | 5 | 1,830 | 16.67 | 66.67 | 11.24 | 23.18 |
| 501-800 | 5 | 3,170 | 16.67 | 83.34 | 19.48 | 42.66 |
| 801-1,100 | 1 | 1,100 | 3.33 | 86.67 | 6.76 | 49.42 |
| MORE THAN 1,100 | 4 | 8,232 | 13.33 | 100.00 | 50.58 | 100.00 |
| T O T A L | 30 | 16,276 | 100.00 | - | 100.00 | - |
| AVERAGE OR-CHARD SIZE | - | 542.53 | - | - | - | - |

1. In the survey districts, orchard size is almost invariably measured in terms of number of vines on the holding. As a general rule, 700 of these are planted per acre in Central Province.

Source: Field Survey 1976

TABLE 6.4: Comparative Orchard Sizes¹ in the two main Passion Fruit Producing Areas: Nyanza and Cental Provinces combined, Kenya, 1976
Part III

| NUMBER OF VINES PER HOLDING | NUMBER OF FARMERS | NUMBER OF VINES | PERCENTAGE FREQUENCY OF FARMERS | PERCENTAGE CUMULATIVE FREQUENCY OF FARMERS | PERCENTAGE FREQUENCY OF VINES | PERCENTAGE CUMULATIVE FREQUENCY OF VINES |
|-----------------------------|-------------------|-----------------|---------------------------------|--|-------------------------------|--|
| LESS THAN 201 | 17 | 2,344 | 28.33 | 28.33 | 5.30 | 5.30 |
| 201-500 | 12 | 4,274 | 20.00 | 48.33 | 9.67 | 14.97 |
| 501-800 | 13 | 8,700 | 21.67 | 70.00 | 19.68 | 34.66 |
| 801-1,100 | 5 | 5,000 | 8.33 | 78.33 | 11.31 | 45.97 |
| MORE THAN 1,100 | 13 | 23,882 | 21.67 | 100.00 | 54.03 | 100.00 |
| T O T A L | 60 | 44,200 | 100.00 | - | 100.00 | - |
| AVERAGE OR-CHARD SIZE | - | 736.67 | - | - | - | - |

1. In the survey districts, orchard size is almost invariably measured in terms of vines on the holding. The combined average for Nyanza and Central Provinces is 711 plants per acre.

Source: Field Survey 1976

If the K.F.P.'s estimate is not accurate, it would call into question the factory's estimates of total area under cultivation and the total number of growers. The reason for this doubt is that the average plot size was calculated from these figures.

(g) Farmers' opinion of the Integrated System

Asked to comment on the Integrated System operated by the K.F.P., 97% of the Central Province farmers replied that it was "good", or words to that effect, and 3% thought it was "not good". In Kisii, 43% said that the system was "good" and 57% said it was "not good".

(h) Farmer training

The technical educational level of farmers poses a range of serious problems. Evidence for this was frequently manifested: for example, (i) farmers were unaware of the recommended dosage of chemical sprays³⁴ (see Chapter 7, Section I (g)) and (ii) the Ministry of Agriculture recommendations of daily harvesting (to avoid sun-scorch and reduce weight loss of the fruit)

34. A farmer in Kisii was annoyed at the suggestion (made by the H.C.D.A. field representative) that he did not use sufficient chemical spray. He insisted that he did use enough because he made up the necessary quantity of spray by adding a greater quantity of water. Other farmers admitted that they did not know the correct dosage, whereas others did know but explained that the chemical was too expensive. Rather than not spray at all, they used less than the recommended dosage.

was only rarely followed in Kisii. To ensure that fruit is of the necessary sugar content, K.F.P. recommends, indeed, requires, farmers to allow fruit to fall off the vines and collect it from the ground. If the fruit is left in the hot sun, sun-scorch results. Such fruit is unsuitable for processing, and if delivered to the K.F.P. it must, of course, be rejected. Furthermore, if fruit is left on the ground, loss of weight is inevitable. Average weight losses in Motamanywa on this account were found to be 27.5% in the dry months and 16.2% during wet ones (21, p.24). Since the K.F.P. pays according to the weight of sound fruit received, farmers are incurring very substantial losses of income under this heading alone.

As can be seen from Table 6.5, 93% of the Central Province growers harvest daily, as compared to only 16% of the Kisii farmers. Over 43% of the Kisii growers harvest only once a week. It seems very probable that these extremely poor husbandry practices are due to inadequate communications between field advisory staff and the farmers in Kisii. Growers in both regions complained of not seeing the field staff frequently enough. Indeed, one farmer in Kiambu stated that he was unaware of the existence of field staff³⁵.

35. The Ministry of Agriculture records an average of 1 field staff member responsible for 250 farms (30). It is extremely difficult for field staff to visit each farm, as there is no provision of transport.

TABLE 6.5: Frequency of Passion Fruit Harvesting among 60 Growers in Nyanza and Central Provinces, Kenya, 1976

| AREA FREQUENCY OF HARVESTING | NYANZA PROVINCE | | | CENTRAL PROVINCE | | | NYANZA AND CENTRAL PROVINCES COMBINED | | |
|------------------------------------|-----------------------------|-------------------------|--|-----------------------------|-------------------------|--|--|-------------------------|--|
| | ACTUAL NUMBER OF FARMERS | PERCENTAGE FREQUENCY | PERCENTAGE COMMULATIVE FREQUENCY | ACTUAL NUMBER OF FARMERS | PERCENTAGE FREQUENCY | PERCENTAGE CUMMULATIVE FREQUENCY | ACTUAL NUMBER OF FARMERS | PERCENTAGE FREQUENCY | PERCENTAGE CUMMULATIVE FREQUENCY |
| DAILY | 5 | 16.67 | 16.67 | 28 | 93.33 | 93.33 | 33 | 55.00 | 55.00 |
| THRICE WEEKLY | 3 | 10.00 | 26.67 | 1 | 3.33 | 96.66 | 4 | 6.67 | 61.67 |
| TWICE WEEKLY | 9 | 30.00 | 56.67 | 0 | 0.00 | 96.66 | 9 | 15.00 | 76.67 |
| WEEKLY | 13 | 43.33 | 100.00 | 1 | 3.33 | 100.00 | 14 | 23.33 | 100.00 |
| T O T A L | 30 | 100.00 | - | 30 | 100.00 | - | 60 | 100.00 | - |

Source: Field Survey 1976

(i) Communications

In Kisii especially, it was found that there was a general lack of communication between the farmers and the K.F.P. The growers consider that the factory does not take sufficient interest in them. A general complaint was that the K.F.P. does not arrange meetings to discuss difficulties and explain company policies³⁶. Of 60 passion fruit growers interviewed, 12 want closer contact with the factory: 11 of these were from Kisii, and only 1 from Central Province. (See Table 8.2.) Of the same 11 Kisii farmers, 6 expressed the desire to have meetings attended by the General Manager, as was the custom earlier. The farmers in Central Province had not experienced personal contact with the previous General Manager and, consequently, do not experience the same isolation effect as do the Kisii producers.

A further example of poor communication is the problem of posts needed for trellising the vines. Three Kisii farmers complained that they were unable to obtain the required posts, while the Sotik factory management grumbled that posts were lying at the factory

36. This problem is accentuated by the fact that the former General Manager of the K.F.P. resided in Sotik and regularly accompanied the collection vehicle to talk with growers. The Kisii farmers do not understand that as the present General Manager is based in Thika, he is unable to visit the farmers surrounding Sotik regularly.

because farmers never ordered them (29). (See Table 8.2.) Upon investigation, it was discovered that the growers did not know the requisitioning procedure. They were under the mistaken idea that a lorry was supposed to automatically distribute posts to farmers who need them. The farmers stated that they "missed the lorry bringing posts", and wanted to know when the next one was due. When questioned, they asserted that the field staff had informed them that this was the method the K.F.P. was using to distribute posts³⁷. Whether the field staff was misinformed, uninterested or lazy is open to speculation.

A further indication of poor communication is the fact that 4 producers stated that they would prefer payments through the bank. (See Table 8.2). This facility is, in fact, available on request, but the farmers were not aware of this.

Other evidence of poor communication is that the farmers were never sure about which day the K.F.P. would be paying out. The field staff is responsible for informing the farmers about the paying-out date,

37. The procedure by which posts and wire are distributed is for farmers to inform the field officer of their requirements. He, in turn, requisitions from K.F.P. Subject to availability, the company then sends the requested posts and wire to the farmer with the next collection vehicle. The chemical spray is usually available on each collection van.

but many growers declared that they were seldom informed³⁸.

(j) Kisii Farmers' reaction to the Thika factory
location

The Kisii farmers continue to resent the establishment, in 1972, of the processing plant in Thika. They feel that they have been slighted, and are of the opinion that the factory should have been built in Kisii. Despite the fact that the answer was not relevant to the question being posed, 3 growers replied that the second factory should have been established at Sotik when asked how the K.F.P. could provide better service. (See Table 8.2.) While conducting the interviews, a typical remark made by the Kisii farmers was to the effect that they started growing passion fruit in Kisii, therefore the new factory should be there.

38. This contention was borne out by the fact that on the third pay-out route in Kisii, only 3 interviews were conducted due to the fact that farmers were not notified of the vehicle's impending arrival. (See Chapter 5, Section (e).)

There continues to be much ill-feeling towards the K.F.P. Thika headquarters. This is demonstrated by the fact that the Kisii farmers gave 20% more suggestions for improving K.F.P. services than their Central Province counterparts³⁹. Furthermore, 57% of the Kisii growers interviewed said the K.F.P.'s integrated system was "not good", as compared to only 3% in Central Province. (See Chapter 6, Section (g).) The farmers' dissatisfaction with the company is also reflected in the assumption that the "Group Leader" system was deliberately abolished by the K.F.P., rather than at the leaders' own request. (See Chapter 4, Section (a) and Chapter 8, Section I(h).)

The Kisii farmers hold the management responsible for the district's loss of the status of being the only passion fruit producing area in Kenya, and its subsequent decline in importance. Two former Kisii growers voiced the opinion that the Sotik factory is "dying-off", and felt that if they resumed growing passion fruit, they might be left "high and dry" with no one to whom to sell

39. The Kisii growers interviewed offered 115 proposals for improvement compared with 95 suggestions from Central Province.

the fruit⁴⁰. There is a general resentment throughout the district, and farmers feel neglected. This feeling of being by-passed is demonstrated in Table 8.2 which indicates that 10 Kisii producers expressed the desire for closer contact between the farmers and the factory. (See Section (i).)

40. Although it is generally felt in the area that the K.F.P. is allowing the Kisii production to "die-off" in order to expand Central Province production, this is not the officially declared policy of the company. However, the K.F.P. management has intimated in a private interview (29), that it would not be averse to concentrating on Central Province and gradually phasing-out Kisii. The feeling that they are regarded by the K.F.P. as a burden, has communicated itself to the Kisii producers.

CHAPTER 7

PROFITABILITY OF GROWING PASSION FRUIT

In this chapter it is intended to shed some light on the profitability of growing passion fruit. To this end, Section I will show the present estimated average net returns to farmers, as computed from the field survey. Section II contains estimates of the average net returns that farmers can expect to earn if they implement Lippmann's recommendations.

I. Calculation of Present Average Net Returns

(a) Initial cost of commencing production

When commencing production, producers are faced with a choice of posts: they can either use the special-purpose, treated posts supplied through the K.F.P., or they can use improvised cheaper ones obtained from the nearby forest.

Although the latter type of post costs an average of only KShs.2.00 (or free of payment if the farmer searches for them himself in the surrounding forest), they frequently break under the weight of fruit-bearing vines. This was a common complaint in the Central Province area where farmers had found it necessary to use the improvised material. (See Chapter 6, Section (c).) The survey showed that 17 out of the 30 Central Province growers interviewed complained of lack of durable posts. (See Table 8.2.) These farmers complained that their substitute beams broke easily and lasted only two to three years.

The posts purchased through the K.F.P. cost KShs.4.00 each, and, being treated against rotting and termites, last at least ten years(29). In the calculations of the average net returns, a cost of KShs.4.00 per post was used.

The current price of wire through the K.F.P. is KShs.7.00 per kg.⁴¹. A source of wire may soon become available and, if it materializes, wire may cost the producers KShs.5.00 per kg. (29).

To establish one acre of fruit production, 72 kg. of wire and 380 posts are required. At KShs.7.00 per kg. and KShs.4.00 each for wire and posts respectively, it costs the farmer KShs.504.00 for wire and KShs.1,520.00 for posts. The total cost for wire and posts for one acre is KShs.2,024.00.

(b) Type of labour employed

The 60 farmers interviewed used family labour, permanently employed labour, casual labour and combinations of these. Most of the children working on their parents' farm, did so on a part-time basis, since they attended school⁴².

41. The local price for similar wire is KShs.8.50 per kg. (29).

42. It was not possible to determine the exact numbers attending school because the number of offspring is a sensitive subject with the farmers. Most of those interviewed attempted to skirt around the subject and would not give a definite answer. Apparently this phenomenon is due to a belief in the localities that to disclose this type of personal family information invites evil on those discussed.

(c) Labour requirements

The actual labour requirements for setting up and producing passion fruit could not be ascertained from the survey. The farmers were unable to recall and isolate the labour input in setting up production, from the other costs. Furthermore, farmers did not consider the cost of personal labour, but only the actual monetary expense incurred in hiring. Farmers were not able to isolate the amount of time spent on passion fruit cultivation from that spent on other farm enterprises.

Of the 60 growers interviewed, 34 hired labour. The number of mandays for hired casual workers ranged from 9 to 336 per year. (See Table 7.1 and 7.2.)

In the case of regularly hired workers it was impossible to allocate time between passion fruit and other work. For this reason the permanent workers' mandays were not included in the analysis. However, the recorded casual labourers worked solely on passion fruit, and, therefore, only these were utilized in arriving at the figures given in Tables 7.1 and 7.2. The figures were converted to mandays per acre and rounded to two decimal places. The consequence of using only casual labour in the analysis is that the sample size is drastically reduced: only 8 producers in Kisii employed casual labour, and 13 in Central Province. Since the sample size is extremely small,

TABLE 7.1: Passion Fruit Production: Annual Hired Casual Labour Requirements per Acre on Established Plantations, Nyanza Province, Kenya, 1976
(Number of Mandays per Year, Rounded to Two Decimal Places)

| MONTH INTER- VIEW NUMBER | JAN. | FEB. | MARCH | APRIL | MAY | JUNE | JULY | AUG. | SEPT. | OCT. | NOV. | DEC. | TOTAL PER YEAR |
|--------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------------------|
| 4 | - | - | - | 40.92 | - | - | - | - | 40.92 | - | - | - | 81.84 |
| 7 | 13.48 | 13.48 | 13.48 | 13.48 | 13.48 | 13.48 | 13.48 | 13.48 | 13.48 | 13.48 | 13.48 | 13.48 | 161.76 |
| 12 | 10.11 | 10.11 | 10.11 | 10.11 | 10.11 | 10.11 | 10.11 | 10.11 | 10.11 | 10.11 | 10.11 | 10.11 | 121.32 |
| 14 | 18.57 | 18.57 | 18.57 | 18.57 | 18.57 | 18.57 | 18.57 | 18.57 | 18.57 | 18.57 | 18.57 | 18.57 | 222.84 |
| 15 | 6.50 | 6.50 | 6.50 | 6.50 | 6.50 | 6.50 | 6.50 | 6.50 | 6.50 | 6.50 | 6.50 | 6.50 | 78.00 |
| 18 | 7.22 | 7.22 | 7.22 | 7.22 | 7.22 | 7.22 | 7.22 | 7.22 | 7.22 | 7.22 | 7.22 | 7.22 | 86.64 |
| 27 | 7.22 | 7.22 | 7.22 | 7.22 | 7.22 | 7.22 | 7.22 | 7.22 | 7.22 | 7.22 | 7.22 | 7.22 | 86.64 |
| 28 | 20.22 | 20.22 | 20.22 | 20.22 | 20.22 | 20.22 | 20.22 | 20.22 | 20.22 | 20.22 | 20.22 | 20.22 | 242.64 |
| AVERAGE | 10.42 | 10.41 | 10.42 | 15.53 | 10.41 | 10.42 | 10.41 | 10.42 | 15.53 | 10.41 | 10.42 | 10.41 | 135.21 |

Source: Field Survey 1976

TABLE 7.2: Passion Fruit Production: Annual Hired Casual Labour Requirements
 Established Plantations, Central Province, Kenya, 1976
 (Number of Mandays per year, Rounded to Two Decimal Places)

| MONTH INTER- VIEW NUMBER | JAN. | FEB. | MARCH | APRIL | MAY | JUNE | JULY | AUG. | SEPT. | OCT. | NOV. | DEC. | TOTAL PER YEAR |
|--------------------------------|-------|-------|-------|-------|-------|-------|------|-------|-------|------|-------|-------|-------------------|
| 4 | - | - | - | 28.00 | - | 28.00 | - | - | - | - | 28.00 | 28.00 | 112.00 |
| 5 | - | - | - | 4.00 | - | 4.00 | - | - | - | - | 4.00 | 4.00 | 16.00 |
| 8 | - | - | - | 48.84 | 48.84 | - | - | - | - | - | 48.84 | 48.84 | 195.36 |
| 13 | - | - | - | 21.00 | 21.00 | - | - | - | - | - | 21.00 | 21.00 | 84.00 |
| 14 | 84.00 | 84.00 | - | 84.00 | 84.00 | - | - | - | - | - | - | - | 336.00 |
| 16 | 2.33 | 2.33 | - | 2.33 | 2.33 | - | - | - | - | - | - | - | 9.32 |
| 17 | 20.26 | 20.26 | - | 20.26 | 20.26 | - | - | - | - | - | - | - | 81.04 |
| 19 | 6.32 | - | - | - | - | 6.32 | - | - | 6.32 | - | 6.32 | - | 25.28 |
| 20 | - | - | 70.00 | - | - | - | - | - | - | - | - | - | 70.00 |
| 21 | - | - | 24.00 | 24.00 | - | - | - | - | - | - | 24.00 | 24.00 | 96.00 |
| 24 | - | - | 22.40 | 22.40 | - | - | - | 22.40 | 22.40 | - | - | - | 89.60 |
| 25 | - | - | 5.73 | 5.73 | - | - | - | 5.73 | 5.73 | - | - | - | 22.92 |
| 29 | - | - | 24.50 | 24.50 | - | 24.50 | - | - | - | - | 24.50 | - | 98.00 |
| AVERAGE | 8.69 | 8.20 | 11.28 | 21.93 | 13.57 | 4.83 | 0.00 | 2.16 | 2.65 | 0.00 | 12.05 | 9.68 | 95.04 |

Source: Field Survey 1976

no statistically valid conclusions can be drawn, of course. Nevertheless, it does provide a useful indication of the seasonal labour profile. In Central Province the peak month is April. Kisii has two peaks: one in April and a second one in September. These peaks coincide with the rainy seasons in each area⁴³, and support the farmers' contention that they hire casual labour especially for weeding and pruning, since the rain greatly increases vegetative growth. Furthermore, the higher average labour requirement figure for Kisii is probably accounted for, at least in part, by the higher rainfall in that area.

(d) Average wages

Permanent workers not provided with food were paid at a daily rate equal to that received by casual workers. Therefore, those permanent workers not provided with food were tabulated with casual workers (also not provided with food). The permanent workers who were given food in addition to their wages were recorded separately.

The average daily wage in Central Province for workers without food was KShs.6.40. In Kisii, the average was KShs.5.94. These figures were calculated from the wages received by 50 labourers in Central Province, and 20 in Kisii.

Permanent workers in Kisii receiving food in addition to their wages earned an average of KShs.2.40

43. In Kisii District, the greatest rainfall is in April and September (21, p.4), whereas in Central Province, the heaviest rainfall occurs between mid-March and mid-May (18, p.8).

per manday. This is based on the earnings of 16 workers. In Central Province, only one farmer employed non-family labour and included food as part of the wages. This farmer had 3 labourers and paid KShs.1.25 per manday. This figure seemed almost incredible and was carefully re-checked during the interview.

(e) Pruning

Pruning was carried out by all but one of the 60 farmers interviewed. In Kisii, producers pruned an average of 4.30 times per year, and in Central Province 5.67 times yearly.

Pruning requires a heavy labour input, and, where performed by hired workers, represents a high cost factor in terms of mandays. Lippmann found that the pruning of a plant takes from three to twelve minutes, depending on the frequency of pruning and the quantity of vegetative growth (21, p.36). Taking a crude average of 7.50 minutes, this results in 12.89 and 12.50 mandays per acre in Kisii and Central Province respectively⁴⁴. Since Kisii farmers have a pruning average of 4.30 times a year, and Central Province growers 5.67 times a year, this results in 55.43 mandays per acre in Kisii and 70.88 mandays per acre in Central Province spent on

44. Taking a manday as 7 hours or 420 minutes, this results:
In Kisii: 7.50 minutes x 722 average number of vines per acre = 5,415 minutes. Therefore, $5,415 \div 420 = 12.89$ mandays.
In Central Province: 7.50 minutes x 700 average number of vines per acre = 5,250 minutes. Therefore, $5,250 \div 420 = 12.50$ mandays.

pruning per year. (See Tables 7.8 and 7.9.) Lippmann recommends farmers not to prune, since this does not significantly lengthen the life of the vines (21, p.44). The disentangling of vines, rather than pruning, is now recommended. (See Chapter 7, Section II (a).)

(f) Weeding

The Kisii producers weed an average of 7.13 times a year, whereas the Central Province growers average 4.13 times a year. The reason for more frequent weeding in Kisii District is probably the greater amount of rainfall in this area (18, p.7).

According to Lippmann's findings, about 3.65 mandays are required for each weeding of an acre of passion fruit (27, p.3; 21, p.2). Therefore, in Kisii, 26.02 mandays would be required per year, and 15.07 in Central Province⁴⁵. Multiplying the mandays by the regions' respective average wages brings the yearly cost of weeding one acre to KShs.154.59 in Kisii and KShs.96.48 in Central Province. (See Tables 7.9 and 7.10.)

(g) Fungicide spraying

Of the 60 producers interviewed, 54 (i.e. 90%) sprayed with a fungicide to combat Brown Spot Disease.

45. In Kisii: $3.65 \text{ mandays} \times 7.13 = 26.02 \text{ mandays}$. In Central Province: $3.65 \text{ mandays} \times 4.13 = 15.07 \text{ mandays}$.

This treatment is recommended by the Ministry of Agriculture, the H.C.D.A. and the K.F.P. The K.F.P. distributes this chemical from its collection vans, and farmers either pay cash or through the H.C.D.A. Inputs Credit Scheme. The cost for one 170 gram packet is KShs.5.15.

The recommended chemical is Dithane M-45. The suggested dosage is one packet (containing 170 grams) for 200 vines, once per month. Table 7.3 shows the number of packets the farmers used for 200 vines. Table 7.4 indicates the frequency of spraying.

As can be seen from Table 7.3, only 36% of the farmers who treated their plants, sprayed approximately correct amounts of Dithane, i.e. between 0.75 and 1.49 packets for 200 vines. Over 38% sprayed insufficient quantities, while over 25% sprayed too much.

Table 7.4 shows that approximately 75% of the Kisii farmers who sprayed did so at least once a month, as compared to 43% in Central Province⁴⁶.

As can be seen from Table 7.3, in Kisii, the average number of packets used per spraying was found to be 1.11 for 200 vines, or 4.01 for 722 vines,

46. The fungicide treatment does not appear to be effective because 45 of the 60 producers interviewed (i.e. 75%), stated that Brown Spot Disease was a serious problem for them. (See Chapter 7, Section I(h) and Chapter 8, Section I(a).)

TABLE 7.3: Quantity of Dithane M-45 used per 200 Vines, Nyanza and Central Provinces, Kenya, 1976

| AREA NUMBER OF PACKETS OF DITHANE M-45 FOR 200 VINES ¹ | NYANZA PROVINCE | | CENTRAL PROVINCE | | NYANZA AND CENTRAL PROVINCE COMBINED | |
|---|---------------------------------------|-------------------------|---------------------------------------|-------------------------|---|-------------------------|
| | NUMBER OF FARMERS INTER- VIEWED | PERCENTAGE FREQUENCY | NUMBER OF FARMERS INTER- VIEWED | PERCENTAGE FREQUENCY | NUMBER OF FARMERS INTER- VIEWED | PERCENTAGE FREQUENCY |
| LESS THAN 0.75 | 12 | 41.38 | 6 | 33.33 | 18 | 38.30 |
| 0.75 TO 1.49 | 10 | 34.48 | 7 | 38.89 | 17 | 36.17 |
| 1.50 TO 2.24 | 4 | 13.79 | 3 | 16.67 | 7 | 14.89 |
| GREATER THAN 2.24 | 3 | 10.35 | 2 | 11.11 | 5 | 10.64 |
| T O T A L | 29 | 100.00 | 18 | 100.00 | 47 | 100.00 |
| AVERAGE NUMBER OF PACKETS USED PER 200 VINES | 1.11 | | 1.25 | | 1.16 | |

1. Each packet contains 170 grams.

Source: Field Survey 1976

TABLE 7.4: Frequency of Spraying with Dithane M-45, Nyanza and Central Provinces, Kenya, 1976

| AREA FREQUENCY OF SPRAYING | NYANZA PROVINCE | | | CENTRAL PROVINCE | | | NYANZA AND CENTRAL PROVINCE COMBINED | | |
|--------------------------------------|--------------------------|----------------------|---------------------------------|--------------------------|----------------------|---------------------------------|--------------------------------------|----------------------|---------------------------------|
| | ACTUAL NUMBER OF FARMERS | PERCENTAGE FREQUENCY | CUMULATIVE PERCENTAGE FREQUENCY | ACTUAL NUMBER OF FARMERS | PERCENTAGE FREQUENCY | CUMULATIVE PERCENTAGE FREQUENCY | ACTUAL NUMBER OF FARMERS | PERCENTAGE FREQUENCY | CUMULATIVE PERCENTAGE FREQUENCY |
| TWO TIMES PER MONTH | 12 | 41.38 | 41.38 | 1 | 4.35 | 4.35 | 13 | 25.00 | 25.00 |
| ONCE A MONTH | 10 | 34.48 | 75.86 | 9 | 39.13 | 43.48 | 19 | 36.54 | 61.54 |
| SIX TIMES A YEAR | 3 | 10.35 | 86.21 | 5 | 21.74 | 65.22 | 8 | 15.38 | 76.92 |
| FOUR TIMES A YEAR | 0 | 0.00 | 86.21 | 4 | 17.39 | 82.61 | 4 | 7.69 | 84.61 |
| LESS THAN FOUR TIMES A YEAR | 4 | 13.79 | 100.00 | 4 | 17.39 | 100.00 | 8 | 15.39 | 100.00 |
| T O T A L | 29 | 100.00 | - | 23 | 100.00 | - | 52 | 100.00 | - |
| AVERAGE NUMBER OF SPRAYINGS PER YEAR | 15.00 | | | 8.42 | | | 12.02 | | |

Source: Field Survey 1976

(i.e. the average number of vines per acre in Kisii). From Table 7.4 can be seen that Kisii growers sprayed 15 times per year on average, or 30 times during the two bearing years.

In Central Province, farmers use an average of 1.25 packets for 200 vines, or 4.38 for 700 vines (i.e. the average number of vines per acre in Central Province). The vines were sprayed an average of 8.42 times per year, or 16.84 times during the two bearing years. According to Lippmann's findings, spraying one hectare 18 times requires 156.6 mandays (21, p.3, 50). Therefore, 3.52 mandays are required to spray one acre once. (See Tables 7.8 and 7.9.)

(h) Brown Spot Disease

This problem is chiefly dealt with in Chapter 8. Nevertheless, it is mentioned here because this disease profoundly affects the yield. Brown Spot Disease causes the fruit to abort prematurely (i.e. before the fruit is fully ripe and sweet), and, consequently, such affected fruit is rejected by the K.F.P. The survey was unable to determine what percentage of fruit is lost in this way, but Mr. Paul Nicholas of the K.F.P. puts the loss at under 10% of the crop. However, as already mentioned, 75% of the growers considered the disease a serious problem. Furthermore, 9 of the 20 Former Passion Fruit Growers (i.e. 45%) who were interviewed, gave this as a reason for discontinuing production.

(i) Application of fertilizer

In Kisii, 18 of the 30 farmers interviewed (i.e. 60%) used fertilizer, whereas in Central Province 28 of the 30 (i.e. 93%) did so.

Tables 7.5 and 7.6 show the quantity of fertilizer applied per acre per year by the farmers interviewed. The Kisii growers in the sample used a greater quantity of chemical fertilizer, but less farmyard manure than their Central Province counterparts. However, the sample was too small to permit any statistically valid conclusions to be drawn.

The farmers used a wide variety of fertilizers, but the most commonly used was Calcium Ammonium Nitrate (CAN). CAN was applied by 65% of the farmers who used chemical fertilizer. The 1975 price for CAN was KShs.90.00 for a 50 kg. bag (10,p.1). Taking an average of 6.20 bags of chemical fertilizer per acre per year in Kisii (see Table 7.5) and 3.97 bags in Central Province (see Table 7.6), this costs the farmers KShs.558.00 and 357.30 in Kisii and Central Province respectively. (See Tables 7.8 and 7.9.)

The cost for manure is not calculated because most (i.e. 80%) of the farmers who applied it, used farmyard manure. Of those who bought manure (i.e. 8 farmers), the prices paid ranged from KShs.2.00 to KShs.50.00 for a 50 kg. bag. Therefore, it would not be meaningful to arrive at an average cost per bag.

TABLE 7.5: Nyanza Province: Type and Quantity of Fertilizer applied by Farmers per Acre per Year, Kenya, 1976

| TYPE OF FERTILIZER APPLIED | ACTUAL NUMBER OF FARMERS | PERCENTAGE FREQUENCY | NUMBER OF BAGS ¹ | |
|-------------------------------------|--------------------------|----------------------|---|----------------------------|
| | | | AVERAGE QUANTITY OF CHEMICAL FERTILIZER | AVERAGE QUANTITY OF MANURE |
| CHEMICAL FERTILIZER ONLY | 4 | 22.22 | 6.03 | - |
| MANURE ONLY | 10 | 55.56 | - | 20.53 |
| BOTH CHEMICAL FERTILIZER AND MANURE | 4 | 22.22 | 6.37 | 12.63 |
| T O T A L | 18 | 100.00 | 6.20 | 18.27 |

1. Chemical Fertilizer = 50 kg. bags
 Manure = Approximately 50 kg. bags

Source: Field Survey 1976

TABLE 7.6: Central Province: Type and Quantity of Fertilizer applied by Farmers per Acre per Year, Kenya, 1976

| TYPE OF FERTILIZER APPLIED | ACTUAL NUMBER OF FARMERS | PERCENTAGE FREQUENCY | NUMBER OF BAGS ¹ | |
|-------------------------------------|--------------------------|----------------------|---|----------------------------|
| | | | AVERAGE QUANTITY OF CHEMICAL FERTILIZER | AVERAGE QUANTITY OF MANURE |
| CHEMICAL FERTILIZER ONLY | 2 | 7.14 | 3.74 | - |
| MANURE ONLY | 5 | 17.86 | - | 115.31 |
| BOTH CHEMICAL FERTILIZER AND MANURE | 21 | 75.00 | 3.99 | 62.21 |
| T O T A L | 28 | 100.00 | 3.97 | 74.01 |

1. Chemical Fertilizer = 50 kg. bags

Manure = Approximately 50 kg. bags

Source: Field Survey 1976

Farmers are advised by the H.C.D.A., the Ministry of Agriculture and the K.F.P., to apply manure and chemical fertilizer to new vines at the time of planting. Table 7.7 indicates the number of growers who planted with either, neither, or both, chemical fertilizer and manure. The cost of fertilizer and manure used for planting purposes was not computed, since the quantities used were not recorded in the survey.

The information on the labour requirements for fertilizer application was unavailable, therefore, no estimate has been made.

(j) Production figures

Only 2 of the 60 producers interviewed knew how much they produced annually. This is another example of the low level of farmer training.

One of the 2 growers who had maintained at least rudimentary records had an annual yield of 3,500 kg. and the other, 4,161 kg. per acre. Both yields are well below the K.F.P. estimate of an average yearly production of 5,250 kg. per acre (29). In calculating the average net returns, the K.F.P.'s estimate of an annual yield of 5,250 kg. per acre was used.

(k) Labour requirements for harvesting

It was possible to calculate a ratio between labour requirements for harvesting and output. Using Lippmann's figures on average yields per hectare (in metric tons) for 8 different experimental variations

TABLE 7.7: New Seedlings planted with Fertilizers, Nyanza and Central Provinces, Kenya, 1976

| | | | | | | | | | | |
|------------------|---------------|----------------------|-------------|----------------------|--------------------------|----------------------|-----------------------------|----------------------|-------------------------|----------------------|
| AREA | CHEMICAL ONLY | PERCENTAGE FREQUENCY | MANURE ONLY | PERCENTAGE FREQUENCY | BOTH CHEMICAL AND MANURE | PERCENTAGE FREQUENCY | NEITHER CHEMICAL NOR MANURE | PERCENTAGE FREQUENCY | TOTAL NUMBER OF FARMERS | PERCENTAGE FREQUENCY |
| NYANZA PROVINCE | 2 | 6.67 | 13 | 43.33 | 8 | 26.67 | 7 | 23.33 | 30 | 100.00 |
| CENTRAL PROVINCE | 0 | 0.00 | 8 | 26.67 | 22 | 73.33 | 0 | 0.00 | 30 | 100.00 |
| TOTAL | 2 | - | 21 | - | 30 | - | 7 | - | 60 | - |

Source: Field Survey 1976

(21, p.34) and the corresponding labour required to harvest the fruit (21, p.50), a ratio of 4.1645 was computed. Therefore, on the basis of the K.F.P. estimated average of 5.25 tons per acre per year, the labour requirement would be 4.1645×5.25 tons, or 21.86 mandays per acre per year.

(1) Crop rotation

Although 49 of the 60 farmers interviewed (i.e. 82%) practised crop rotation of their seasonal crops, only one rotated his passion fruit vines. This failure to practise passion fruit rotation is very probably an important factor in explaining why the average yields are so very much lower than Lippmann's average yields⁴⁷. According to Lippmann, if passion fruit is not rotated, "yields drop rapidly" (27, p.5). The farmers interviewed did not appear to be even remotely aware of the importance of rotating this particular crop. Furthermore, rotating passion fruit is associated with some difficulties: producers must have two areas set up in which they alternate growing the fruit. This requires a double outlay for posts and wire, and sufficient land to permit this rotation. Both these prerequisites pose hardships for the farmers in the initial phase, since small-holders are plagued by lack of ready cash (to buy the extra quantities of posts and wires) and have limited land.

47. Lippmann's average yield for fertilized, pruned and sprayed fruit was 12.26 tons per acre per year (21, p.34).

(m) Calculation of average net returns

The life cycle of passion fruit vines consists of three years: the first nine months in which the as yet immature and unproductive plants are trained and trellised, and two producing years. Depending on the husbandry, the productive life cycle of the vines may be lengthened by six to nine months, but the yields will then be "very low" (27, p.5). Due to the additional costs, it becomes uneconomic to extend the plant life beyond three years (21, pp.43-44). In his calculations on the profitability of passion fruit, Lippmann bases his figures on two productive years, and, therefore, the following estimates are also based on this assumption. The calculations are in Kenya shillings for one acre, over a period of three years.

The posts and wire, if bought through the K.F.P., have a useful life of ten years, i.e. three productive cycles. The cost of the posts and wire, therefore, is divided by three cycles. Nevertheless, since the farmers must pay back the loans for posts and wire within the first life cycle of the vines (29), in practice, producers will find it more profitable to grow passion fruit in the second and third production cycles because this financial burden will have been eliminated.

To calculate the average net returns, an average wage of KShs.5.94 and KShs.6.40 was used for Kisii and Central Province respectively. (See Chapter 7, Section I(d).)

Table 7.8 indicates the average net returns for Kisii producers and Table 7.9 shows the average net returns for Central Province growers.

A Kisii farmer who employs only family labour, thereby avoiding monetary labour costs, must produce at least 3,710.28 kg. per acre per year just to break even⁴⁸. His Central Province counterpart must produce at least 2,658.04 kg.⁴⁹.

When labour is hired, output must be considerably higher to absorb this cost. In order to break even with the costs given in Table 7.8 and 7.9, yield per acre per year must reach a minimum of 6,633.31 kg. in Kisii⁵⁰,

-
48. A Kisii grower who does not hire labour, but who sprays and applies fertilizer, incurs average costs of KShs.2,968.22 per acre over the three years. At 40 cents a kg., production must be at least $2,968.22 \div 0.40 = 7,420.55$ kg. of fruit over the two bearing years, or $7,420.55 \div 2 = 3,710.28$ kg. in each of the two bearing years.
49. A Central Province producer who does not hire labour, but who sprays and applies fertilizer, has an average cost of KShs.2,126.43 per acre over the three years. At 40 cents a kg., production must be at least $2,126.43 \div 0.40 = 5,316.08$ kg. of fruit over the two bearing years, or $5,316.08 \div 2 = 2,658.04$ kg. in each of the two bearing years.
50. Kisii producers who employ labour for all operations incur an average cost of KShs.5,306.65 per acre over the three year period. At 40 cents a kg., output must be at least $5,306.65 \div 0.40 = 13,266.63$ kg. of fruit over the two bearing years, or $13,266.63 \div 2 = 6,633.31$ kg. in each of the two bearing years.

TABLE 7.8: Estimate of Average Net Returns for Nyanza Province Growers,
Kenya, 1976

md = mandays

Average Material Costs

| | | | |
|--|---|-----------------|----------|
| Posts: 380 x 4.00 each | = | 1,520.00 | |
| Wire: 72kg. x 7.00 per kg. | = | <u>504.00</u> | |
| | | 2,024.00 | |
| Cost per production cycle: 2,024.00 ÷ 3 | = | 674.67 | |
| Fungicide: 4.01 packets x 30 x 5.15 | = | 619.55 | |
| Chemical fertilizer: 6.20 bags x 3 years x 90.00 | = | <u>1,674.00</u> | |
| TOTAL MATERIAL COSTS: | | | 2,968.22 |

Average Labour Costs (i.e. Hired Labour only)

| | | | |
|--|---|--------|------------------------|
| Trellising and | | | |
| Pruning: 12.89md x 4.30 x 3 years x 5.94 | = | 987.71 | |
| Weeding: 3.65md x 7.13 x 3 years x 5.94 | = | 463.76 | |
| Fungicide spraying: 3.52md x 30 x 5.94 | = | 627.26 | |
| Harvesting: 21.86md x 2 years x 5.94 | = | 259.70 | |
| Fertilizer application: | | - . - | |
| TOTAL LABOUR COSTS: | | | <u>2,338.43</u> |
| TOTAL COSTS: | | | <u><u>5,306.65</u></u> |

Average Gross Returns

| | | | |
|--|--|--|------------------------|
| Yield: 5,250 kg. x 2 years = 10,500kg. | | | |
| Price paid by K.F.P.: 0.40 per kg. | | | |
| Gross returns: 10,500kg. x 0.40 = | | | <u><u>4,200.00</u></u> |

TABLE 7.8: contd.

Average Net Returns

| | | | | |
|-------------------------|----------|---|----------|---|
| Excluding labour costs: | 4,200.00 | - | 2,968.22 | = |
| per year: | 1,231.78 | ÷ | 3 years | = |
| Including labour costs: | 4,200.00 | - | 5,306.65 | = |
| per year: | 1,106.65 | ÷ | 3 years | = |

Source: Field Survey 1976

= 1,231.78
= 410.59
= 1,106.65
= - 368.88

TABLE 7.9: Estimate of Average Net Returns for Central Province Growers,
Kenya, 1976

md = mandays

Average Material Costs

| | | |
|---|-------------------|----------|
| Posts: 380 x 4.00 each | = 1,520.00 | |
| Wire: 72kg. x 7.00 per kg. | = 504.00 | |
| | <u>2,024.00</u> | |
| Cost per production cycle: 2,024.00 ÷ 3 | = 674.67 | |
| Fungicide: 4.38 packets x 16.84 x 5.15 | = 379.86 | |
| Fertilizer: 3.97 bags x 3 years x 90.00 | = <u>1,071.90</u> | |
| TOTAL MATERIAL COSTS: | | 2,126.43 |

Average Labour Costs (i.e. Hired Labour only)

| | | |
|---|-----------------|------------------------|
| Trellising and | | |
| Pruning: 12.50md x 5.67 x 3 years x 6.40 | = 1,360.80 | |
| Weeding: 3.65 md x 4.13 x 3 years x 6.40 | = 289.43 | |
| Fungicide Spraying: 3.52md x 16.84 x 6.40 | = 379.37 | |
| Harvesting: 21.86 md x 2 years x 6.40 | = <u>279.81</u> | |
| TOTAL LABOUR COSTS: | | 2,309.41 |
| TOTAL COSTS: | | <u><u>4,435.84</u></u> |

Average Gross Returns

| | | |
|---|--|------------------------|
| Yield: 5,250 kg. x 2 years = 10,500 kg. | | |
| Price paid by K.F.P: 0.40 per kg. | | |
| Gross returns: 10,500 kg. x 0.40 = | | <u><u>4,200.00</u></u> |

TABLE 7.9: contd.

Average Net Returns

| | | | |
|-------------------------|----------|---|----------|
| Excluding labour costs: | 4,200.00 | - | 2,126.43 |
| Per year: | 2,073.57 | ÷ | 3 years |
| Including labour costs: | 4,200.00 | - | 4,435.84 |
| Per year: | -235.84 | ÷ | 3 years |

Source: Field Survey 1976

$$\begin{aligned} &= 2,073.57 \\ &= 691.19 \\ &= - 235.84 \\ &= - 78.61 \end{aligned}$$

and 5,544.80 kg. in Central Province⁵¹. The cost for harvesting the fruit, however, will increase as the yield increases⁵².

The estimates in Tables 7.8 and 7.9 represent an indication of the present average net returns to farmers. However, input costs may vary. For example, when posts are not purchased through the K.F.P., the average price for the posts was found to be KShs.2.00. (See Chapter 7, Section I(a).) This decreases the cost of posts to KShs.760.00 per acre. Nevertheless, since such posts on average last for only one production cycle, the average net returns per year for producers not hiring labour would be reduced to KShs.214.15 and KShs.494.75 for Nyanza and Central Province growers respectively. However, the cheaper posts have the advantage of halving the initial cost of entering production, i.e. from KShs.1,520 to KShs.760.00 per acre.

-
51. Central Province growers who employ labour for all their passion fruit's labour requirements incur an average cost of KShs.4,435.84 per acre over the three year period. At 40 cents a kg., to merely break even, output must be at least $4,435.84 \div 0.40 = 11,089.60$ kg. of fruit over the two bearing years, or $11,089.60 \div 2 = 5,544.80$ kg. per acre in each of the two bearing years.
52. Harvest labour requirements (in mandays) will increase by 4.1645 times the metric tonnage increase. (See Chapter 7, Section I(k).)

II. The Probable Effect on Average Net Returns
of Adopting Lippmann's Recommendations

Lippmann conducted his research in Motamanywa, in Kisii District; whilst his findings are particularly relevant to this production area, he considers that the results are also appropriate to Central Province (29).

(a) Pruning

Lippmann proved that pruning does not lengthen the life of the vines (21, p.44). Consequently, he recommends that farmers should no longer prune their vines, but instead follow a method of disentangling vines. This has the effect of increasing the yield per plant since there are more secondary tendrils to bear fruit⁵³. The labour involved in disentangling is not an extra labour cost, since disentangling must be carried out regularly, regardless of whether or not a pruning programme is being followed⁵⁴.

53. On his experimental plots, Lippmann found that yield per acre for unfertilized, unsprayed and unpruned plants averaged 9.77 metric tons per acre per year, as compared to 8.96 metric tons for unfertilized, unsprayed and pruned vines (21, p.34). Therefore, by not pruning, Lippmann increased his yield by an average of 0.81 metric tons per acre per year. This is an increase of 9.04%. Since growers are at present producing an average yield of 5.25 tons per acre per year, it is probable that the average output per acre per year would increase to about 5.72 tons by not pruning. Farmers would thereby stand to increase their incomes by approximately KShs.168.00 per year.

54. Farmers do their disentangling as they prune, consequently there are no separate figures in the survey results for disentangling and pruning. Therefore, by not pruning, farmers will not save the total number of mandays for pruning, but only part of them, since farmers will still need to spend time disentangling their vines.

(b) Fungicide spraying

According to Lippmann's findings, fungicide sprayings definitely increase the yields and the life span of the plants, but the extra costs involved outweighed the additional income (21, pp.44, 65). Consequently, he recommends that spraying should be discontinued. This will result in savings to the growers, since fungicide spraying represents a cost factor in both labour requirements and chemical input. (See Tables 7.8 and 7.9.)

(c) Application of fertilizer

Lippmann found that fertilizer application has no significant effect on output. He suggests that in view of the present high cost of fertilizer, it should not be applied (21, p.65). This would represent a considerable saving to producers. (See Tables 7.8 and 7.9.)

(d) Calculation of average net returns

Tables 7.10 and 7.11 indicate the probable effect on profitability, when growers adopt the new recommendations of not fertilizing, spraying or pruning. These estimates do not include the labour cost for disentangling the vines. (See Footnote 54.)

As can be seen from Tables 7.10 and 7.11, the elimination of fertilizing, spraying and pruning would result in a considerable increase in the average net returns. Before producers will accept these new recommendations, however, time must be spent on full scale

TABLE 7.10: Estimate of the Probable Average Net Returns if Lippmann's
New Recommendations are put into Effect: Nyanza Province
Growers, Kenya, 1976

md = mandays

Average Material Costs

| | | | |
|---|---|---------------|---------------|
| Posts: 380 x 4.00 each | = | 1,520.00 | |
| Wire: 72 kg. x 7.00 per kg. | = | <u>504.00</u> | |
| | | 2,024.00 | |
| Cost per production cycle: 2,024.00 ÷ 3 | = | | <u>674.67</u> |
| TOTAL MATERIAL COSTS: | | | 674.67 |

Average Labour Costs

| | | | |
|--|---|---------------|------------------------|
| Trellising and Disentangling ¹ : | | - . - | |
| Weeding: 3.65 md x 7.13 x 3 years x 5.94 | = | 463.76 | |
| Harvesting: ² 23.82 md x 2 years x 5.94 | = | <u>282.98</u> | |
| TOTAL LABOUR COSTS: | | | <u>746.74</u> |
| TOTAL COSTS: | | | <u><u>1,421.41</u></u> |

Average Gross Returns

| | | | |
|---|---|--|------------------------|
| Yield: 5,720 kg ³ x 2 years = 11,440 kg. | | | |
| Price paid by K.F.P: 0.40 per kg. | | | |
| Gross Returns: 11,440 x 0.40 | = | | <u><u>4,576.00</u></u> |

Average Net Returns

| | | |
|---|---|----------|
| Excluding Labour Costs: 4,576.00 - 674.67 | = | 3,901.00 |
| Per year: 3,901.33 ÷ 3 years | = | 1,300.44 |
| Including Labour costs: 4,576.00 - 1,421.41 | = | 3,154.59 |
| Per year: 1,051.53 ÷ 3 years | = | 1,051.53 |

TABLE 7.10: contd.

1. It is not possible to determine the amount of time spent on disentangling the vines. Consequently, no figures have been given. (See also Footnote 54.)
2. By not pruning, the expected average yield would increase to about 5.72 tons. (See Footnote 52.) With a ratio of output to labour requirement of 4.1645, the required labour for harvesting would be 5.72×4.1645 , i.e. 23.82 mandays.
3. See Footnote 52.

Source: Field Survey 1976

TABLE 7.11: Estimate of the Probable Average Net Returns if Lippmann's New Recommendations are put into Effect: Central Province Growers, Kenya, 1976

md = mandays

Average Material Costs

| | | | |
|--------------------------------------|---|---------------|--------|
| Posts: 380 x 4.00 each | = | 1,520.00 | |
| Wire: 72kg. x 7.00 per kg. | = | <u>504.00</u> | |
| | | 2,024.00 | |
| Cost per production cycle: 2,024 ÷ 3 | = | <u>674.67</u> | |
| TOTAL MATERIAL COSTS: | | | 674.67 |

Average Labour Costs

| | | | |
|--|---|---------------|------------------------|
| Trellising and Disentangling ¹ : | | -.- | |
| Weeding: 3.65 md x 4.13 x 3 years x 6.40 | = | 289.43 | |
| Harvesting: ² 23.82 md x 2 years x 6.40 | = | <u>304.90</u> | |
| TOTAL LABOUR COSTS: | | | <u>594.33</u> |
| TOTAL COSTS: | | | <u><u>1,269.00</u></u> |

Average Gross Returns

| | | | |
|---|---|--|------------------------|
| Yield: 5,720 kg ³ x 2 years = 11,440 kg. | | | |
| Price paid by K.F.P: 0.40 per kg. | | | |
| Gross Returns: 11,440 x 0.40 | = | | <u><u>4,576.00</u></u> |

Average Net Returns

| | | |
|---|---|----------|
| Excluding Labour Costs: 4,576.00 - 674.67 | = | 3,901.33 |
| Per year: 3,901.33 ÷ 3 years | = | 1,300.44 |

TABLE 7.11, contd.

| | | | |
|-------------------------|---------------------|---|----------|
| Including Labour Costs: | 4,576.00 - 1,269.00 | = | 3,307.00 |
| Per year: | 3,307.00 ÷ 3 years | = | 1,102.33 |

1. It is not possible to determine the amount of time spent on disentangling the vines. Consequently, no figure have been given. (See also Footnote 54.)
2. By not pruning, the expected average yield would increase to about 5.72 tons. (See Footnote 52.) With a ratio of output to labour requirement of 4.1645, the required labour for harvesting would be 5.72 x 4.1645, i.e. 23.82 mandays.
3. See Footnote 52.

Source: Field Survey 1976

commercial trials and on re-educating and training growers to accept revised recommendations.

Although Lippmann took great care to carry out his research scientifically and cautiously, it must be remembered that only four repetitions of the experiments were performed. Furthermore, the experiments were conducted in Kisii and, although Lippmann considers the results appropriate to Central Province, this needs to be proved empirically. Different soil types and climatic conditions may require different optimal inputs.

CHAPTER 8

PROBLEMS ENCOUNTERED BY FARMERS

I. Present Passion Fruit Growers

The survey results brought to light a number of problems which farmers have been encountering with passion fruit production and these are summarised in Table 8.1. Table 8.2 contains growers' suggestions as to how K.F.P. services to growers can be improved.

(a) Brown Spot Disease

From Table 8.1 it can be seen that producers regard Brown Spot Disease as the major problem in passion fruit cultivation. In Kisii, 28 out of 30 farmers (i.e. 93%) cited this disease as the chief production hazard, and in Central Province the corresponding figure was 17 out of 30 (i.e. 57%).

Lippmann observed that the incidence of Brown Spot Disease was not serious in his experimental plots (21, p.16). He further noted that the symptoms invariably appeared only after parts of the plants had been injured. These injuries could be due to careless weeding⁵⁵; disentangling of the vines; pruning; plucking

55. The roots of the vines are close to the surface and are, consequently, easily damaged if hoeing is carried out carelessly.

TABLE 8.1: Difficulties Farmers reported concerning the Cultivation of Passion Fruit, Nyanza and Central Provinces, Kenya, 1976

| PROBLEM | NYANZA PROVINCE | PERCENTAGE FREQUENCY | CENTRAL PROVINCE | PERCENTAGE FREQUENCY | TOTAL | PERCENTAGE FREQUENCY |
|---|-----------------|----------------------|------------------|----------------------|-------|----------------------|
| BROWN SPOT DISEASE | 28 | 45.16 | 17 | 30.36 | 45 | 38.14 |
| WOODINESS DISEASE | 8 | 12.90 | 0 | 0.00 | 8 | 6.78 |
| POSTS NOT AVAILABLE | 3 | 4.84 | 17 | 30.36 | 20 | 16.95 |
| WIRE NOT AVAILABLE | 0 | 0.00 | 11 | 19.64 | 11 | 9.32 |
| POSTS AND WIRE ARE TOO EXPENSIVE | 6 | 9.68 | 1 | 1.78 | 7 | 5.93 |
| LACK OF SPRAY PUMPS (FOR FUNGICIDE APPLICATION) | 10 | 16.13 | 3 | 5.36 | 13 | 11.02 |
| LABOUR REQUIREMENT TOO HIGH | 5 | 8.06 | 4 | 7.14 | 9 | 7.63 |
| OTHER | 2 | 3.23 | 3 | 5.36 | 5 | 4.24 |
| TOTAL NUMBER OF SUGGESTIONS | 62 | 100.00 | 56 | 100.00 | 118 | 100.00 |
| TOTAL NUMBER OF FARMERS | 30 | - | 30 | - | 60 | - |

Source: Field Survey 1976

TABLE 8.2: Farmers' Suggestions as to how K.F.P. could improve Services to Growers, Nyanza and Central Provinces, Kenya, 1976

| SUGGESTIONS | NUMBER OF REPLIES | | | | | |
|--|-------------------|----------------------|------------------|----------------------|-------|----------------------|
| | NYANZA PROVINCE | PERCENTAGE FREQUENCY | CENTRAL PROVINCE | PERCENTAGE FREQUENCY | TOTAL | PERCENTAGE FREQUENCY |
| PRICE SHOULD BE INCREASED | 22 | 19.13 | 24 | 25.26 | 46 | 21.90 |
| PAYMENTS SHOULD BE MADE ON TIME AT THE BEGINNING OF EACH MONTH | 11 | 9.57 | 4 | 4.21 | 15 | 7.14 |
| LOANS SHOULD BE MADE AVAILABLE | 10 | 8.70 | 1 | 1.05 | 11 | 5.24 |
| A BONUS PAYMENT SHOULD BE GIVEN AT THE END OF THE YEAR | 6 | 5.22 | 2 | 2.11 | 8 | 3.81 |
| PAYMENT SHOULD BE MADE THROUGH A BANK | 0 | 0.00 | 4 | 4.21 | 4 | 1.90 |
| PAYMENTS SHOULD NOT BE "LOST" OR DEFFICIENT | 2 | 1.74 | 1 | 1.05 | 3 | 1.43 |
| A REASONABLE PRICE SHOULD BE PAID FOR 2ND GRADE FRUIT | 0 | 0.00 | 2 | 2.11 | 2 | 0.95 |
| POSTS SHOULD BE READILY AVAILABLE | 3 | 2.61 | 17 | 17.89 | 20 | 9.52 |

TABLE 8.2: contd.

| | |
|--|----|
| WIRE SHOULD BE READILY AVAILABLE | 0 |
| FERTILIZERS SHOULD BE SUPPLIED THROUGH THE K.F.P. | 0 |
| CHEMICAL SPRAY SHOULD BE READILY AVAILABLE | 0 |
| SPRAY PUMPS SHOULD BE PROVIDED (FOR FUNGICIDE APPLICATION) | 10 |
| EFFECTIVE TREATMENT OF BROWN SPOT DISEASE SHOULD BE AVAILABLE | 4 |
| COLLECTION POINT SHOULD BE CLOSER TO THE FARM | 8 |
| MORE LORRIES SHOULD BE PROVIDED SO THAT THEY DO NOT FILL UP BEFORE COMPLETING THE COLLECTION ROUTE | 14 |
| COLLECTION SHOULD BE MADE AT A SPECIFIC TIME OF DAY | 1 |

| | | | | |
|-------|----|-------|----|------|
| | | | | |
| 0.00 | 11 | 11.58 | 11 | 5.24 |
| 0.00 | 1 | 1.05 | 1 | 0.48 |
| 0.00 | 5 | 5.26 | 5 | 2.38 |
| 8.70 | 3 | 3.16 | 13 | 6.19 |
| 3.48 | 3 | 3.16 | 7 | 3.33 |
| 6.96 | 11 | 11.58 | 19 | 9.05 |
| 12.17 | 1 | 1.05 | 15 | 7.14 |
| 0.87 | 3 | 3.16 | 4 | 1.90 |

TABLE 8.2: contd.

| | | | | | | |
|--|-----|--------|----|--------|-----|--------|
| CLOSER CONTACT BETWEEN FARMERS AND FACTORY INCLUDING MEETINGS WITH THE GENERAL MANAGER | 11 | 9.57 | 1 | 1.05 | 12 | 5.71 |
| THE GROUP LEADER SYSTEM SHOULD BE RESTORED | 8 | 6.96 | 0 | 0.00 | 8 | 3.81 |
| THE K.F.P. SHOULD EMPLOY MORE FIELD ADVISORS | 0 | 0.00 | 1 | 1.05 | 1 | 0.48 |
| THE NEW FACTORY SHOULD HAVE BEEN ESTABLISHED IN SOTIK RATHER THAN THIKA | 3 | 2.61 | 0 | 0.00 | 3 | 1.43 |
| OTHER | 2 | 1.74 | 0 | 0.00 | 2 | 0.95 |
| TOTAL NUMBER OF SUGGESTIONS | 115 | 100.00 | 95 | 100.00 | 210 | 100.00 |
| TOTAL NUMBER OF FARMERS INTERVIEWED | 30 | - | 30 | - | 60 | - |

Source: Field Survey 1976

the fruit⁵⁶; strangulation of the vines by their training strings; negligent turning of the vines over the trellising wire; collapse of the vines due to post break-ages; attacks by bugs or moles; hail stones or wind (21, p.15).

The high proportion of respondents citing Brown Spot Disease as a serious problem may be due to the above mentioned poor husbandry methods, resulting in injury to the plants. Another possibility may be the natural break-down of the vines after two bearing years. Farmers may be mistaking this natural process for Brown Spot Disease because the break-down symptoms due to ageing are similar to those of the disease. In conversation, many growers said that vines should have a fruit-bearing life of four to five years⁵⁷. This view is in serious conflict with the conclusion of Lippmann who considers that the optimum fruit-bearing life is two years. (See Chapter 7, Section I(m).)

✓ (b) Lack of posts and wire

In Central Province, 17 out of 30 farmers (i.e. 57%) said that posts were not obtainable, whereas in Kisii, only 3 out of 30 (i.e. 10%) cited this as a

56. The Ministry of Agriculture and the K.F.P. recommend letting the fruit drop off the vines, and then gathering it from the ground. When the fruit is plucked injury may result if leaves are removed carelessly. Furthermore, unless the grower is experienced, picked fruit is not ripe enough for processing purposes.

57. The field staff, both K.F.P. field staff and extension advisors of the Ministry of Agriculture, have been teaching farmers that the plant life cycle consists of four to five bearing years. Lippmann's results, therefore, necessitate a re-education of the farmers.

problem (see Tables 8.1 and 8.2). The K.F.P. confirmed that at the time of the survey, at least, there were no posts available from the H.C.D.A. for Thika growers (29)⁵⁸. The lack of posts is a severe hardship for producers who must either improvise with inferior material, or let the vines die.

The non-availability of wire was only a serious problem in Central Province, where 11 out of 30 farmers (i.e. 37%) met with this difficulty.

(c) Distance from nearest collection point

As can be seen from Table 8.2, 19 of the 60 farmers (i.e. 32%) complained that the collection point was too far away from their farms. The average distance to the collection point was found to be 0.94 miles in Kisii, and 1.63 miles in Central Province. However, of the 8 farmers in Kisii who said that the collection point was too far away, the average distance was 1.69 miles. Their 11 Central Province counterparts had an average of 3.00 miles to travel. On the whole, it would appear that the Central Province producers' complaints as to the distance to the collection points, were more justified than those of the Kisii growers.

One of the Central Province producers experienced the above problem only during the rainy season; during the

58. At the time of the field survey, posts were, in fact, in store at the Sotik factory, but according to Mr. Paul Nicholas of the K.F.P. they have not been requested by the Kisii producers. (See Chapter 6, Section (i).)

dry period, the K.F.P. vehicles come to his farm gate to collect the fruit. However, during the rainy seasons, the road is inaccessible to lorries and the collection point is then three miles away from his farm. The farmer then must hire labour to carry the fruit in bags to the collection point, at KShs.3.00 per bag. Since he is a producer having up to thirty bags weekly, this is a considerable expense.

A number of growers in the Central Province area who are obliged to hire vehicles to transport their produce to the collection points, felt that such vehicles are exploiting the situation by over-charging the farmers along the short distances involved.

(d) Lack of pumps

Tables 8.1 and 8.2 indicate that 10 out of 30 Kisii producers (i.e. 33%) found it difficult to get pumps to spray their vines. The corresponding number for Central Province was only 3 out of 30 (i.e. 10%). Lack of pumps is a more serious problem in predominantly tea producing areas like Kisii, than in coffee growing regions such as Murang'a and Kiambu. Coffee requires spraying, and the same pumps can be used for spraying passion fruit. This is borne out by the survey results: in Central Province passion fruit growing areas, coffee predominates, whereas in Kisii, tea prevails (4).

This problem will be solved if Lippmann's recommendations are followed, i.e. that spraying is quite uneconomical.

(e) Transportation

Transportation is a serious problem in Kisii, where 14 out of 30 farmers (i.e. 47%) felt this to be a problem. (See Table 8.2.) The lorries are sometimes fully loaded before the collection route is completed, and some growers do not have their fruit collected on that day. Farmers complained of wasting their time waiting for vehicles. At times the van arrives up to 24 hours or more after the appointed time and hour; indeed, on occasion it was a week late. The consequence of poor collection arrangements is that the fruit shrivels and loses weight (see Chapter 6, Section (h)), resulting in reduced incomes to the producers, who are paid by weight. If the vehicle misses the week completely, the fruit deteriorates to such a degree as to be unacceptable to the factory. This results in rejection of the fruit and the attendant loss of revenue to the farmer. All this is quite apart from the losses which K.F.P. sustains due to low factory intake and poor quality.

(f) Payments to growers

From Table 8.2, it can be seen that 11 out of 30 Kisii growers (i.e. 37%) and 4 out of 30 Central Province Producers (i.e. 13%) mentioned delayed payment as a difficulty. A further 3 out of 60 producers (i.e. 5%) stated that at times their remittances are "lost" or were incorrect. In such cases, it usually takes a further month to

rectify the problem⁵⁹.

(g) Loans

In Kisii, 10 of the 30 producers (i.e. 33%) stated that they suffered from liquidity problems and would welcome a system of loans. They declared that this was necessary to meet running expenses for employed labour and fertilizers⁶⁰.

This problem should decline in importance if Lippmann's recommendations are put into practice: less labour will be required if the vines are not pruned, and input costs for fertilizers and sprays will be eliminated. (See Tables 7.10 and 7.11.)

(h) Group Leader System

As mentioned in Chapter 4, Section (a), the abolition of the "Group Leader" system caused ill-feeling among the Kisii growers. Of the 30 Kisii farmers interviewed, 8 (i.e. 27%) said the "Group Leader" system should be restored. One farmer pointed out that in 1973, in his area, i.e. East Kitutu, the K.F.P. used to collect about three lorry-loads of fruit weekly.

59. A solution to this problem would be to provide the pay-out staff with a cash float. On presentation of receipts growers could be paid the sum due to them from the float.

60. One Kisii farmer wanted loans to be introduced for corrugated iron sheets for his house.

This has dropped to less than one load because producers in the area uprooted their vines as a protest against the termination of the system. This is emphasized by the fact that 2 out of the 10 Former Kisii Passion Fruit Growers interviewed (i.e. 20%), gave the discontinuance of the system as the reason for ceasing to cultivate the fruit. (See Table 8.3.) Moreover, 7 out of the 10 former Kisii growers (i.e. 70%) gave the reinstatement of the system as a pre-condition for starting to grow the fruit again. (See Table 8.4.)

(i) Bonus payment

Of the 60 growers questioned, 8 (i.e. 13%) suggested that an annual bonus payment be paid to producers in years when market prices permit this. They cited the example of the coffee co-operative societies.

(j) Grading

Due to the quantity of fruit rejected by the K.F.P.⁶¹, 2 Central Province farmers out of 30 (i.e. 7%) suggested the introduction of a grading system whereby "grade 2" fruit could be accepted at a lower price. However, the problem with rejected fruit is that it is not suitable for processing into juice. If some alternative use could be found for the rejected fruit, for example as animal feed, this would help the producers

61. The exact quantity of fruit rejected annually by the K.F.P. is not known.

to recover at least some money for the sub-standard fruit. At present, the rejected fruit is simply thrown away.

(k) Inducement to increase acreage

Tables 82, 83, 84 and 85 indicate that the constraint to increased acreage is the price paid by the K.F.P. However, increased production could also be achieved by increasing yields per acre and without increasing the input costs. If Lippmann's recommendations are adopted, input costs can be reduced, while yields should increase. As was seen in Chapter 7, Section II, if Lippmann's recommendations are followed, average yearly input costs per acre would be reduced by KShs.3,885.24 (i.e. 73%) and KShs.3,166.84 (i.e. 71%) in Nyanza and Central Provinces respectively. Furthermore, average yearly net returns per acre in the two regions are likely to increase by KShs. 889.85 (i.e. 217%) and KShs.609.25 (i.e. 88%) in Nyanza and Central Provinces respectively if labour costs are excluded, and KShs.1,420.41 (i.e. 385%) and KShs.1,180.94 (i.e. 1,502%) in Nyanza and Central Provinces respectively if labour costs are included. (See Tables 7.8, 7.9, 7.10 and 7.11.)

II. Former Passion Fruit Growers

Table 8.3 shows why the growers discontinued production. The most frequent reason given was the low price received for the fruit. Brown Spot Disease, the

TABLE 8.3: Reasons why Former Passion Fruit Growers discontinued Production, Nyanza and Central Provinces, Kenya, 1976

| REASONS FOR DISCONTINUING PRODUCTION | NYANZA PROVINCE | PERCENTAGE FREQUENCY | CENTRAL PROVINCE | PERCENTAGE FREQUENCY | TOTAL | PERCENTAGE FREQUENCY |
|--------------------------------------|-----------------|----------------------|------------------|----------------------|-------|----------------------|
| LOW PRICES | 8 | 42.11 | 4 | 22.22 | 12 | 32.43 |
| BROWN SPOT DISEASE | 2 | 10.53 | 7 | 38.89 | 9 | 24.32 |
| HIGH INPUT COSTS | 4 | 21.05 | 1 | 5.56 | 5 | 13.51 |
| OTHER CROPS PAID BETTER | 0 | 0.00 | 3 | 16.67 | 3 | 8.11 |
| SHORTAGE OF LABOUR | 0 | 0.00 | 2 | 11.11 | 2 | 5.41 |
| ABOLITION OF "GROUP LEADER" SYSTEM | 2 | 10.53 | 0 | 0.00 | 2 | 5.41 |
| NO BONUS PAID | 2 | 10.53 | 0 | 0.00 | 2 | 5.41 |
| OTHER | 1 | 5.26 | 1 | 5.55 | 2 | 5.41 |
| TOTAL NUMBER OF REASONS | 19 | 100.00 | 18 | 100.00 | 37 | 100.00 |
| TOTAL NUMBER OF FARMERS | 10 | - | 10 | - | 20 | - |

Source: Field Survey 1976

TABLE 8.4: Inducements which will be needed to persuade Former Passion Fruit Growers to resume Cultivation, Nyanza and Central Provinces, Kenya, 1976

| INDUCEMENT TO RESUME PASSION FRUIT CULTIVATION | NYANZA PROVINCE | PERCENTAGE FREQUENCY | CENTRAL PROVINCE | PERCENTAGE FREQUENCY | TOTAL | PERCENTAGE FREQUENCY |
|--|-----------------|----------------------|------------------|----------------------|-------|----------------------|
| FRUIT PRICE TO BE INCREASED | 8 | 42.11 | 4 | 28.57 | 12 | 36.36 |
| "GROUP LEADER" SYSTEM TO BE RESTORED | 7 | 36.84 | 0 | 0.00 | 7 | 21.21 |
| BROWN SPOT DISEASE TO BE ADEQUATELY CONTROLLED | 2 | 10.53 | 4 | 28.57 | 6 | 18.18 |
| COST OF INPUTS TO BE REDUCED | 1 | 5.26 | 2 | 14.29 | 3 | 9.09 |
| NOTHING (i.e. UNDER NO CIRCUMSTANCES WOULD THEY RE-START PRODUCTION) | 0 | 0.00 | 2 | 14.29 | 2 | 6.06 |
| OTHER | 1 | 5.26 | 2 | 14.29 | 3 | 9.09 |
| TOTAL NUMBER OF INDUCEMENTS | 19 | 100.00 | 14 | 100.00 | 33 | 100.00 |
| TOTAL NUMBER OF FARMERS | 10 | - | 10 | - | 20 | - |

Source: Field Survey 1976

TABLE 8.5: Inducements which will be needed to increase Passion Fruit Acreage, Nyanza and Central Provinces, Kenya, 1976

| INDUCEMENT NEEDED TO INCREASE ACREAGE | NYANZA PROVINCE | PERCENTAGE FREQUENCY | CENTRAL PROVINCE | PERCENTAGE FREQUENCY | TOTAL | PERCENTAGE FREQUENCY |
|--|-----------------|----------------------|------------------|----------------------|-------|----------------------|
| INCREASED PRICE | 28 | 90.32 | 24 | 70.59 | 52 | 80.00 |
| INPUTS TO BE READILY AVAILABLE (i.e. POSTS, WIRE, FUNGICIDE) | 0 | 0.00 | 6 | 17.65 | 6 | 9.23 |
| REDUCED LABOUR REQUIREMENTS | 1 | 3.23 | 2 | 5.88 | 3 | 4.62 |
| BROWN SPOT DISEASE CONTROL | 1 | 3.23 | 2 | 5.88 | 3 | 4.62 |
| AVAILABILITY OF LOANS | 1 | 3.23 | 0 | 0.00 | 1 | 1.54 |
| TOTAL | 31 | 100.00 | 34 | 100.00 | 65 | 100.00 |

Source: Field Survey 1976

high cost of inputs, and the fact that other crops paid better, were also significant causes for ceasing production. These four reasons together constitute over 78% of the total number of reasons given for discontinuing production⁶². It could be said that these can be summed up by saying that passion fruit production was not profitable enough vis-à-vis other cash crops. The survey analysis of the average net returns in Chapter 7, Section I, supports this finding. (See also Chapter 9.)

Table 8.5 indicates factors which would induce former growers to resume passion fruit production. As mentioned in Section I(h) above, the restoration of the "Group Leader" system in Kisii is an important prerequisite for persuading Kisii producers to restart production.

A total of 12 of the 20 farmers interviewed stated that they would resume passion fruit cultivation if the price is increased. These producers could probably be lured back to fruit production if the yields are increased and the input costs decreased, since this would have the same effect as a price rise. Tables 8.3 and 8.4 would appear to indicate that the adoption of Lippmann's recommendations would go a long way towards making passion fruit cultivation more attractive to producers.

62. See Table 8.3: $32.43 + 24.32 + 13.51 + 8.11 = 78.37$.

CHAPTER 9

PROFITABILITY OF PASSION FRUIT AS
COMPARED TO OTHER CASH CROPS

In an ideal situation, each developing country would maintain reliable, comprehensive, recent and current farm management data. Such data would include the yields, costs, returns and profitability of each type of agricultural enterprise, soil and climatic type and holding size. Regrettably Kenya, in common with the vast majority of Third World countries has so far assembled only the most limited data. The Farm Management District Guidelines, compiled by the Ministry of Agriculture, form virtually the only available data on the profitability of various farm enterprises in the different districts. Since the net return figures are calculated by locally stationed District Agricultural Officers, it is hoped that the Guidelines are a fair indication of the profitability of enterprises in the different districts.

To leave this study with a vacuum on the profitability of growing passion fruit compared with the chief competing enterprises would be to evade a most vital question. Accordingly, the remainder of this chapter will be devoted to a preliminary and tentative discussion of the question of whether passion fruit cultivation is more profitable to producers than, for example, coffee or pyrethrum.

The 20 interviews with coffee growers who do not grow passion fruit produced inconclusive results. The answers varied too widely and the sample size was too small to permit the averaging of any findings. For this reason, the estimated profitability of cultivating pyrethrum and coffee was taken from the Farm Management District Guidelines, 1976.

(a) Coffee

Of the 10 coffee producers interviewed in Central Province, 9 said they maintained records of their 1975 production. They were fairly consistent with an average yield of 3,548 kg. of coffee per acre. Even the lowest yield was well above the 'Guidelines' "average" output figure for Murang'a, of 1,619 kg. per acre. Consequently, the average production for the 10 farmers questioned put them in what the Guidelines term the "high" output category. In Kisii, the 10 coffee growers interviewed said that they did not know their annual yield⁶³.

Tables 9.1 and 9.2 indicate the average net returns for Kisii and Central Province, as calculated from the Farm Management District Guidelines for Kisii and Murang'a. By comparing the annual average net returns for passion fruit and coffee (see Tables 7.8 and 7.9), it can be seen

63. The Kisii coffee producers were very suspicious and reluctant to be interviewed. It may be that they knew the figures, but for reasons best known to themselves refused to give the answers.

TABLE 9.1: Estimated Profitability of Coffee Growing¹ in Nyanza Province, Kenya, 1976

| | "Average" Yearly Output per Acre (2,000 kg. per acre per year) | "High" Yearly Output per Acre (3,500 kg. per acre per year) |
|------------------------|---|--|
| Input Costs (KShs) | | |
| excluding labour costs | 330.00 | 600.00 |
| including labour costs | 1,530.00 | 1,800.00 |
| Yield | 2,000 kg. | 3,500 kg. |
| Price (KShs) | -.90 per kg. | -.90 per kg. |
| Gross Returns (KShs) | 1,800.00 | 3,150.00 |
| Net Returns (KShs) | | |
| excluding labour costs | 1,470.00 | 2,550.00 |
| including labour costs | 270.00 | 1,350.00 |

1. The data in this table refers to mature coffee.

Source: Farm Management District Guidelines, Kisii, 1976.
Ministry of Agriculture, Kenya.

TABLE 9.2: Estimated Profitability of Coffee Growing¹ in Central Province, Kenya, 1976

| | "Average" Yearly Output per Acre (1,619 kg. per acre per year) | "High" Yearly Output per Acre (3,642 kg. per acre per year) |
|------------------------|---|--|
| Input Costs (KShs) | | |
| excluding labour costs | 890.00 | 1,153.00 |
| including labour costs | 1,682.00 | 1,945.00 |
| Yield | 1,619 kg | 3,642 kg. |
| Price (KShs) | 1.00 per kg. | 1.00 per kg. |
| Gross Returns (KShs) | 1,619.00 | 3,642.00 |
| Net Returns (KShs) | | |
| excluding labour costs | 729.00 | 2,489.00 |
| including labour costs | -63.00 | 1,697.00 |

1. The data in this table refers to mature coffee.

Source: Farm Management District Guidelines, Murang'a, 1976.
Ministry of Agriculture, Kenya.

that coffee appears to be more profitable than passion fruit in both Central Province and Kisii. This is so even if only the Guidelines' "average" quantity of coffee is produced per acre.

If Lippmann's recommendations are adopted, a different picture emerges. (Compare Tables 9.1 and 9.2 with Tables 7.10 and 7.11.) In Kisii, if labour costs are excluded, coffee growing is more profitable than passion fruit. However, if only an "average" quantity of coffee is produced per acre, then passion fruit becomes more lucrative as it becomes necessary to hire labour. If "high" outputs are achieved, coffee continues to be more profitable than passion fruit.

In Central Province, provided Lippmann's recommendations are followed, passion fruit will be more remunerative than coffee regardless of whether or not labour costs are included, provided only an "average" quantity of coffee is produced. As coffee production approaches "high" output level, coffee becomes more profitable. The 9 growers in Central Province who knew their 1975 production figures, produced an average of 4,035.76 kg. of coffee per acre, thereby placing them at the "high" output level.

Several other points should be mentioned regarding the relative profitability of coffee and passion fruit. When coffee is planted, the seedlings must be purchased from the local Coffee Co-operative Society and these usually cost KShs.322.00 per acre. It will be remembered that in contrast, the K.F.P. provides free seedlings. (See Chapter 4, Section (a).) Furthermore,

coffee producers bear the inconvenience of having to provide their own means of transportation to the local coffee factory. Unlike the K.F.P., the Coffee Co-operative Society does not run a collection system for its suppliers.

Coffee has another distinct disadvantage when compared to passion fruit. The coffee trees have a life cycle of approximately thirty years, with a four to five year vegetative period. Should prices for coffee become uneconomic, as they sometimes do for periods of several years, it is often impracticable to change to a more profitable crop due to the permanent nature of the trees. Passion fruit has only a three year cycle and, as such, can be quickly and relatively cheaply replaced with another enterprise should the farmer wish to switch. Furthermore, payments for coffee are made annually, whereas those for passion fruit are made monthly, thereby providing farmers with a more regular and frequent cash flow.

(b) Pyrethrum

Tables 9.3 and 9.4 give the estimated average net returns for pyrethrum for Kisii and Central Province respectively, as calculated from the Farm Management Guidelines for Kisii and Murang'a. By comparing these figures with those given for passion fruit in Tables 7.8 and 7.9, it will be seen that pyrethrum is considerably more profitable than passion fruit in

TABLE 9.3: Average Net Returns for Pyrethrum in Nyanza Province, Kenya, 1976

Net Returns with an Average Yearly Output per Acre (KShs)
(292 kg. per acre per year)

| | <u>Excluding Labour Costs</u> | <u>Including Labour Costs</u> |
|----------|-------------------------------|-------------------------------|
| Year I | -597.50 | -1,347.50 |
| Year II | 1,885.00 | 985.00 |
| Year III | 1,885.00 | 985.00 |
| TOTAL | 3,172.50 | 622.50 |
| Per year | 1,057.50 | 207.50 |

Source: Farm Management District Guidelines, Kisii, 1976.
Ministry of Agriculture, Kenya.

TABLE 9.4: Average Net Returns for Pyrethrum in Central Province, Kenya, 1976

Net Returns with an Average Yearly Output per Acre (KShs)
(216 kg. per acre per year)

| | <u>Excluding Labour Costs</u> | <u>Including Labour Costs</u> |
|----------|-------------------------------|-------------------------------|
| Year I | 57.00 | -765.00 |
| Year II | 1364.00 | 905.00 |
| Year III | 1364.00 | 905.00 |
| TOTAL | 2785.00 | 1045.00 |
| Per year | 928.33 | 348.33 |

Source: Farm Management District Guidelines, Murang'a, 1976.
Ministry of Agriculture, Kenya.

both areas. If Lippmann's suggestions are implemented, passion fruit will become more competitive vis-à-vis pyrethrum. (See Tables 7.10 and 7.11.) In both regions, pyrethrum will be more lucrative than passion fruit if no labour is hired. However, as more wage labour must be employed, so passion fruit becomes financially more attractive.

Before closing this tentative discussion it is stressed that it has had, regrettably, to be conducted on the basis of quite flimsy evidence and, sometimes, inspired guesswork. In any case it should be emphasized that coffee and pyrethrum are much more important crops in the national economy and have been established far longer than passion fruit. Accordingly, the scale of support in such respects as research, development and extension, is far larger, and longer and better established, for coffee and pyrethrum. Given anything approaching a parity of support, the relative profitability position might be dramatically changed.

CHAPTER 10

SUMMARY AND CONCLUSIONS

Passion fruit is produced in Murang'a, Kiambu, Machakos, Embu, Kisii and Kakamega Districts of Kenya. There are 4,477 growers registered with the K.F.P., cultivating an estimated 1,118 acres. (See Table 4.1.)

The K.F.P. operates two factories: a single strength juice extraction plant at Sotik and an extraction and concentration plant at Thika. Over 90% of the K.F.P.'s production is exported, the 1975 exports totalling K£ 162,500 and 1976 exports expected to exceed K£ 300,000 (29).

The objectives of the survey included ascertaining why farmers have not grown the quantities of fruit for which the Thika processing plant was designed, finding out how farmers can be persuaded to increase production, identifying and examining the problems which farmers encounter in passion fruit production, and, lastly, offering some solutions to these problems.

In order to achieve the objectives, a combination field and desk research study was designed. Interviews were conducted in Kisii District and Central Province among 100 farmers: 60 Passion Fruit Growers, 20 Former Passion Fruit Growers and 20 Coffee Producers.

The survey was intended to provide answers to a number of questions. The study showed that the most

expensive items in establishing production were posts and wire. Farmers complained of the high outlay costs. Few farmers took advantage of the Inputs Loan Scheme.

The major constraints deterring farmers from increasing their acreage are the present low level of returns and the high risk factor, notably the high incidence of Brown Spot Disease. The very limited evidence available suggests that net returns from passion fruit cultivation are at the moment considerably lower than those from coffee or pyrethrum.

If the recommendations of the leading researcher, Lippmann, are adopted, the profitability of passion fruit will increase very considerably:

1. in Kisii, if all labour costs are excluded, coffee will become more profitable, but when these are included, passion fruit will become more remunerative;
2. in Central Province, passion fruit will be more profitable than coffee (regardless of whether labour costs are included) if average yields of coffee are grown;
and
3. passion fruit will be more profitable than pyrethrum in both regions, regardless of whether labour costs are included.

Numerous attempts were made to determine the method of price-determination used by the K.F.P. to establish the present growers' price of forty cents per kg., but all efforts proved ineffective. The survey indicated that the fruit realised a higher price on the local market, than from the K.F.P. The most frequent complaint of growers was found to be the low

price received from K.F.P. for the fruit. However, although the average price on the local market was considerably higher than that paid by the K.F.P. (i.e. an average of eighty cents on the local market), the K.F.P. offer a number of advantages to farmers, including a guaranteed market and a fruit collection system. The introduction of an annual bonus payment was advocated by several growers.

A number of farmers had complaints concerning the K.F.P. paying-out system, saying that frequently payments are "lost" or deficient.

Farmers had several complaints concerning the collection system, the most serious of which was the distance from holding to the nearest collection point. Of 60 growers interviewed, 17 (i.e. 28%) were compelled to transport their produce over a distance of more than two miles to the nearest collection point under difficult conditions.

A further grievance about the collection system was the frequent delay of the vehicles. This resulted in spoilt and, often, rejected fruit.

The extent of the volume and value of fruit wasted due to spoilage and rejection by the K.F.P. could not be accurately ascertained, because no records of rejected fruit are maintained. However, the K.F.P. management put the loss at under 10% of the total crop.

The survey brought to light the low level of farmers' technological training, the basis of which must, of course, be field and similar experimental research and development. As far as could be ascertained, Lippmann was the only full-time graduate researcher engaged in passion fruit research, in Kenya in 1975. Regrettably, in the following year this limited, but valuable, work terminated, at least for the time being. The low level of farmers' technological training may well be correlated to the lack of experimental researchers.

The study indicated that the communication between field-staffs, producers and the K.F.P. is very poor. Furthermore, contact between Kenyan passion fruit producers as a group and fellow suppliers in countries like Brazil has not, as far as can be seen, even been considered. There appear to be no arrangements for consultation between the Kenyan and Brazilian Governments and other major world suppliers of passion fruit juice. There do not appear to be any arrangements for the primary producers to even liaise over common problems, let alone act in concert to attempt to secure improved terms from the world's main handler of the fruit juice.

9 Closer contact between H.C.D.A./K.F.P. field staff and growers should be developed in order to convince producers of the benefits of the H.C.D.A. Inputs Loan Scheme. A possible solution would be to

form a growers' association, possibly along the lines of U.S. bargaining co-operatives. Such an organisation would probably need a full-time executive and a Growers' Liason Officer or Field Production Manager. Such an association would undoubtedly help to solve some of the communication problems which farmers, especially those in Kisii, have been experiencing. Furthermore, the low level of farmers' technological training which was found to exist, could be combated through a growers' association which would provide regular meetings with practical demonstrations. Such a training programme is imperative if Lippmann's recommendations are to be implemented, which, indeed, they must, if farmers are to continue growing fruit. A complete re-education plan will need to be designed to re-train farmers to change their cultivation techniques. Producers are currently taught to fertilize, prune and spray (with a fungicide) their vines regularly and that vines are expected to have a fruit-bearing life of four to five years. Lippmann recommends that vines should not be fertilized, not be pruned, not be sprayed, and that the vines have a fruit-bearing life of two years, and no longer. These simple but critical changes do not involve any expenditure, indeed they will lead to considerable savings of money and labour. To achieve these easily-available benefits for producers, an intensive education programme should be provided, possibly by the proposed growers' association.

4 The Kenyan Government is recommended to give priority to the developments of research on passion fruit production and marketing. Furthermore, the possibilities for the Government and its passion fruit producers on the one hand and Governments and producers of countries like Brazil on the other hand, to work closely should be investigated.

The adoption of Lippmann's recommendations would considerably improve the average net returns vis-à-vis other crops. If the result of adopting the recommendations on average net returns is similar to that estimated in Tables 7.10 and 7.11, then it may not be necessary to increase the price paid by the K.F.P. since input costs will be reduced and yields increased, resulting in increased net returns.

5 Since with Lippmann's recommendations the expected fruit-bearing life of the vines is two years, the alleged incidence of Brown Spot Disease will be reduced since it is likely that producers are currently mistaking signs of ageing for the disease.

6 In those cases where the collection point is more than two miles away from the farm, the K.F.P. should consider alleviating the situation. Furthermore, the problem of unsatisfactory collection could be solved by using larger lorries.

7 The farmers' problems concerning the "lost" or deficient payments could be solved by providing the

pay-out staff with a cash float. On presentation of receipts, producers could be paid the amount due to them without having the inconvenience of waiting a month before the error could be rectified.

⑧ Several areas for future research are recommended. The various attempts to determine the price-setting mechanism used by the K.F.P. proved unsuccessful. Research into this area should be undertaken in the interests of producers, the K.F.P. minority shareholder, i.e. the Kenya Government, and, in the medium and longer term, the major shareholder itself, i.e. Passi Ltd.

⑨ Time and other constraints did not permit a close examination of the world market situation, or the production and stock positions of other important producers like Brazil. Research into the export market situation is recommended, and it is desirable that there be a continuing series of situation and outlook studies.

⑩ Another suggestion for future research is to look into the actual effects of adopting Lippmann's recommendations. Efforts should be made to determine whether the recommendations make passion fruit cultivation sufficiently attractive to induce farmers to increase their passion fruit acreage or whether, in fact, an increase in the price paid by the K.F.P. is necessary.

APPENDIX A

QUESTIONNAIRE FOR PASSION FRUIT GROWERS

Date: _____

Time at beginning of interview: _____

1. What types of passion fruit do you grow? How many acres of each?
 - (a) Passiflora edulis
 - (b) Passiflora ligularis*t*.....
 - (c) Other

2. How long have you been growing passion fruit commercially?

3. What was your initial acreage?

4. How long have you been growing passion fruit for the factory?

5. How long have you been growing your present acreage of passion fruit?

6. Why do you grow passion fruit rather than another cash crop?
 - (a) Price levels
 - (b) Price stability
 - (c) Cost of inputs
 - (d) Availability of labour
 - (e) Necessary credit facilities were readily available
 - (f) The level of yields

- (g) Profitability relative to other crops
- (h) Other

- 7. What would induce you to grow more passion fruit than you do at present?

- 8. How much money did you need to begin passion fruit production in the year?

- 9. Were you able to raise the necessary initial capital from:-
 - (a) Your savings
 - (b) Credit from the HCDA ...
 - (c) Loan from the bank
 - (d) Loan from a friend ...
 - (e) Loan from an institution which?....
 - (f) Other source

- 10. Did you plant from seeds or seedlings?

- 11. Did you obtain these from:-
 - (a) The KFP
 - (b) Your own plants If so, was there any qualitative selection?
 - (c) Other source

- 12. What type of labour is engaged in passion fruit production? (Indicate number of each)
 - (a) family
 - (i) Adults
 - (ii) Children
 - (b) hired Number:

- 13. If labour is hired, in what months is this labour used?

- 14. If labour is hired, how many days per month?

15. If labour is hired, how much is each worker paid per day?
16. Do you use fertilizer on your passion fruit?
17. If yes, what type of fertilizer?
 - (a) Chemical (i) type(s)
(ii) cost
 - (b) Manure (i) type(s)
(ii) source
(iii) if purchased, cost....
18. How much fertilizer do you apply per acre?
Chemical Manure
19. How often do you apply it? Chemical
Manure
20. Do you plant new vines with manure and/or fertilizer?
..... (Indicate whether either, both or
neither are used.)
21. Do you prune the passion fruit vines?
22. If yes, how often do you prune?
23. How often do you weed the passion fruit vines?.....
24. Do you mulch the passion fruit vines?.....
25. Do you engage in crop rotation on your farm?
(Elaborate:)
Do you rotate passion fruit?
26. Do you use insecticides and/or fungicides on the
passion fruit?

- (a) type(s)
 - (b) Quantity(s)
 - (c) Frequency
27. Do you experience any particular difficulties with passion fruit cultivation?
- Elaborate
-
28. What method of harvesting do you use? (i.e. do you wait till the fruit falls off the vine, or pick when fruit is ripe?)
29. How often do you harvest?
- (Indicate whether on a daily, weekly, etc. basis.)
30. How much is produced per acre of passion fruit per year?
31. To whom do you sell your passion fruit? (Indicate quantity sold to each.)
- (a) KFP
 - (b) Local markets
 - (c) Agents
 - (d) Other
32. What determines to whom you sell the passion fruit? (If sells to KFP, why do you sell to the KFP?) -
- Indicate order of importance.
- (a) Price levels
 - (b) Price stability
 - (c) Promptness of payment
 - (d) Assured markets
 - (e) Other

33. How much does each buyer pay for the passion fruit?
(Indicate the highest, lowest and average price paid in 1975 by each.)
- (a) Local markets
 - (b) Agents
 - (c) Other
34. Does the price you receive for passion fruit on the open market vary from month to month?
Are there peak times for prices? When do these occur?
35. Is there one standard price or are there adjustments for quality or volume?
36. Do you take the passion fruit to the respective buyers, or do the buyers collect the fruit from the farm?
37. What is the distance from your farm to the KFP collection point? How do you transport the fruit to this point?
38. How do you store the passion fruit until it is collected by the KFP?
39. In what ways do you think the KFP could provide better service to its growers?
-
-

40. Do you think that the present system operated by the KFP is, on the whole, good for farmers like yourself?

Why? What improvements would you suggest?

.....

.....

FARMERS'S NAME:

FARMER'S KFP NUMBER:

MEMBERS OF HOUSEHOLD:

ADULT:

CHILDREN:

AT HOME:

SIZE OF FARM:

AT SCHOOL:

DISTRICT:

LOCATION:

SUBLOCATION:

TYPE OF FARM ENTERPRISES:

TYPE

QUANTITY

ANIMAL PRODUCTION:

CROP PRODUCTION:

Time interview concluded: _____

APPENDIX B

QUESTIONNAIRE FOR FORMER PASSION FRUIT GROWERS

Date: _____

Time at beginning of interview: _____

1. Do you cultivate passion fruit?
2. What types of passion fruit do/did you grow? How many acres of each?
 - (a) Passiflora edulis
 - (b) Passiflora ligularis
 - (c) Other
3. What was your passion fruit yield per acre in the last year of production?
4. For how long did you grow passion fruit before discontinuing its cultivation?
5. Why did you decide to stop producing passion fruit?
 - (a) Low price
 - (b) Price fluctuations
 - (c) High cost of inputs
 - (d) Shortage of posts
 - (e) Shortage of wire
 - (f) Brown Spot Disease
 - (g) Shortage of labour
 - (h) Shortage of money/credit
 - (i) One crop failure
 - (j) More than one crop failure
 - (k) Low yields

- (l) Other crops paid better
- (m) Other
- 6. What crop replaced passion fruit?
- 7. What would induce you to begin passion fruit cultivation again?
-

FARMER'S NAME: FARMER'S KFP NUMBER:
 MEMBERS OF HOUSEHOLD: ADULT:
 CHILDREN: AT HOME:
 AT SCHOOL:
 SIZE OF FARM:
 DISTRICT:
 LOCATION: SUBLOCATION:

TYPE OF FARM ENTERPRISES: TYPE QUANTITY

ANIMAL PRODUCTION:

CROP PRODUCTION:

Time interview concluded: _____

APPENDIX C

QUESTIONNAIRE FOR COFFEE GROWERS

Date: _____

Time at beginning of interview: _____

1. How many acres of coffee do you grow?
2. How long have you been growing coffee?
3. What was your initial acreage?
4. How long have you been growing the present acreage
of coffee?
5. Why do you grow coffee rather than another cash crop?
 - (a) Price levels
 - (b) Price stability
 - (c) Cost of inputs
 - (d) Availability of labour
 - (e) Necessary credit facilities were readily
available
 - (f) The level of yields
 - (g) Profitability relative to other crops
 - (h) Other
6. How much money did you need to begin coffee production
in the year?
7. Were you able to raise the necessary initial capital
from:-
 - (a) Your savings

16. How often do you apply it?
 - (a) Chemical
 - (b) Manure
17. Do you plant new coffee plants with manure/fertilizer?
..... (Indicate whether either, both or
neither are used.)
18. Do you prune the coffee plants?
19. If yes, how often do you prune?
20. How often do you weed the coffee plants?
21. Do you mulch the coffee plants?
22. Do you engage in crop rotation on your farm?
- (Elaborate:))
23. Do you use insecticides and/or fungicides on the
coffee plants?
- (a) Type(s) Cost:
- (b) Quantity(s)
- (c) Frequency
24. Do you experience any particular difficulties with
coffee cultivation? Elaborate:
-
-
25. How often do you harvest?
- (Indicate whether on a daily, weekly, etc. basis.)
26. How much is produced per acre of coffee per year?
.....

27. What is the distance from your farm to the coffee collection point? How do you transport the coffee to this point?
28. How do you store the coffee until it is collected?
29. How often is the coffee collected?

FARMER'S NAME:

FARMER'S KFP NUMBER:

MEMBERS OF HOUSEHOLD:

ADULT:

CHILDREN: AT HOME:

SIZE OF FARM:

AT SCHOOL:

DISTRICT:

LOCATION:

SUBLOCATION:

TYPE OF FARM ENTERPRISES:

TYPE

QUANTITY

ANIMAL PRODUCTION:

CROP PRODUCTION:

Time interview concluded: _____

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