

SOUTH EAST JOHORE PROJECT.

WORKING PAPERS.

GENERAL AGRICULTURE I

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GENERAL AGRICULTURE ICONTENTS

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Possible Agricultural Activities in South-East Johore.

1. The scope of work states on page 3:-

(e) Agronomic and Economic Assessment of Crops and Livestock:

This study will determine the feasibility of increasing the range of crops that may be grown economically to supplement the well established range of crops including rubber, oil palm and coconuts. The study will involve the assessment of all available agronomic and economic (production and marketing) data on potential diversification crops including for example cereals, legumes, sugar-cane, tapioca, sweet potatoes, bananas, other fruits and tobacco in addition to rubber, oil palm and coconuts, and where appropriate make recommendations for the phasing of pilot projects necessary to facilitate the establishment of larger scale commercial planting of the more promising diversification crops during the early phases of the development plan. Particular attention will be given to the current proposals for Banana Estate development in the Tanjong Penggerang area, which are now being considered by the State and Central Governments.

The study will also cover the animal husbandry and fresh water fisheries development prospects, giving special attention to the possibilities for mixed farming in the smallholder sector.

2. The soils and terrain are known to reconnaissance level in the two areas and are currently the subject of semi-detailed survey. Final assessments must be left until these are more advanced.

The following list of potential agricultural activities has been developed using primarily climatic criteria. The list is subject to modification as various economic and agronomic studies progress and at this stage is presented as a working document for discussion and information.

3. The climate of the area is characterised by high, fairly evenly distributed rainfall with no really well defined dry period. Temperatures are high, with small variation from the mean and the temperature range is low.

Table 1 shows selected meteorological data from Kluang and Mersing which will illustrate the climatic problem.

The even climate provides ideal conditions for vegetative growth

Table 1 - Selected Meteorological Records from Kluang and Mersing

(Source: P. R. Wycherly - date unknown)

STATION	LOCATION												ALTITUDE m.a.m.s.l.
	2°01'N 103°19'E												
MONTH	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Mean
Kluang													
Bright Sun hrs./day	4.65	7.14	5.68	5.57	6.14	5.48	5.55	5.67	5.24	4.33	4.07	4.63	5.35
Mean Temp. °F	76.3	77.7	77.9	78.1	78.6	77.9	77.7	77.5	77.4	77.4	77.0	76.5	77.5
Temp. Range °F	13.5	17.1	16.5	19.1	16.8	16.6	15.7	16.7	16.9	16.2	15.1	14.5	16.2
Evap. mm/day	4.58	6.14	5.45	5.22	5.19	4.74	4.84	5.04	5.09	4.69	4.31	4.50	4.98
Prec. mm/day	9.56	4.51	7.99	8.42	6.52	6.78	3.44	5.76	5.08	6.76	7.17	6.87	6.57
Def. mm/day	4.98	<u>1.63</u>	2.56	3.20	1.33	2.04	<u>1.40</u>	0.72	<u>0.01</u>	2.07	2.86	2.37	1.59
Mersing													
Bright Sun hrs./day	5.84	7.04	7.25	7.45	7.00	6.46	6.91	5.91	6.12	6.36	5.13	4.18	6.30
Mean Temp. °F	78.4	79.2	79.5	79.9	79.9	79.3	78.6	78.2	78.1	78.4	77.9	77.5	78.8
Temp. Range °F	8.8	9.8	12.3	15.5	15.9	15.8	15.8	15.7	16.4	16.4	13.3	8.5	15.9
Evap. mm/day	5.79	6.40	6.36	6.13	5.68	5.31	5.46	5.32	5.57	5.64	4.92	4.67	5.60
Prec. mm/day	7.95	5.07	6.67	4.30	4.21	4.63	5.99	5.00	6.59	6.81	11.93	21.71	7.57
Def. mm/day	2.16	<u>1.33</u>	0.31	<u>1.83</u>	<u>1.47</u>	<u>0.68</u>	0.53	<u>0.32</u>	1.02	1.17	7.01	17.04	1.97

but the lack of a reliable dry period and the relatively low number of bright sunshine days provide limitations on yields and difficulties with harvest of some products, particularly grain crops. The moist humid conditions also provide an ideal environment for the spread of fungal diseases. The small variation in day length throughout the year, about 5 - 10 minutes between the longest and shortest day also limits possible crops to those which are not photosensitive or can thrive in the practically constant day length conditions.

4. The high rainfall also give rise to terrain limitations on many types of crops. The risk of soil erosion is very high on all slopes and thus, on similar soils, the range of crops is reduced as the slope becomes steeper. This discussion is undoubtedly capable of considerable extension, but basically the crops most suitable for steeper soils are those which lead to the minimum amount of annual ground disturbance. Production costs will almost certainly be higher on steeper slopes as the cost of erosion control increases and the area per labourer decreases. A general quantitative assessment of these cost increases has yet to be done. There is, however, no reason why output per unit area should decrease with slope although this may be associated with other limitations.
5. The Land Capability Classification is in the process of being worked out. The activities mentioned below will be discussed in relation to land capability at the appropriate stage.
6. There will need to be correlation of the environmental of the factors which control the range of crop production, with demand aspects, management availability, production economics, social preferences and social and natural objectives in the final assessment of feasibility of any particular activity or system of activities.
7. Potential Agricultural Activities.

Several systems of classification are possible. The one decided on for this presentation is one which lists the activities according to the length of ground occupancy. This is laid out as follows:

- | | |
|--------------------|----------------------------------|
| a) Long term crops | - 5 years and over |
| b) Medium term | - 1 - 5 years before replacement |

- can or should occur.
- c) Short Rotational crops - Less than 1 year.

In general, the shorter term activities will result in more frequent soil disturbance and clearing and thus a higher degree of erosion. These crops should be kept to areas of least slope. They will also allow more flexibility in land use according to prevailing economic conditions but this is mainly of value if sound planning decisions are possible using good short term market forecasts.

(a) Long term crops

(i) Rubber: There are no special climatic disadvantages in S.E.J. for this crop and it will tolerate soils of low pH. It is suitable for slopes of up to 25° - 30° given good terracing and erosion control. Peaty soils do not provide good anchorage for the roots and should be avoided. Waterlogging is also not tolerated. Diurnal variation in rainfall in the area imposes no special limitations as nearly 70 per cent on average falls between 12 mid-day and 12 midnight. In fact absence of a firm wintering period could provide better than average girthing rates and shorten the time to maturity.

Current average yields in Malaya are still below 1,000 lbs/acre/annum dry rubber basis. The highest yielding estate gives an average yield of 1,600 - 1,700 lbs with individual fields (up to 50 - 100 acres in size) giving up to 3,000 lbs/acre.

New Plantings with the new RRIM 600 and 700 series clones are confidently expected to yield 2,000 - 2,500 lbs.

Time from first planting to first tapping (at 20 inches trunk girth) is between 5 - 7 years depending on clone and management. It is possible that the immature period would be shorter in Johore due to the favourable growing climate.

Tapping can carry on for very many years. 23 - 25 years is considered realistic at present because, although yields may have declined from a peak of 2,500 lbs down to 1,500 - 1,600 lbs, by that time new planting material with

higher potential or different technical specifications is expected to be available.

Management in rubber has to control labour and costs. The estate manager tends to make few agricultural decisions and is increasingly called on to provide rigid quality control of processing as the market becomes more demanding.

(ii) Oil Palm: The climate of the region is very suitable for oil palm growth with its evenly distributed rainfall and lack of pronounced dry season. In this respect Tengah area would tend to be marginally more suited than Penggerang. There may, however, be some yield limitations due to the relatively low sunshine hours, a factor which has been correlated with yield in West Africa.

Soil requirements are fairly critical. Ideal conditions demand a well aerated, freely drained soil to about 5 feet in depth with pH between 5.5 and 6.5. A hard pan 2 - 3ft. below the surface renders soil totalling unsuitable.

Average yields tend to be in the region of 10 tons of FFB (Fresh Fruit Bunches) but this could increase with breeding and management, some estates achieving up to 14 tons FFB in the 8th year after planting. Oil extraction rates start at 17 per cent of FFB weight and rise to 21 per cent after 5 years. Harvesting starts 2½ - 3 years after field planting and maximum yields are reached 5 years later. Normal yielding life is 25 years. At this age the palm are too tall for ease of management and harvesting costs become very high.

Management factors are expected to override climatic factors and soil and slope limitations will control planting areas. Slopes in excess of 12 degrees are unacceptable as fruit loss due to rolling bunches is higher and soil conservation measures become expensive.

Factory costs are high and due to this, possibly the minimum size for economic operation is 7,500 acres with 15,000 - 16,000 acres being an optimum. Detailed work will have to be carried out on economics of size as some estates have been seen

(v) Tea: The climate is certainly suitable for tea growth. Soil requirements are for deep permeable acid soils of pH 4.5 - 6. Calcium has an inhibitory effect on the plant but aluminium in the soil is demanded as the plant takes this up.

6,000 lbs of made tea per acre is the maximum that has been recorded (in Ceylon) but 1,000 - 2,000 lbs is a more usual yield.

A relationship exists between quality and height grown above mean sea level. However, there is also a relationship between quality and the number of leaves per stem plucked, the quality decreasing with each extra leaf harvested down the stem from the terminal bud. It may therefore be possible to utilise S.E.J. conditions for very good vegetative growth in combination with selective tip plucking to produce lowland tea of acceptable quality. Certainly this is possible as evidenced by the production of good quality lowland tea at Serdang. Estate size may be critical. Guthries attempted to grow 1,300 acres a few years ago and ran into management problems. They now say 200 - 400 acres is suitable management unit under Malayan conditions.

(vi) Cocoa: Rainfall and temperature are suitable for cocoa in S.E.J. Soils required ideally have a good top humic layer, pH 5.5 - 7.5, adequate calcium (which can however be added) and free rooting depth of up to 5 feet. Some shade is necessary in the early years but some of the highest yields in East Malaysia are found after the complete removal of shade once the cocoa canopy is complete.

Yielding is allowed to start in the 4th year after planting and rises after 4-5 years to 1,000 - 1,200 lbs on average. Cocoa hybrids will achieve 2,000 lbs/acre and yields in Sabah have been recorded in excess of 3,000 lbs lbs per acre on very fertile volcanic soils.

Although the fermentation process and drying has to be carefully controlled to avoid spoiling the beans, it can easily be handled by smallholders with simple equipment. Given suitable soils and adequate lime supplies, cocoa is perhaps one of the most promising tree crops for diversification.

(vii) Coffee: Can grow well in S.E.J. although the absence of a reliable dry period may have a limiting effect on yields.

Deep medium textured soils of pH 4.2 - 5.1 are considered ideal for coffee with a temperature range of 62°F - 80°F and rainfall of 110 - 118 inches.

C.Liberica is seen to grow well under local conditions, does not require shade and suffers little from pests and diseases. In Malaya it yields from 700 - 900 lbs although much higher yields can be obtained. On the world market it is used as a filler coffee but only about 1 percent of total trade is in this type. There may be a good local market. Local liberica coffee has been seen to be extremely variable in plant form and would benefit from selection.

Robusta also grows well in Malaya but may suffer more from pests. This is the major export coffee, used in instant coffee manufacture. Yields in Indonesia are 900 - 1,100 lbs per acre.

(viii) Pepper: Johore is the centre of West Malaysian pepper growing industry. Rainfall requirements are in the range 70 - 150 inches with no marked dry period. The crop cannot stand water-logging but will otherwise tolerate a wide variety of soils, the ideal being one which is well drained, rich in humus and pH above 5.5. As it is normally kept clean weeded, slopes should not be too great.

First harvest is 2½ - 3 years after planting and continues for 15 years starting at about 2,000 lbs/acre rising to 13,500 lbs/acre in the 7th year and then falling to 3,000 lbs in the 15th year.

It is a very labour intensive crop and seems to require specialised management skills, with one family normally planting 1 - 2 acres only.

(ix) Cashew nut: This crop is best suited to lower elevations but will grow under a wide variety of soil and climate conditions. It grows best on sandy soils with good drainage. Flowering occurs at the beginning of a dry period, so would be more suited to the coastal areas where this may occur more reliably.

Yielding starts in the 3rd year and full production is achieved by the 10th year. Economic yielding life is 30 years and an average yield is 860 - 1,000 lbs nuts/acre/year from mature trees. The nuts

command a high price generally and the shells (or pericarp) yield cashew shell oil which is a vesicant and used for a variety of industrial purposes. The swollen pedicel (cashew apple) is edible and can also be fermented to wine with the pulp used for preserves. The sap from the bark provides a source of indelible ink.

(x) Guava: Guava will also grow well in a wide range of soil and climatic conditions. First yielding occurs 2 years after transplanting and will continue for 30 years. In India, seedlings will yield about 17,000 lbs fruit per acre/year while budgrafts will yield 50 - 60,000 lbs fruit.

There seems to be a good local demand, but local varieties are poor and unselected. There are also possibilities of Vitamin C extraction and for inclusion in canned tropical fruit salads. Selection is important and initially good varieties will have to be imported.

(xi) Citrus: Limes, mandarin oranges and pomello should grow well in the area but probably only mandarin oranges have any long term economic potential.

Citrus generally requires free draining soils, and will not tolerate waterlogging. With this requirement satisfied, a wide range of soil types is allowable apart from heavy clays, pH requirements are ideally 5.5 - 6.5. Management is important and locally grown citrus invariably looks poor. It is highly probable that nutrient imbalance is the cause. Yielding starts at about the 4th - 5th year and continues for 20 years.

(xii) Ramie: This fibre crop could have economic potential and some varieties are climatically adapted to the area. In a similar area in the Phillipines five crops per year are obtained but 2 - 3 cuts per year are more usual. The crop has been tried several times in the past and, although it grew well, failed on account of the difficulty of processing. Now Japanese and American equipment is available making it a suitable crop for relatively small production units. It grows well on the peat soils of Florida.

The first crop is obtained after 10 months and then continues

for 7 - 10 years. It is an exhausting crop and needs rich loamy soil, heavy manuring and freedom from waterlogging.

Ramie can yield about 20 tons a year giving about $\frac{1}{2}$ ton of degummed fibre. The dried leaves contain 24 per cent crude protein and can be fed to livestock.

The fibre has many very attractive qualities and is used for a variety of purposes in the textile industry. It has four times the absorptive capacity of cotton and therefore is suitable for tropical wear. It also is used, with wool, to make high quality suiting material.

(xiii) Cinnamon: This crop does well on poor sandy soils and in a damp humid climate with no pronounced dry season.

The bark and leaves are used for the production of cinnamon and cinnamon oil.

The first harvest is taken about 4 - 5 years after planting and is in the region of 50 - 60 lbs. This yield rises to 150 - 200 lbs at the 10th year and then declines.

The best quality cinnamon comes from Ceylon with Mexico, U.S.A. and West Europe providing the major outlets.

Cinnamon is used for flavouring and the oil is used in perfumes and dental preparations.

(xiv) Cellulose supplies for paper: The paper industry relies on large quantities of cheaply obtained cellulose materials. The climate of the area provides an ideal environment for continuous vegetative growth and many longer term crops such as bamboo, caribbean pines and other soft woods, Erythrina spp. and others may be suitable on the poorer soils.

A pulping (chipping?) plant is to be erected in Johore Bahru primarily for old rubber trees. Pulping plants would be suitable for receiving other materials - perhaps even crop by products such as papaya stem and banana stems with suitable modifications.

(xv) Areca nut: The areca nut is one of the main constituents of 'betel' the popular masticatory of the East. The palm grows abundantly throughout Malaya and is a familiar sight in the countryside. The palm is cross pollinated so that while varieties do occur they are impossible to fix. The palm is grown from seed and begins to bear after 5 or 6 years and continues for up to 20 years thereafter becoming sterile. The kernels are sliced and dried and marketed at different grades. There is an export of nuts from producing countries to those where the palm cannot grow.

(b) Medium term crops

(xvi) Bananas: The climate of the area is suitable for growth of bananas. There will be no growth check either from cold or drought. Wind speeds tend to be low and this is an added advantage.

Flat terrain is usually preferred but given soil conservation measures, sloping land up to 15° could be used. Good internal drainage and therefore soil structure is necessary. Low pH values tend to favour the spread of Panama Disease and so these soils should be avoided if possible although banana growth is quite good in soils of low pH. Banana is a shallow rooting crop so soils of 3 - 4 feet are probably sufficient provided that drainage is adequate.

Yields on plantations in other parts of the world vary with climate, clone and management but 14 - 27 tons per acre is the normal range.

The most popular variety is Gros Michel but it is subject to Panama Disease and is being replaced by the dwarf variety Cavendish. Gros Michel is grown in the country - called here Pisang Ambon. Its popularity depends partly on taste but mainly on keeping quality which is all important for the European and U.S.A. markets.

The establishment of a banana industry is difficult in the early stages. Planting material will have to be brought in and multiplied up. For the best yields, harvesting rounds of 10 - 14 days are required and shippers require about 50,000 stems per load to operate efficiently. There could be good market in

Japan and Japanese banana venture is being started on 5,000 acres in Sabah.

Depending on variety the crop takes 12 - 18 months to first harvest and can then be left in the ground for 2 - 3 ratoons. Re-planting is normally carried out after $4\frac{1}{2}$ - 5 years.

(xvii) Pineapples: There is already a well established pineapple industry in Johore but due to world overproduction is in a rather stagnant state. Pineapples require a large amount of moisture but cannot stand water logged conditions. It has been found that peat soils with adequate drainage give good yields. Fields are planted with vegetative suckers of known varieties and once established remain in the ground for up to 3 years before being replanted. Pineapples have been interplanted with various with various crops including:- sago, rubber, papaya and other fruit crops but these are rarely satisfactory because of conflicting requirements.

In order to revive sales of pineapples from the canning industry tropical fruit cocktails are being tried, combinations of pineapple with papaya, guava, rambutan and mandarins are all successful. Also mixed pineapple/papaya, or pineapple/mandarin juices are very good. The Malayan canning industry is particularly wasteful / high protein, high carbohydrate, vitamin rich cattle food.

The shallower peats, particularly on Penggerang may be usefully converted into a suitable.

(xviii) Papaya: This fruit grows best in the humid tropics and thus the climate is suitable. Commercial production of high quality fruit is concentrated below 1000 metres in the tropics. It thrives best on well-drained soils which are rich in humus but will tolerate a wide range of soil conditions provided water logging does not occur. 48 hours in standing water is fatal.

Although the plants will bear fruit for 9 - 10 years, by this time they will have grown so tall that harvesting is extremely difficult. Replanting normally occurs after 2 - 4 years, depending on variety. Some dwarf varieties are available from Florida.

Papaya has a high demand for fertilizer and organic matter and these requirements must be supplied for successful production.

There are processing possibilities as well as industrial potential. The leaves contain the alkaloid 'carpain' which is a heart stimulant and the latex contains 'papain', widely used as a meat tenderizer, beer clarifier and a drug for digestive ailments. Papain is normally extracted by tapping the fruit for its latex.

(xix) Tapioca: Tapioca will grow under almost any lowland tropical conditions. It is indifferent to soil conditions but the yield is largely determined by the amount of nutrients available either natural or supplied.

Yields of fresh roots (tons/acre) in Perak (from Lulof report).

Virgin jungle soils	15 - 18	1st crop
	12 - 13	2nd crop
	9 - 11	3rd crop
Laterite soils	11 - 12	
Clay loam	12 - 13	
Sandy clay	9 - 13	
Sandy soils	6 - 7	
Tin tailings	3 - 4	

As with all crops giving a bulky harvest considerable quantities of nutrients are removed from the soil. Results from India show that a 12 tons/acre crop removes the following nutrients.

N	54 - 56	lbs/acre
P ₂ O ₅	40 - 45	lbs/acre
K ₂ O	195 - 230	lbs/acre

Much higher rates of nutrient uptake have been found in Malaysia with up to 200 lbs of Nitrogen and 200 lbs of P₂O₅ removed.

It is obvious that large quantities of Potassium are removed and it is known that most Malaysian soil are particularly deficient

in Potassium. Trials have shown that the N/K ratio is very important. Too high a nitrogen contents results in luxuriant vegetative growth without a corresponding yield in tubers. On most Malaysian soils the N/K ratio could be as high as 1:3

There are a large number of varieties available which vary according to starch content, production of fresh tubers, time to maturity and hydrocyanic acid content. Varieties with starch contents in excess of 30 per cent are desirable. Some work on variety selection is going on at the R.R.I.M. and at Serdang.

The tubers have poor keeping quality, only 4 days, and so the plantation must have good access to the processing factory. The commercial products of tapioca are flour, flake, pearl and chips. Industrial alcohol can also be made from the tubers.

(xx) Gambier: This old fashioned crop widely grown in Johore in the last century as a source of tannin, is being re-examined. Gambier is a native of South Malaya and well suited to estate cultivation. It yields a substance called catechin. This substance is being investigated by pharmaceutical companies for use in infant medicines against gastro-enteric disorders. In very young children it is undesirable to use antibiotics and the effect of catechin while totally dissimilar to that of antibiotics nevertheless can provide much the same curative results.

Very little has been found out about this crop but it is hoped to gain information from a Swiss pharmaceutical company working on all aspects of its cultivation and processing at the R.R.I.M.

(c) Short Rotational Crops

This group of crops may have several important advantages in the area but at the moment are represented only by vegetables and a very small amount of rice. The climate does restrict the range of possible crops somewhat as the humid conditions render some very susceptible to fungal disease. In the context of agricultural development however, they are likely to provide reasonable incomes certainly within a year of planting and often within 3 - 4 months. Many of the crops are amenable to a wide range of management practices and are suitable for

large scale mechanised arable farming as well as intensive smallholder production using a maximum of hand or hand/mechanical labour. Slope will be very important as frequent cultivation will give a high erosion hazard. Flat land is ideal but slopes of up to 6° are considered suitable given good conservation practices.

The fact that short term rotations can be devised to meet many situations within the limits of the technical restraints is a great advantage in obtaining acceptance of the concepts of arable farming. Flexibility in the crops that an area of group of people grow is desirable in order to hedge against price uncertainties. The shape of the income flow is important to all business and short term returns are likely to be particularly important to small farmers with limited capital and currently low living standards.

However, a caveat is necessary. The very flexibility of arable rotation systems introduces the need for a degree or type of management which perhaps is deficient in the country. The daily decision making process of management is much more important than in a monoculture operation involving a long term tree crop. Much management expertise may of necessity have to be imported at least in the early stages of diversification. New crops sold on the world market will have to be graded to a standard acceptable to that market. Marketing chains which can cope with traditional crops on traditional markets may not be able to handle new crops for new markets as readily. In order to enter a new market, processing industries may well have to be added into the chain.

Pilot projects will probably be necessary, but for this group of crops, results could be quickly forthcoming, given adequate support and incentive.

(xxi) Groundnuts: Groundnuts are highly non-specific in their climatic requirements and will give good yields (over 20 pickuls/acre) in S.E.J. It is self pollinated and nonphotoperiodic. It will grow on almost any soil given adequate nutrients. However for ease of harvesting and to promote a clean crop the best soil is a loose friable sandy loam. These soils tend to be droughty and lacking in nutrients but this should not be a problem in S.E.J. with its even rainfall and given good management. The main problem is infection of the harvested groundnuts with fungi which are very dangerous if

consumed producing high concentration of aflatoxin. At the moment these fungi are not present in the area but it is considered that popularisation of the crop is likely to introduce the fungi which does occur in the country. The export market is very sensitive and all samples with fungi are rejected. The local market is unsatisfied and Malaysia imports considerable quantities for oil milling and animal foods processing. Groundnuts can be usefully intercropped on a short term basis with both young rubber and oil palm and in the long term can take a useful place in a rotation of other arable crops.

(xxii) Tobacco: The climatic requirements of the tobacco plant are quite specific. The growing period is 90 - 120 days and the optimum mean temperature is 70° - 80°F. Strong illumination is required. A minimum of 10 inches of rain is required during the growing season but most rapid growth is with 20 inches. However drier weather is required for ripening and harvesting. Continual rain during the growing season leads to disease and thin leaves while a prolonged dry spell when nearing maturity causes premature ripening.

Soils of high fertility are required, having light textures with free drainage but good moisture retention. Tobacco will not tolerate waterlogging. A slightly acid soil reaction is best with pH 5 - 6.5.

It could be possible that detailed examination of climate records will reveal a suitable growing/ripening period for tobacco and indeed, Malayan Tobacco Co. has successfully grown a high quality flue-cured crop of Singapore island and will be continuing their trials.

Management by a major tobacco company will probably be essential if a viable industry is to be developed owing to the complexities of marketing. There are over 2,000 grades of tobacco recognised at the moment and standards are frequently altered to meet changing demand patterns.

(xxiii) Maize: If planting dates are accurately determined, maize may well be a good crop for the area. The climate of the area is not ideal for cultivation of the crop for grain as a very important requirement is for a dry period at harvest time. Ideally, a little rain at planting followed at the end of the first month by heavy rains every four or five days tapering off three weeks after flowering to harvest. The high average temperature is suitable.

Almost any soil except heavy clay is suitable provided drainage is unimpeded. Soil fertility and structure have to be of a high order to obtain the best yields which are usually obtained on deep fertile well drained silt loams or young volcanic soils

Current yields in Malaya range from 2000 - 3200 lbs per acre from the main areas of production in Trengganu, Perak, Pahang and Selangor with experimental yields up to 6000 lbs/acre. The time from planting to harvest is about 90 - 100 days. There may be some demand for sweet corn and it may also be possible to incorporate the crop as fodder on a livestock farm.

(xxiv) Sorghum: While sorghum has considerable drought resistance and has come to be thought of as a semi arid crop, it has considerable scope in the tropics too. It will tolerate wide climatic variations but for grain production needs to ripen so that harvesting can take place in a dry period.

Acceptable crops can be grown in most soil types ranging from light sands to heavy clays but the best yields are obtained on fertile well drained sandy loams. The growing period is about 100 - 120 days.

The major use is for animal feed and the grain, of which yields of about 2 - 4000 lbs/acre are obtainable, is primarily used for this purpose. Sugar sorghum are also available, producing a syrup of distinctive flavour.

Wilted sorghum plants are used for fodder and breeding of varieties for many other use is proceeding successfully in other countries.

(xxv) Vegetables: A study of vegetable types is being carried on at the moment. The many different vegetables available will have to be categorised before definite recommendations are made. However, on the flatter, fertile, well drained soils, leafy vegetables and roots would be especially suited to the area given the good climatic conditions for vegetative growth. Success in increasing the viability of the vegetable industry will depend on increasing outputs per man as the main competition comes from Mainland China and Indonesia both apparently with lower labour costs.

Apart from any potential growth in the local market, there are export possibilities to Singapore, currently importing about 50 per cent of her requirements and also possibilities of a processing industry manufacturing canned, dried and frozen products.

At the moment, vegetable growing is done on a largely speculative basis, with many farmers growing only one or two types in an attempt to achieve a very high price. The industry can hardly hope to attain stability under such circumstances and it may well be that a processing industry, with the possibility of contract growing could lead to a stable industry.

(xvi) Grass: Johore has the most evenly distributed annual rainfall pattern in Malaya which is ideal for vegetative growth. It follows that Johore is ideally placed for any agricultural or industrial enterprises based on grass production. The soils are generally considered reasonable for grass growth provided drainage is adequate though high yielding swamp grasses thrive in water logged conditions. For easy machine management, nutrient and moisture retention, loams and clay loams are desirable. In Johore soils are poor in calcium and transported lime costs \$55 a ton. Therefore it is best to cultivate species with low calcium requirement and adjust the fertilizer practice to maintain the highest possible pH.

Species which do well in Johore.

Napier Grass - Pennisetum purpureum.

This the highest yielding species and harvests of 10 tons/acre fresh grass can be harvested every 45 days - about 8 harvests per year. This grass needs careful management to maintain high nutritive content of the grass and to maintain a uniform stand. It can be directly grazed or cut and carted to animals who find it palatable and have a satisfactory live weight gain.

Guinea Grass - Panicum maximum

This yields considerably less than Napier grass, 5 - 6 tons/acre at 45 day intervals but the grass is less stemmy. It is cheaper to establish than Napier grass.

Signal Grass - Brachiaria brigantha

This grass is particularly useful on areas with a weed

problem as once established it can out grow lalang. It yields are about 5 tons/acre but one drawback is that it is very slow to establish.

Paragrass - Brachiaria mutica

This grass yields extremely well on water logged sites but is very drought sensitive and cannot stand direct grazing so well as the other species.

Several other species are being tried, many showing considerable promise but suitable management practices need to be developed. With /suitable fertilizer applications crude protein contents of 10 - 12 per cent can be expected. Thus grass can provide a complete food for cattle or can be a useful raw material for manufacture into grass meal for livestock foodstuffs industry.

(xvii) Soyabean: This crop is not ideally adapted to conditions prevailing in S.E.J. As a crop it cannot stand excessive heat and requires a short day to induce flowering. However, it is one of the most genetically variable of all crops and with appropriate selection of the material that exists suitable varieties could be found. It will grow on a wide variety of soils, but for best yields, soils should not be too acid as nodulation is inhibited.

With the existing planting material available crops can be obtained but leafy tops seem to be produced at the expense of the beans. Experiments with artificial inoculation of the soil have shown marked improvement in yield. It can be grown with grass species and will produce an excellent forage. Generally the crop is grown for the feeding value of the beans which have high protein content and low oil content. There are varieties which have high oil content and much lower protein content, these would seem to be less desirable types for Malaysian conditions.

Yields from experimental plots have given over 2000 lbs of dry beans per acre and the potential could be as high as 2500 lbs.

F.A.S./R.A.J.H.

Mr. Ysselmuider

20

Date: October 6th 1969.

Time: A.M.

Meeting of Consultants with members of the Department of Agriculture.

Held at: Ministry of Agriculture.

Present: English, Harrison, Sole, Law (soils), Ani (Agronomist), Van, Kanapathy (soils) plus several others including Inche Jamal the Director of Agriculture.

F.A.S. made the introductions and opened the discussion by explaining what were our aims and our requirements from them. They were asked specifically to outline their lines of research and trails and the trends in agricultural development. No clear trends were put forward but several suggestions were made covering different crops.

Tapioca: The problem of over production was stressed, apparently Thailand has a considerable surplus.

Coffee: There is an unspecified hybrid type being grown in Selangor on peat.

Cocoa: Considerable interest is being shown in mixed cocoa/coconuts system which are being tried in several places notably at Pakloh Estate near Kluang 600 acres. Oil palm and cocoa are being tried by F.L.D.A.

Tobacco: Malayan Tobacco Company is holding enormous stocks of poor quality local grown tobacco.

Coconuts: An American Company wants 20 million nuts per year and could take up to 120 million for desiccated coconut production. This industry has pioneer status.

We were assured of access to the Singapore port facilities and markets.

The clearance of steep land was controlled by State Government.

Farmers Association and Co-operations cover under a separate division. Mr. Lee the Assistant Director of Extension explained that Co-operatives were handled by a separate division of the Ministry.

Farmers Associations had been set up under the umbrella of the Department of Agriculture following the Farmers Association Act of 1957. This act prevented them from entering into any commercial enterprises and envisaged them as providing an aid to the extension effort.

- 2 -

However they had tended to become social clubs or had drifted along with no clear aim in view not being able to assist farmers directly in their production and marketing problems.

The 1968 Farm Association Act allowed multi purpose organizations. These are run by a Board of Directors drawn from local farmers; executive functions are carried out by members of the Department of Agriculture. The department aims for association of at least 1,000 members, which can both supply inputs and marketing services and follow this up with an extension effort. At present 21 associations are in operation. The Department is at present concentrating its efforts in areas in which it feels show promise of real results, rather than spreading them haphazardly over the country. The only association in Johore is at Rengit on the west coast between Batu Pahat and Pontian.

PAJH/JCE/11/10/69

NR/M/4

Date: October 7th 1969.

Time: a.m.

Meeting of Consultants with Inche Abu Bakar bin
Mahmud (Administrator Agric. Education.)

Held at: Department of Agriculture, Ministry of Agriculture
and Co-operatives.

Present: Harrison, Sole, Abu Bakar.

Inche Abu Bakar a dynamic and aggressive personality was surprised that he had not been previously informed of the S.E.J.P. He explained that manpower was the key to development and he was in charge of manpower training in the agricultural sector.

Inche Abu Bakar then went on to explain the set up in Agricultural Education with three levels of staff --

1. Specialist Graduates - produced by the University
2. Supervisory Staff, Agricultural Officers - from College of Agriculture, Serdang.
3. Junior Agricultural Assistants - from Farm Training School, Serdang.

At present 1,300 Junior Agricultural Assistants were being produced annually, this number could go up to 2,500 given sufficient funds. There was an annual attrition of 10% of serving Junior Agricultural Assistants, however, as the present average age was 35 years, the early retiring age (55 years) did not affect numbers much at this stage.

Inche Abu Bakar stressed the vital importance of his department being informed of manpower requirements at the earliest possible stage, as it took at least five years to plan and implement manpower training schemes. Without adequate manpower being available it was often very difficult to obtain Loan Approval from aid bodies. He welcomed contact with the Project.

P.M.

Inche Abu Bakar kindly took us in his car to the Agricultural Training School at Serdang. Here we met the principal who took us on a semi-motorised farm walk where we saw trials of a number of interesting crops:- sugar cane, passion fruits, star fruit, guava, mango, cocoa, durian, brazil nuts and several vegetable crops.

NR/H/7

DATE: October 8th 1969.

TIME: A.M.

Meeting of Consultants with Inche Ani bin Arope, Senior Agronomist, Division of Agriculture.

HELD AT: Serdang Agricultural Research Station.

PRESENT: Harrison, Sole, Ani bin Arope, Agric. Botanist and Plant Quarantine Officer.

The discussions rapidly got down to details concerning specific crops:-

COCOA

Originally cocoa growing in Malaya, introduced by experienced West Africa Producers, followed West African practices of planting under jungle shade. Conditions are not the same and cocoa has not been a conspicuous success using this system.

Some cocoa was seen on the station growing under specially planted shade trees. This was also not successful and had been virtually abandoned. Dieback in the 4th year is a problem but on the better soils the trees get over it. The causes are unknown and no work is currently being done.

The most promising system appears to be cocoa under coconuts, practised commercially in New Guinea and there are about 2,000 acres under this system in the country. Harrison & Crossfields have one area. The crop seems to grow best on heavy marine soils.

The system involves the establishment of coconuts first and these are then intercropped with short season crops such as pineapples, bananas, coffee and maize for up to 3 years. By this time, shading from the coconuts precludes further production of these intercrops. By the 5th year cocoa is planted and can then continue to produce under the coconut shade for the economic life of the tree.

Yields under this system vary from 600 lbs/acre of beans on small holdings to over 1,000 lbs/acre on estates. All beans are exported. One advantage of the system is that the processing requirements of both copra and cocoa are simple and similar, the system having attractions as a small holders enterprise.

Coconuts yields vary from 8 cwt. copra/acre on small holdings to 15-20 cwt/acre on estates. With fertiliser applied for both crops, there should be no yield reductions from either.

I.S.P. Publication: Cocoa under Coconuts.

CATTLE/COCONUTS

This is another system which has attractions and is being tried. The maximum recommended stocking rate is 1½ head/acre if damage to drains is to be avoided. At the moment cattle production is apparently of secondary importance in the system, their main function being to keep down the undergrowth and increase the recovery rate of fallen nuts.

(2)

FRUITS

Wholly local fruits such as dukus, starfruit and chicku would tend to have a limited market and little is being done to improve them. Rambutans have been subjected to a lot of breeding work and there is the possibility of export in a processed form as they have a taste and texture similar to lychees.

As yet, mangoes have serious problems with fruit setting, only about 10% of the set fruit being retained. This suggests either nutritional or pollination problems.

Citrus was being tried everywhere but the ideal, which is apparently mandarin type oranges are very unsuccessful. Grapefruit will grow and produce well -- no figures were available.

Bananas are a possibility, but the existence on the American and European markets of the Standard Fyffes (Geest) bananas from the Carribean and Central America would probably force an intensive promotional campaign to obtain acceptance of the different (and very good) Malayan types. A good market exists in Japan. The Japanese have started a banana plantation in East Malaysia.

Passion fruit for processing by the Food Technology Division appeared to be growing well.

VEGETABLES

Several local vegetables were discussed but mention of this section of the industry provoked an apathetic response, although the existence of the Singapore market (importing 50% of its requirements from Indonesia and China) would seem to be advantageous to the project areas.

CEREALS

Although there appears to be little variation in rainfall throughout the year in S.E. Johore (using monthly figures only), it was thought that the short dry spells of up to 10 days in duration would be sufficient for the harvesting of crops like maize and sorghum. The potential for livestock feed appears to be high, even if examination of the probabilities of 10 day dry periods is not too encouraging, as both these crops can be cut and fed green.

SUGAR

Once again scepticism was expressed as to the viability of sugar in the Johore climate, however, the year round rainfall pattern may render the area highly suitable for the production of cane planting material,

One constraint pointed out by Che Ani was that limestone is unavailable in Johore and that transport costs were 12¢ per ton mile.

Possible Crops - Rejected.

- Manila Hemp - Climatically adapted to give good yields in S.E.J. However the present world market is declining and further new plantings cannot be considered worthwhile.
- Sugar Cane - Expert opinion is convinced that it will not be possible to grow canes with a sufficiently high content of sucrose sugar to form the basis of a sugar industry in S.E.J. Nevertheless a large sugar estate is being planted in S.E.J. with serious intention of producing sugar. With appropriate government legislation this estate could sell sugar on the Malaysian market. But as sugar produced in S.E.J. could not compete with more favourable regions in West Malaysia we cannot consider it a serious proposition for the project areas.
- Mango - In order to produce satisfactory harvests a natural break in the growing season is required to induce inflorescence formation. This natural break usually comes with a regular dry season which does not occur in S.E.J. However with further research it may be possible with defoliant to induce a break in the vegetative cycle.
- Keroff - (Deccan Hemp) - Requires a long day photoperiod.
- Jute - Declining world market dominated by India and Pakistan. Malaysia with higher costs could not compete.
- Sisal - These fibres are inferior to abacca and fails in competition with synthetics.
- Sunflower - Not suited to the prevailing climate as it flowers precociously and has a poor seed set.
- Sesame - Humidity at harvest time is detrimental to maturation of the pods.

- 2 -

Castor

- Does grow very well in S.E.J. but produces very few flowers and very poor seed production. Castor does exhibit a wide spectrum of genotypes which with selection could produce good yielding varieties. However castor oil does not have any unique properties and castor seed cake requires treatment to make it platable. With these drawbacks and the general lack of interest being shown in another oil seed crop this research is not being done.

RAJH/BN/FM
17/12/69

TEA

1. Tea production is heavily concentrated in Asia, particularly in India and Ceylon, which are traditionally the major exporters of the commodity. Table 1 shows world distribution of production up to 1968 and F.A.O.s projection of output in 1975. Production has been rising steadily during the past decade at about 3 percent per year. The most rapid rate of increase - 10 percent per annum - has been occurring in Africa.
2. Consumption of tea is interesting in the degree to which it is localised. Table 2 shows 1961-1963 consumption and F.A.O. projections of demand to 1975 and 1985. The greatest quantitative consumer is U.K. followed by India. The major problem facing tea producers is the low rate of growth of consumption in importing countries. F.A.O. has estimated that the income elasticity of demand for tea in the U.K. is 0.1 and that price elasticity is zero. Thus little increase in consumption can be looked for there. Other high income importers are estimated to have income elasticities of between 0.1 and 0.3. Consumption is increasing more rapidly in lower income countries where income elasticities are in the range 0.4 to 0.8. In India for example consumption has been increasing at 3-4 percent per annum. With production growing at just over 2 percent exports have been falling slowly.
3. Overall production has been increasing more rapidly than consumption, as a result prices have fallen (see Table 3). It is noticeable that the price declines have been most marked in the higher quality North Indian and Ceylon blends than in the South Indian teas. The price of African teas has remained stable. This may reflect an increase in quality or the fact that the form of processing adopted in most African factories involves the "cut, tear and curl" process which results in a small size leaf which is greater demand at present for the manufacture of "quick brew" tea blends. This also has the added advantage that the capital cost of machinery is lower than for traditional methods, and has lower wear and tear.
4. Insepection of tables 1 and 2 indicates that this trend is expected to continue, with prices falling by a further 20 percent over the next 12 years and a relative increase in consumption in low income countries.
5. Consumption of tea in Malaysia is expected to rise steadily, from the 1965 level of 0.9 lb/year to 1.2 lb/year in 1985. F.A.O. estimated the income elasticity of demand at 0.6.

In the Indicative World Plan for Agriculture the following development of production and consumption was foreseen.

To date however the area in tea in W. Malaysia has been declining. The acreage of Highland Tea has remained virtually constant between 1964 and 1968 at 5,700 acres in Pahang. Lowland tea has however declined from 3,773 acres in 1964 to 1,834 acres in 1968, mainly as a result of reductions in Selangor.

Table 4.

Malaysia, Tea Production and Consumption 1962, and projected to 1975 and 1985

	<u>1962</u>	<u>1975</u>	<u>1985</u>
Area (acres)	9,884	17,298	29,653
Yield (lbs/acre)	713	803	892
Production ('000 lbs)	7,047	13,890	26,450
Net Inputs ('000 lbs)	2,204	2,204	-
Consumption ('000 lbs)	9,251	16,094	26,450

Table 5.

West Malaysia Trade In Tea 1965-1968

	<u>Imports</u>			<u>Exports</u>		
	Volume ('000 lbs)	Value (\$'000)	Price \$/lb.	Volume ('000 lbs)	Value (\$'000)	Price \$/lb.
Black Tea Leaf						
1965	1707	2,282	1.34	3875	5,665	1.46
1966	1690	2,073	1.23	3775	5,555	1.47
1967	1446	1,643	1.14	3616	5,145	1.42
1968	1436	1,612	1.12	3702	5,068	1.37
Black Tea Dust						
1965	3250	3,710	1.14	981	1,375	1.40
1966	3235	3,567	1.04	910	1,276	1.40
1967	3486	3,029	0.87	532	714	1.34
1968	3524	3,066	0.87	484	677	1.40
Green Tea Leaf						
1965	421	708	1.68	76.9	75.0	0.97
1966	476	665	1.40	188	183	0.97
1967	573	665	1.16	155	144	0.93
1968	627	687	1.20	25.2	24.9	0.99
Green Tea Dust						
1965	3.30	3.20	0.97	1.30	1.20	0.92
1966	2.00	4.40	2.20	-	-	-
1967	25.0	20.3	0.81	5.82	5.65	0.97
1968	41.0	32.7	0.80	1.12	1.04	0.93

6. W. Malaysia's trade in Tea is shown in Table 5. This indicates that Malaysia has been exporting higher grades of tea and importing lower grades. The decline in tea prices is notable particularly in black tea imports but export prices have held up well. Imports of black tea leaf are principally from China, Exports to U.K. have been falling in recent years but have been offset by increased sales to Australia and North America. Dust comes mainly from Indonesia although in 1965 and 1966 supplies from that source were severely restricted and Ceylon was the major supplier. This may account for the higher price paid in those two years. Dust exports are to Singapore, Thailand and U.K.

7. Tea is a labour - intensive crop and it is estimated in I.W.P. that labour accounts for more than half of the cost of production. An idea of the level of cost associated with the crop is given in the following table taken from I.W.P. (adjusted to Malaysian units).

Table 6.

Tea, Production Costs and Return at Different Yield and Price Levels

Yield (made tea)	892 lb/ac		1338 lb/ac		1338 lb/ac	
	cents/lb	\$/acre	cents/lb	\$/acre	cents/lb	\$/acre
Gross Income	117.1	1045	117.1	1568	99.2	1328
General Charges	27.6	246	27.6	369	27.6	369
Cultivation and	51.0	455	41.3	553	41.3	553
Harvesting			11			
(Maintenance)		(160)	(11.0)	(148)	(11.0)	(148)
(Manuring)	(8.3)	(74)	(8.3)	(111)	(8.3)	(111)
(Plucking)	(24.8)	(221)	(22.0)	(295)	(22.0)	(295)
Manufacture and	16.5	148	13.8	185	13.8	185
packing						
Freight and	2.8	25	2.8	37	2.8	37
Transport						
Costs of Production	97.8	873	85.4	1144	85.4	1144
Returns	19.3	172	31.7	424	13.8	184

The above table is of somewhat limited value in that it does not quantify the relevant inputs. However at the higher yield, assuming a farm gate price of 70 cents/lb gross returns to the producer would be approximately \$937 per acre per annum. New higher yielding planting material has been developed in Ceylon at the Tea Research Institute reputed to be capable of yielding up to 4 tons/acre at low altitudes and 2 tons at high altitude.

8. The tea industry is extremely complex in that there are a large variety of teas many identified with specific locations. Further study is necessary to determine Malaysia's position in the tea market and its production potential. It may be that if high yielding lowland teas can be developed eg. 2 tons of tea at 50 cents/lb giving a gross \$2250 per acre the crop could be a useful addition to the agricultural economy.

- Sources
- F.A.O. - Agricultural Commodities - Projections for 1975 and 1985
 - F.A.O. - Provisional Indicative World Plan For Agriculture.
 - F.A.O. - Commodity Review and Outlook 1968/1969.

TEA: PRODUCTION.

TABLE 1.

Production	Average 1955-57	Average 1963-65	1966	1967	1968 (Preliminary)	1975 (Projections)
.....	Thousand tons					Percent ...
WORLD TOTAL	848	1114	1195	1190	1230	
Developed countries	74	92	105	107	107	123
Japan	72	81	83	85	87	99
Turkey	2	11	22	22	20	24
Developing countries.	651	811	868	861	898	1162
Asia	596	731	762	759	780	978
Ceylon	175	222	222	221	225	327
India	309	362	376	382	397	475
Pakistan	23	27	28	30	28	176
Others	89	120	136	126	130	176
Africa	32	64	84	83	97	141
Latin America	3	16	22	19	21	43
Centrally planned countries	143	211	222	222	225	
U.S.S.R.	28	48	58	58	61	89
China (Mainland)	113	159	160	160	160	
Others	2	4	4	4	4	

Table 2 - Tea: Consumption, 1961-63 Average and Demand Projections for 1975 and 1985

	1961-63 Average	1975		1985			
		Low income	High income	Low population		High population	
				Low income	High income	Low income	High income
(..... Thousand tons)							
Producing countries	80	107	117	127	151	151	151
Developed countries of which:							
Japan	71	93	101	108	128	112	128
Developing countries of which:	<u>262</u>	<u>395</u>	<u>428</u>	<u>524</u>	<u>627</u>	<u>551</u>	<u>644</u>
India	139	213	232	284	346	286	351
Indonesia	43	60	63	77	93	80	95
Total, producing countries	<u>342</u>	<u>502</u>	<u>545</u>	<u>651</u>	<u>778</u>	<u>662</u>	<u>795</u>
U.S.S.R.	...	104	109	135	150	140	155
<u>Non producing countries</u>							
Developed countries of which:	<u>400</u>	<u>459</u>	<u>465</u>	<u>492</u>	<u>503</u>	<u>508</u>	<u>519</u>
United Kingdom	234	249	249	250	250	257	257
United States	55	66	66	102	102	107	107
Australia	28	37	38	43	45	45	47
Canada	20	25	25	29	29	30	30
Developing countries of which:	<u>119</u>	<u>180</u>	<u>197</u>	<u>251</u>	<u>285</u>	<u>253</u>	<u>290</u>
U.A.R.	24	38	42	55	63	56	65
Iraq	20	33	34	47	49	49	51
Centrally planned countries	<u>7</u>	<u>15</u>	<u>16</u>	<u>19</u>	<u>21</u>	<u>19</u>	<u>21</u>
Total non producing countries	<u>526</u>	<u>654</u>	<u>678</u>	<u>762</u>	<u>809</u>	<u>780</u>	<u>830</u>
WORLD (excluding centrally planned countries)	861	1 141	1 207	1 394	1 566	1 423	1 604

TABLE 3. TEA PRICES.

	Average 1955-57	Average 1963-65	1966	1967	1968 (Preliminary)
	Pence per kg.
London					
North India	133.2	119.5	115.0	118.4	107.3
South India	110.0	98.5	90.5	93.7	93.2
Ceylon	138.7	115.6	112.1	115.4	108.7
Africa	89.1	91.0	92.7	89.5	97.2
All Tea	126.5	111.9	107.7	109.9	104.6

MAIZE IN WEST MALAYSIA

At the present time maize is a minor crop in Malaysian agriculture. Interest in it derives from its use as a livestock feed, principally for pig and poultry production. The Department of Agriculture estimated that the equivalent of 12,637 acres of sole crop were produced in the country in 1967. Assuming two crops per year each of one ton per acre this means an annual production of approximately 25,000 tons. The estimated acreage has remained at this level throughout the past decade. Usage however has been rising and this reflected in increased imports (see Table 1).

TABLE 1IMPORTS OF MAIZE INTO WEST MALAYSIA
1962-1968 (TONS)

	1962/4(av)	1965	1966	1967	1968
Maize Unmilled	64,185	40,138	57,398	60,964	82,553
Maize for Animals	n. a.	24,760	49,076	50,305	60,000(est)
Maize meal & flour	7,996	4,764	7,820	6,686	7,672
Total	78,838	69,622	114,294	117,955	150,225

Estimates of future requirements must be largely conjectural being based upon the total demand for livestock feed and the proportion of this which will be made up of maize. Estimates of the consumption of livestock products and potential increases in production have been made by the consortium (see "The Outlook for Livestock Products in West Malaysia." 17/12/69). Using these estimates and assuming that the following proportions of total dry matter intake of each class of livestock will come from maize the potential usage of maize in West Malaysia is shown in Table 3

TABLE 2ESTIMATED PROPORTION OF DRY MATTER DERIVED
FROM MAIZE

LIVESTOCK CLASS	PROPORTION
Dairy Cattle	5%
Young Stock	0%
Beef Cattle	10%
Goats	0%
Pigs	30%
Poultry	50%

TABLE 3

POTENTIAL USAGE OF MAIZE TO 1990
(THOUSAND TONS)

YEAR	CATTLE	PIGS	POULTRY	TOTAL
1975	3,877	122,542	199,648	326,067
1980	9,352	170,901	330,420	510,673
1985	24,597	205,956	545,547	774,100
1990	64,654	266,457	820,950	1,152,061

An additional correction had to be made to take into account the fact that at the present time the majority of poultry are kept in kampong "floods" ^{cks} which exist on scraps and whatever they can find. It was assumed that the following proportion of poultry would be kept in commercial flocks:-

	Layers	Table Birds
1975	33%	40%
1980	50%	60%
1985	75%	80%
1990	100%	100%

Total demand for maize is thus estimated as growing by between 9 and 10% per year to a total of one million tons by 1990. This rate of increase results from the growth in demand for livestock products at 5-6% per year and the swing to more intensive methods of production, particularly in the case of poultry. This rate of increase is similar to that which has occurred in West Europe and Japan in recent years, and could indeed prove to be an underestimate.

A projection back of this rate of increase from the 1975 estimate implies a requirement of 170,000 tons in 1968. This is almost exactly equal to total supplies in that year. Since little maize is used for direct human consumption the basis for the above projections appear to be reasonable.

Maize is the largest element in world feed (Coarse) grain production. Other feed grains are barley, oats, sorghum rye. The world market situation for feed grains is however linked to that for wheat and to a lesser extent rice. Official comments on the outlook for these commodities is closely related to outlook for food as a whole and has varied considerably from time to time, and at present is in an extremely volatile phase. In 1967 F.A.O. projected wheat output in 1975 at 303 million tons and forecast an increased

- 3 -

deficit in developing countries, particularly in the Far East and expressed concern over the falling level of wheat stocks. It is now estimated that world production in 1968 was 333 million tons and a similar amount in 1969 with major increases occurring in India and Pakistan and Canada and Australia in particular are embarrassed by stock levels. It was noted in the paper on rice that lower wheat prices could result in increased substitution of wheat for rice; lowering rice prices. Similar effects could occur in the feed grain market with wheat being used as a livestock feed. Wheat and most feed grains are also substitutes in production. In the E.E.C. feed grain prices have been raised to encourage such substitution and in the United States restriction of wheat acreage is likely to result in increased output of barley, oats and sorghum, if not maize.

In 1968 the export price of U.S. maize fell to U.S.\$44 per ton (M\$135). It has since risen to about U.S.\$50 per ton. Given current production and consumption trends it appears likely to stay at this level since grain output is now so closely determined by government policies. Assuming maximum transport and delivery charges of M\$850 per ton to Malaysian mills the total cost at mill is approximately M\$200 per ton (or \$12 per pikul). Farm gate prices are likely therefore to be in the region of \$10 per pikul or \$170 per ton.

CONCLUSIONS

(1) Total demand for maize for livestock feed in West Malaysia will rise at almost 10 percent per year to about 1.1 million tons in 1990.

(2) Given the interaction of increased world grain production capacity, a slow down in growth of livestock production in West Europe and Japan, and national grain policies it is likely that the import price of maize to Malaysia will be in the region of \$190-\$200 in the coming years. Farm gate prices may be taken as in the region of \$170 per ton.

Sugar in West Malaysia

Sugar, previously a very minor crop in West Malaysian agriculture has come in for considerable attention in recent months. This paper will briefly outline the size and growth of the Malaysian sugar market and review the world situation for the commodity.

The imports of sugar into West Malaysia since 1963 are shown in Table 1.

Table 1 Sugar Imports (tons)

Year	Raw	Refined Equivalent	Refined	Total
1963	914	823	153,550	154,353
1964	57,135	51,421	145,129	196,550
1965	141,544	127,390	67,268	194,658
1966	171,125	154,012	63,777	217,789
1967	194,037	174,634	38,308	212,941

The refined equivalent of raw imports of sugar is taken as 90%. 1967 consumption is equivalent to 0.0242 tons per head (or 54.3 lbs). Home produced sugar is ignored since only 2,300 acres were recorded in 1967, most of which were in mixed crops. This would perhaps have yielded 5,000 tons of sugar equivalent.

F.A.O. studies have indicated an income elasticity of demand of about 0.5. Assuming this value, a population increase of 3% per annum and per capita income increase of 2.5% per annum, the growth of per capita and total consumption of sugar in West Malaysia is shown in Table 2.

Table 2 Projected Sugar Consumption

Year	Per Capita (tons)	Total (Thousand tons)
1967	0.0242	212,941
1970	0.0252	242,517
1975	0.0264	293,302
1980	0.0288	371,893
1985	0.0310	463,878
1990	0.0335	580,794

This projected level of consumption is about 25% below that of F.A.O., resulting from a lower estimate of present consumption. Since it has not been possible to reconcile F.A.O.s figures with published trade and production data, the lower figures will be used here.

World sugar prices have tended to fluctuate fairly widely, partly because a fairly small proportion is traded and also much of this is tied to trade agreements such as the Commonwealth Sugar Agreement. Variations in raw sugar prices are shown in the following Malaysian import figures:--

Table 3

Year	Quantity (tons)	Value ('000)	Price (\$/ton)
1963	914	311.8	341.130
1964	57,135	21,783.7	381.257
1965	141,544	38,046.6	268.797
1966	171,125	38,885.8	227.237
1967	194,027	30,541.6	157.401

Sugar is refined from 2 sources -- sugar beet (grown in temperate latitudes) and sugar cane a tropical and semi-tropical product. A feature of the industry in the past 15 years has been the relative growth of beet sugar production see Table 4.

Table 4 Centrifugal Sugar Production (Million tons) & Price (U.S. cents/lb)

	Av. 55-57	Av. 63-65	1966	1967	1968 (Prev)	1969 (prelim)
<u>Production</u>						
World Total	39.93	57.14	62.79	64.73	66.31	67.34
Beet	15.57	24.84	26.61	27.57	29.98	29.82
Cane	24.36	32.30	36.18	37.16	36.33	37.52
Developed Countries	12.39	17.43	17.76	19.33	20.48	21.10
Developing "	20.19	26.18	29.78	29.67	28.41	29.83
Russia & E. Europe	6.55	11.78	13.00	13.31	14.92	13.91
<u>Consumption:</u>						
Developed Countries	21.20	25.75	26.91	27.37	28.40	29.06
Developing "	12.20	16.74	18.65	19.46	19.81	20.77
Russia & E. Europe	6.68	12.13	13.63	14.12	14.84	15.46
<u>Exports</u>						
Developed Countries	2.78	3.38	3.53	3.86	4.07	
Developing "	11.10	12.49	12.90	13.87	13.15	
Russia & E. Europe	0.71	1.98	2.17	2.43	2.70	
<u>Imports</u>						
Developed Countries	10.18	11.07	11.46	11.94	12.05	
Developing "	3.27	3.84	4.53	4.09	4.25	
Russia & E. Europe	0.93	2.86	3.21	3.95	3.90	
Price (f.a.s. Cuba)	3.95	5.35	1.76	1.87	1.85	

The table shows that sugar production has increased by approximately 7% in developed countries, 9% in East Europe and 4% in developing countries. The former two areas are almost exclusively beet sugar producers where domestic producers are generally fairly highly subsidised. The slower growth of cane sugar production in developing countries is mainly because of the slow growth of export outlets - the table shows the slow growth of imports in developed countries and exports from developing countries.

Wide areas of the world can be used for sugar cane production, but the above situation is likely to continue. F.A.O. in its agricultural projections to 1985 stated that "the development of production resources to achieve the consumption levels envisaged should not present serious difficulties. However, the projections suggest that, unless some international arrangements are agreed, present exporting countries, both developed and developing, will have to tailor their sugar output over and above domestic requirements to relatively modest export expectations.

Since the degree of self-sufficiency will undoubtedly remain high, or increase further, the free market is likely to be continued to be faced with problems of surpluses and low prices, with only occasional shortages. Some developing countries not especially adapted to sugar production might therefore find the price advantages of importing their sugar requirements greater than the advantages of import-saving...."

Given the potential for increased world sugar production it seems reasonable to assume that Malaysia will continue to be able to import sugar at 3-4 U.S. cents/lb or M\$200-250 per ton.

At present tentative plans have been made to develop at least 60,000 acres in West Malaysia for cane sugar production, 20,000 acres each in Johor and Negri Sembilan, and 10,000 acres each in Perak and Perlis. The suitability of these areas for sugar is not yet established and likely yields can only be very roughly estimated. Assuming however initial yields of 3-4 tons of sugar per acre these schemes would produce between 180,000 and 240,000 tons per year or approximately meet the country's present needs. Given the world market situation and the uncertainty surrounding the results of the proposed schemes it would be advisable not to consider additional schemes in the near future. Should Malaysia prove to be able to produce sugar competitively and yields be raised to about 5 tons/acre/year, an additional 60,000 acres would be needed to meet expected consumption by 1990.

Summary

1. The import price of raw sugar is expected to lie between M\$200-250 per ton for the foreseeable future.
2. Schemes at present mooted in West Malaysia should meet the country's present needs and possibly those to 1975.

selection of planting materials is being carried out to improve fruit size and some promising varieties are now being multiplied.

Natural gluts of fruit do occur in May, June and July and to lesser extent in November and December. Treatment of crowns with calcium carbide solution is carried out to induce flowering during low production periods so that the factory can run on a year round basis.

There are no serious pests and diseases but routine inspection and spraying is carried out against minor pests. Weeds are the main problem and hand weeding is the usual practice. Atrazine and Diuron are good weedicides.

The greatest cash outlay comes in initial clearing and planting and costs can be \$1000 per acre for clearing up to 1st fruiting after 18 months. 16 tons of fruit is usual per acre for the first crop thereafter 8 tons of fruit per year. Annual input costs per acre after the first crop are \$120. One acre requires 38 labour days therefore one smallholder can manage 8 acres on his own. The fruit is sold either to a co-operative transporter or direct to the factory, the price at the moment is 2.9 cts/lb after factory grading and has been about this level for several years.

List of papers on Pineapples available in Agronomy files;
obtained from Pineapple Research Station.

Technical Paper No.3	Bl(a): Mass Selection in Johore State.
" " No.4	A3(e): Rooting Abilities of Singapore Spanish Slips.
" " No.5	Ananas Comosus (L) Merr. (Pineapple).
" " No.6	Fertilizer Mixture Observation Plots.
" " No.7	Shade Trial.
" " No.8	The effects of Slip Pretreatment on Rooting.
" " No.10	Storage of Slips.
" " No.11	Hybridization.
" " No.12	The Response of Pineapple Varieties to Carbide with Age.
" " No.13	Clonal Selection.
" " No.15	Carbide application and Rain.
" " No.17	A Three-Rows Plant Density Trial - Part I: Plant crop.
" " No.19	Twenty-Four Hours "Hormoning".
" " No.20	A Case-study of Carpophilus Foveicollis in Pineapple.
" " No.21	Pretreatment of Pineapple Slips.
" " No.22	Use of "Auxin H 61" Tablets for Flower Induction.
" " No.23	A Preliminary Study on the Weeding Requirements of New (Pineapple) Plantings.
" " No.24	The Use of Bordeaux Mixture in Slip Storage.
" " No.25	Carbide Solution vs. Auxin Tablets: Costings.
" " No.26	Decrowning and Deslipping in the Culture of Singapore Spanish Variety.
" " No.27	Leaf analysis in relation to yield, sugar and acid content of the fruit.
" " No.28	Decrowning Observations with the Sarawak variety.
" " No.29	Mass Selection in Ayer Hitam/Muar, Johore.
" " No.30	The Food Materials of the Pineapple Beetles.
" " No.31	Life Span and Breeding Habits of Pineapple Beetles.
" " No.32	Some Observations on the Effect of Month of Planting on the Singapore Spanish variety of Pineapples.
" " No.33	The Response of Smooth Cayenne to Carbide with Age.
" " No.34	Suckering Behaviour of the Singapore Spanish Variety.
" " No.35	Weeding Requirements of Ratoon Plantings.

Technical Paper No.36	A Method for the Early Detection of Flowering Response to Carbide.
" " No.37	Evaluation of Pre-Emergence Herbicides - I
" " No.38	The Uptake of Nutrient Through Foliar Spray.
" " No.39	The Effectiveness of Mass Selection.
" " No.40	ACP 66-329 as a Flower Inductant.
" " No.41	Leaf Area Study of Pineapple (<i>Ananas comosus</i> (L) Merr. var. Singapore Spanish). I. Relationship between "leaf area" and leaf weight of three month old plants.
" " No.42	Soil-Water Ratio and pH Determination of Peat Soil.
" " No.43	Preliminary Observations on the Effect of Maleic Acid Hydrazide on Singapore Spanish Crown.
" " No.45	Placement of Fertilizers. I-Plant Crop.
" " No.47	Weed Succession Observations on Arable Peat Land.
" " No.48	Fertilizer Spray vs. Broadcast. I Plant Crop.
" " No.49	Red Wilt Observations.
" " No.51	Utilisation of Pineapple Waste.
" " No.52	Bionomics of <i>Carpophilus foveicollis</i> Murr. in Pineapple.
" " No.54	Solubility Studies of acetylene gas in Water.
" " No.55	Post-Emergence Herbicides - Preliminary Screening I.
" " No.56	A Two-Row Plant Density Trial. Part II - Ratoon Crop.
" " No.57	A Three-Row Plant Density Trial. Part II - Ratoon Crop.
" " No.60	Evaluation of PCP-Oil and Weedazol TL-Oil as Post-Emergence Herbicides.
" " No.61	Size of Sample in Fruit Quality Determination.
" " No.62	Staggered vs. Normal Planting.
" " No.63	Planting Density Trials with <i>Ananas Comosus</i> (L.) Merr. Var. Singapore Spanish.
" " No.64	Phosphate Fertilization.
" " No.65	The Response of Singapore Spanish to Carbide with Age.
" " No.66	A Correlation of the Total Sugar and Sucrose contents with the Total Soluble Solids in Pineapple.
" " No.67	Methods of Decrowning Singapore Spanish.
" " No.69	Flower Induction in Pineapple Culture.

Technical Paper No:70

- A Comparative Study of the Changes in Fruit Quality between Natural Ripening and Post Harvest Ripening of the Pineapple Fruit (Ananas Comosus, var. Singapore Spanish).
- " " No.71 A Case Study of Pineapple Smallholders.
- " " No.72 A Comparative Study of the rate of mineralisation of soil nitrogen in Peat and Coastal Clay (Selangor Series) Soils under laboratory conditions.
- " " No.74 Effects of Pre-Emergence Herbicides on Pineapple Plants.
- " " No.75 Effectiveness of Ametryne, Prometryne and Herban in Controlling young Weeds on New Peat Area.
- " " No.76 The Effects of Alpha-Naphthylacetic Acid on the Pineapple Fruit.
- " " No.77 Evaluation of Pre-emergence Herbicides for Weed Control in Pineapple.
- " " No.78 The Application of the Principles of Production Economics to Fertilizer Use in Pineapple.
- " " No.79 The Influence of Plant Height and Number of Leaves on Fruit Weight of Pineapple.
- " " No.80 Fertilizer and Carbide Applications in Ratoon Crops.
- " " No.81 A Three-Rows Plant Density Trial Part III A final Review.
- " " No.82 A Two-Rows Plant Density Trial Part III: A Final Review.
- " " No.83 Flowering Control and Fruit Production In Pineapple Smallholdings.
- " " No.84 Mineral Deficiency Symptoms in Singapore Spanish.
- " " No.85 Weeding Requirements of New Plantings - II
- " " No.86 Preliminary Studies on the Different methods of cutting up the Pineapple Fruit for Sugar ($^{\circ}$ Brix) and acid analyses.
- " " No.87 The Effects of Soil: Water/Extractant ratio and Addition of electrolytes on the Soil pH determined electrometrically.
- " " No.89 Preliminary study on the Nutrient removal by Pineapple leaves.
- " " No.90 Leaching of some Common Fertilisers through Peat Soil Columns.
- " " No.91 Preliminary Assessment of the Soil Fertility of Peat by the Webb's Subtractive Technique.
- " " No.92 Viable Weed Seeds in Peat Soils under Pineapple Cultivation.
- " " No.93 Flow Induction Trials: Chemicals vs. Volumes.

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Technical Paper No.95.		The Influence of Size of Slips on Plant Development, Fruit Weight and Quality in Graded and Mixed Planting.
"	" No.96	Effects of Depth of Planting Holes and Air Pockets on the Performance of Pineapple.
"	" No.97	The Influence of Weed Species on Fruit Yield and Defects.

Research Information Paper No.4	Pineapple Cultivation in Malaya.
"	" No.10 Smallgrowers' Registration, 1969.

MISCELLANEOUS

Leaf Bud Method of Vegetative Propagation.
 The Nutritional Requirements of Pineapple (*Ananas Comosus* (L) Merr. var. Singapore Spanish). On Peat Soil in Malaya.
 Research Paper No.II - Pineapple Cultivation in West Malaysia.
 Chemical Analysis of South Malayan Peat Soil.
 Pineapple Research: 1964 - 1968. (in the Library).

RAJH/FM.
 20/1/1970.

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DATE : 21st January, 1970

VISIT TO: Federal Coconut Research Station, Parit Botak.

PRESENT : R.A.J.H., F.A.S., Mr. Viviekanandan Chief Agronomist.

The station consists of 175 acres on marine alluvium, acid sulphate cat clay soils with river pockets of deep peat soils isolated from the main plantation area. The station was started in 1964 but was without staff until 1967 when serious work started. As coconuts take a minimum of 3 - 4 years for bearing and many years before meaningful conclusions from treatment can be made, little data is available. However the station has a number of different trials which already offer a powerful demonstration as to the possibilities of these soils.

Coconuts

The station site had some 10+ years old palms on part of the area these have been taken over for experiments on improving yields, intercropping, pollination studies and basic conservation. From results of work at other station and from Mr. Viviekanandan's practical experience it now seems that dwarf coconuts types have not upheld their initial promise except for culinary purposes. Dwarf types start to bear in 3 to 4 years but with improved management tall varieties can start to bear in 4 to 5 years. It takes 450 - 600 nuts of dwarf types to produce 1 pickul dried copra whereas 200 - 300 nuts from tall varieties give the same amount. A major disadvantage with dwarf types is they are less robust, yield is severely reduced, by both flooding and drought. At the station individual tree performance records are being kept. The inflorescence can only carry a certain number of fruits so that some are always aborted. Pollination is reduced during the wetter months and yields definitely increase during the dry period as it takes one complete year for fruits to mature. There may be a case for hand pollination during the wet months. In another area a

- 2 -

large trial with newly planted coconuts was taking place as yet too young for any yield data. The coconuts are fertilized every six months with 3lbs magnesium limestone per plant and two pounds/six month of the following mixture 36lbs area, 38lbs CIRP, 26lbs Muriate of potash. Dwarf varieties were usually planted at 90 plants/acre whereas 30 plants/acre was usual for tall varieties. Coconut estates get 12 pickuls of dried copra/acre which is equivalent of 4,000 nuts/acre.

Pineapples

These are considered suitable as an intercrop for coconuts for the first 3 years only. A new selection of Singapore Spanish variety known as Muar type has been planted with the result that with only one third the usual number of plants per acre, 6,000 compared with almost 18,000, gave 8 tons of fruit per acre. This is half the usual yield from 18,000 plants. The Muar type produces large fruit consistently in excess of three lbs each this results in greater factory recovery. Trials of pineapples with coconuts with and without fertilize show that while the fertilized plants look better for the first crop there was no statistically significant difference in yields. The coconuts show no visible harmful effects from intercropping and benefit is thought to be obtained by keeping weeds down during the pineapple cultivations.

Coffee

Eighteen months old Liberica coffee trees were doing well between coconuts. Some trees had been lost when the area was flooded recently, and the activities of burrowing crabs was said to introduce salt water directly on the coffee roots which killed the plants. Trials would be carried out to determine suitable growing techniques.

Cocoa

These acid sulphate soils have a pH around 4. Outside the station we were taken to see 4 year old cocoa trees growing on these soils under poorish coconuts and with no management treatment at all. The trees were well grown with well formed large leaves with no nutrient deficiency symptoms but showing considerable insect attack. A good many large well filled fruits were seen but many had been attacked by squirrels. The fruit were not harvested as there is no way to sell them at present. On the station cocoa plants 8' x 8' have been planted out under 10 year old coconuts. After two months they looked promising but we considered the shade is too light. Some Gliricidia for shade had been planted.

Tomatoes

On the small areas of peat soils we saw a simple trial of tomato growing. The land is prepared by ridgeing and covering the ridges with dry lalang and other burnable materials. This is fired and more peat piled over the fire and left to smoulder. The burning releases the potash from the peat which neutralises excess acidity and also sterilizes the soil. Tomatoes then grown on the ashes yield extremely well and 4 - 5000 dollars per acre have been obtained by this method.

RAJH/RI/RS/25/1/70.

~~000009~~Coconuts and Palm Kernels in West Malaysia.

The study of production and consumption of coconuts and coconut products in West Malaysia is complicated by a number of factors:-

- (a) The bulk of commercial production is by smallholders and information on them may be subject to a fair degree of error.
- (b) A great number of coconuts are produced for own consumption in towns and kampongs (a drive around Johor Baharu will make this apparent). The 1957-58 Household Budget Survey recorded household consumption of coconuts for urban and rural sectors of each racial group. Using these figures it has been estimated that the total consumption of fresh coconuts in the country in 1967 was about 192 million nuts. Using figures from the Report on the Minyak Beku (Johore) Coconut Replanting and Rehabilitation Scheme it appears that the average smallholder produces about 500-600 nuts per acre. The total smallholder acreage of 441,500 would therefore produce 220 to 265 million nuts, which would not leave many nuts from which to produce 100,000 tons of smallholder copra, if 190 million were consumed fresh. For present purposes it is assumed that fresh coconuts are home produced and that this will continue. Demand for this purpose will therefore not be considered.
- (c) Coconut oil and palm kernel oil have very similar properties. Coconut oil has been widely used for a long time for cooking purposes. It is known that it is common practice for oil millers in Malaysia to mix these two products for sale as cooking oil. The extent to which this is done is not known. Figures on palm kernel oil production are not at present available and it is not known whether figures for coconut oil production contain some element of palm kernel oil. It will be assumed here that figures for coconut oil do not include palm kernel oil.

An attempt will therefore be made to estimate consumption of coconut and palm kernel oil combined for domestic purposes and this will be projected forward for the study period. Coconut oil cake and palm kernel cake will be considered later together with study of availability of other oil cakes for animal feeding.

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The production of coconut oil by local mills and trade has been reported by the Statistics Department for the period 1963-1968 as in Table 1.

Table 1. Production and Trade in Coconut Oil (Tons)

<u>Year</u>	<u>Copra Purchased by mills.</u>	<u>Oil Expressed</u>	<u>Imports</u>	<u>Exports</u>	<u>Available Supply</u>
1963	128,671	71,281	1998	29,738	43,541
1964	108,189	62,132	1565	14,517	49,180
1965	108,947	63,767	1356	18,050	47,073
1966	136,763	83,418	2618	25,068	60,968
1967	139,085	85,643	862	29,030	57,475
1968	151,745	89,954	1429	38,399	52,984

As noted above production figures are not available for palm-kernel oil. The estimates in Table 2 are obtained from apparent domestic disappearance of palm kernels assuming that on crushing the kernels yield 45% oil. The figures for exports in the table include increases in domestic stocks.

Table 2. Estimated Palm Kernel Oil Production 1963-1968

<u>Year</u>	<u>Production of Kernels</u>	<u>Export</u>	<u>Domestic use</u>	<u>Oil Expressed</u>
1963	32,054	19,474	12,580	5661
1964	30,001	17,442	12,559	5652
1965	34,426	19,209	15,217	6848
1966	42,669	22,775	19,894	8952
1967	48,318	23,266	25,052	11,273
1968	58,715	31,963	26,752	12,038

The total availability of these two oils will then have been as follows:-

1963	49,202 (tons)
1964	54,832
1965	53,921
1966	69,920
1967	68,748
1968	65,022

These oils are also used for soap manufacture, together with tallow. The U.N. Industrial Profiles indicated that 1 ton of oil or tallow produces approximately 2½ tons of soap. Using this figure and import values for tallow the quantity of domestic oil used for soap manufacture has been estimated in Table 3.

Table 3. Use of Coconut and Palm Kernel Oil for Soap Manufacture (Tons)

Year	Soap Man.	Oil and Tallow Req.	Tallow Imported	Oil Req.
1966	33,300	13,320	5,618	7,702
1967	29,400	11,760	8,874	2,886
1968	34,100	13,640	8,216	5,424

Table 4 Availability of Coconut and Palm Kernel Oil for Domestic Use (Tons)

Year	Total Supply	Use for Soaps	Available Supply
1966	69,920	7,702	62,218
1967	68,748	2,886	65,862
1968	65,022	5,424	59,598

Table 5. Demand for Coconut and Palm Kernel Oil (Tons)

Year	Cooking Per Capita	Total Cooking Demand	Soaps	Total
1970	0.007445	71,765	6,003	77,768
1975	0.008051	89,619	7,304	96,923
1980	0.008735	112,714	8,887	121,601
1985	0.009509	142,245	10,817	153,062
1990	0.010385	180,097	13,154	193,251

Table 6. Copra and Coconut Oil Production and Palm Kernel Oil Req.

Year	Copra Production	Coconut Oil Expressed	Min. Palm Kernel Oil Req.
1970	150,000	90,000	- 12,232
1975	150,000	90,000	6,923
1980	150,000	90,000	31,601
1985	150,000	90,000	63,062
1990	150,000	90,000	103,251

Table 7. Projected Palm Oil and Kernel Outputs (Thousand tons)

Year	Palm Oil Ests.		Palm Kernel	
	M.G.T.S.	E.P.U.	Est. Supply	Oil Content
1970	431	368	90.92	40.92
1975	1,128	1,077	250.48	112.72
1980	1,900	1,922	434.37	195.47
1985	2,925	3,056	679.63	305.83

Notes.

- (1) Palm Kernels assumed as 22.73% of mean of oil estimates.
- (2) Palm Kernels assumed to yield 45% oil.

The average available supply of coconut and palm kernel oils in the period 1966-68 was thus 62,559 as shown in Table 4. This is equal to a per capita consumption of 0.007119 tons per capita. Future demand for these oils for domestic purposes is estimated in Table 5 (assuming income elasticity of demand of 0.6, population growth of 3% and per capita income growth of 2.5% per annum). Also in Table 5 demand for oils for soap manufacture has been projected at a 4% per annum rate of growth. Total demand for coconut and palm kernel oils is thus projected to rise from almost 78,000 tons in 1970 to 193,000 tons in 1990.

The FAO Economic Survey of the Coconut Industry of 1968 indicated that copra production in West Malaysia had remained virtually unchanged over the past 15-20 years. This report however did not make any projection of future production. The Malaysian General Transport Survey also made no specific projection but did not expect any great increase in production. It will be assumed here that copra production will remain at about 150,000 tons per year. Table 6 then shows the quantity of palm kernel oil required to meet the demand estimated in Table 5. The required quantity can be seen to increase rapidly to 100,000 tons by 1990.

Table 7 shows the expected supply of palm kernels and kernel oil, based on the estimates of EPU and MGTS (both from MGTS). The estimate of 3 million tons of palm oil by 1985 appears to be excessively high. In any event the quantity of palm kernels available is likely to be more than sufficient to meet home demand.

Price Trends

The average annual price of West Malaysia's exports of Palm Kernels and Crude Coconut Oil since 1963 is shown in Table 8.

Table 8 Average Price of Exports of Palm Kernels and Crude Coconut Oil (M\$ per ton)

<u>Year</u>	<u>Palm Kernels</u>	<u>Crude Coconut Oil</u>
1963	376	737
1964	393	823
1965	462	907
1966	403	788
1967	375	788
1968	443	984

The difficulty of projecting prices in the complex markets for fats and oils was noted earlier in the paper on Oil Palm products. It was noted then that at the present time it appears supplies of edible oils and fats are increasing more rapidly than demand at constant prices and that therefore a general fall in prices is envisaged for the immediate future. In the Trongganu Report it was assumed that the prices of both palm oil and the lauric acid oils (coconut and palm kernel) remain in a fairly constant proportion to the price of all oils and fats and thus to one another. The projected price path for both oils was thus the same - a fall of 25% by 1990. This seems a priori unreasonable. It is expected that as supplies of Malaysia palm oil expand rapidly over the next few years its price will fall fairly quick to about M\$450 per ton. On the other hand coconut oil production is expanding only slowly. In fact in 1968/9 supplies from Philippines, the major exporter, were reduced and prices rose in a year when the palm oil price slumped. Demand for cooking oils in Asia is rising steadily. Thus while some fall in price from the present high level is expected as supplies from Philippines increase and palm kernel exports from Nigeria recover, the general downward trend is expected to be slow.

Table 9 Projected Price of Palm Kernels and Crude Coconut Oil (M\$/ton)

	<u>Palm Kernel</u>	<u>Coconut Oil</u>
1975	370	750
1980	360	730
1985	350	715
1990	340	700

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Groundnuts in West Malaysia.

Recently a number of statements have been made on the export potential of Malaysian groundnuts. Up to the present however Malaysia has been a net importer of groundnuts to the extent of about 12,000 tons per annum (see table 1). This imports are mainly from Java, Sumatra and Thailand.

Table 1. Malaysian Trade in Groundnuts.

Year	<u>Imports</u>			<u>Imports</u>		
	<u>Shelled Nuts</u>		Price (\$/ton)	<u>Unshelled Nuts</u>		Price (\$/ton)
	Tons	Value (\$'000)		Tons	Value (\$'000)	
1963	5,000	3,408.5	682	5,958	3,071.2	515
1964	5,655	4,098.4	725	6,103	3,398.1	555
1965	5,924	4,250.6	717	5,001	2,806.0	561
1966	6,586	4,794.1	728	6,172	3,396.0	550
1967	6,752	4,447.2	659	4,668	2,689.0	576
1968	6,484	3,656.5	564	2,412	1,012.5	420

Year	<u>Exports</u>			<u>Exports</u>		
	<u>Shelled Nuts</u>		Price	<u>Unshelled Nuts</u>		Price
	Tons	Value		Tons	Value	
1963	117	121.6	1,039	43	37.0	860
1964	65	62.2	957	13	13.3	1023
1965	98	104.8	1,069	6	4.7	783
1966	111	92.9	837	7	10.4	1486
1967	71	88.5	1,246	19	17.7	932

There is virtually no re-export business in groundnuts. Exports in 1966 to 1967 went mainly to Hong Kong and Singapore.

Domestically about 5,000 acres of sole crop equivalent are devoted to groundnuts annually, as shown in Table 2, with the main producing regions being Perak and Kelantan.

Table 2. Malaysian Production: Acres Sole Crop Equivalent.

<u>Year</u>	<u>W. Malaysia</u>	<u>Johor</u>	<u>Perak</u>	<u>Kelantan</u>
1964	6462	124	3452	1,075
1965	5617	205	2970	1,116
1966	5265	112	2366	1,457
1967	5636	n.a.	n.a.	n.a.
1968	5413	99	2416	1,993

Groundnuts are used for a variety of purposes. The whole nuts form a confectionery type food and are used for the manufacture of peanut-butter. The nuts can be crushed to extract oil - 40% by weight. This oil is of a type referred to as a 'soft oil' and can be used as a cooking oil and for the manufacture of margarines and soaps and as a lubricant. The remaining meal can be used as an animal feed.

The use of groundnuts for human consumption in West Malaysia is extremely difficult to estimate. The 1957/58 Household Budget Survey indicated that per capita consumption of groundnuts was 0.75 kati/year among Chinese and 0.4 kati/year among Malays. Assuming this level for 1967 this indicates a total consumption of 6 mil. lbs. Oil appeared only to be used by Chinese at a rate of 3 kati/head/year. This would amount to approximately 14 mil. lbs. in 1967.

Studies have indicated the income elasticity of demand for vegetable oils and fats to be about 0.6. Assuming this value for both groundnuts and oil, Table 3 shows the projected growth of consumption on a per capita and total basis.

Table 3. Projection consumption of groundnuts and groundnut oil.

<u>Per capita (lbs)</u>	<u>Groundnuts</u>	<u>Groundnut oil.</u>
1967	0.6828	1.5933
1970	0.7141	1.6664
1975	0.7722	1.8020
1980	0.8379	1.9551
1985	0.9121	2.1283
1990	0.9961	2.3243

- 3 -

<u>Total (mil.lbs)</u>	<u>Groundnuts</u>	<u>Groundnut oil.</u>
1967		
1970	6.8332	16.0625
1975	8.5953	20.0531
1980	10.8123	25.2286
1985	13.6441	31.8372
1990	17.2744	40.3080

It was noted above that about 14 mil. lbs. of groundnut oil were probably consumed in West Malaysia in 1967. In that year about 4.5 mil.lbs. of oil were imported. Thus approximately 9.5 mil.lbs. came from domestic crushing. Assuming a 40% extraction rate this is equivalent to 23.75 mil. lbs. of shelled nuts. Thus the approximate situation in 1967 seems to have been as follows:-

Direct consumption	-	2.770 tons
Crushed for oil & meal	-	10.670 tons
	-	13.300 tons shelled nuts
Total use	=	20,000 tons unshelled nuts.

This ties up approximately with supplies:-

Imports =	15,000 tons unshelled equiv.
Domestic prod. =	5,000 tons (one ton/acre)
	<hr/>
	20,000 tons.
	<hr/>

The use of groundnut oil cake and other oil cakes for livestock feed will be considered in a later paper.

Price trends.

The major world producers of groundnuts are India and West Africa. A rapid increase in production in these areas does not appear likely. Thus while groundnut prices will be affected by the general pressure of vegetable oil supplies they should not fall to the same degree as palm oil.

-- 4 --

Expected Future Prices of Unshelled Groundnuts c.i.f. Malaysia
(M\$ per ton).

1970	\$ 475
1975	450
1980	430
1985	415
1990	400

JCE/BN/H.
25/1/1970.

~~000009~~

ABACA - (MANILA HEMP)

1. Abaca is one of a group of fibrous products usually grouped together as "Hard Fibres." The other major fibres are Sisal and Henequen. The principal outlet for these fibres is in the manufacture of ropes, twines and other forms of cordage. The fibres are not all equally suited for the different types of cordage. Abaca is utilized in marine cordage and to a lesser extent in industrial ropes.

2. Table 1 shows production, trade and price data for abaca since 1955. Production, almost entirely confined to the Philippines has been declining steadily throughout the period. This decline in output has not been accompanied by rising prices, in fact prices have fallen since 1963. The reason for this has been the development of synthetic substitutes and a reduced demand for marine cordage resulting from an increase in bulk handling facilities, larger ships and an increasing proportion of tankers.

A similar trend has occurred in the case of Sisal and Henequen, used chiefly for agricultural and commercial twines and padding. Reduced use of binders has resulted in a fall in demand for agricultural twine (partly offset by greater use of balers) and at the same time synthetics have entered the market eg. paper string and sellotape. Sisal production has fallen 9 percent since 1963/5 but in the same period the c.i.f. price of East African 3L. sisal has fallen from £119/ton to £68 in 1967 recovering a little to £74 in 1968.

Table 1.

ABACA - Production, Trade and Prices					
	Average 1955/57	Average 1963/65	1966	1967	1968 (Preliminary)
Production ('000 tons)	140	136	104	91	79
Exports ('000 tons)					
Philippines	117	106	83	72	63
Others	10	4	4	4	4
Imports ('000 tons)					
U.S.	39	30	35	28	22
Japan	33	30	21	19	16
U.K.	17	17	13	12	11
Other Dev. Countries	33	23	15	13	10
Other countries	2	8	8	7	6
Total	124	108	92	79	65
Price £/long ton c.i.f.					
Europe					
Non - Davao J.2	100	121	104	99	102

3. In reviewing the position of abaca in 1968/9 F.A.O. noted that "production of abaca in the Philippines in 1968 was some fourteen percent below the already depressed level of 1967, with unremunerative prices inducing many growers to shift to more profitable crops. Exports also contracted heavily, by some 12 percent, as demand continued to be severely affected by substitution from synthetics in higher-priced cordage markets and from sisal in the lower-priced ones. Demand for abaca for paper making however continued to increase slowly in 1968 in the major importing countries (U.S., U.K. and Japan) though this was not sufficient to compensate for losses in the cordage sector."

The current position is thus one of considerable uncertainty and this is reflected in attempts to project production and consumption of hard fibres. Tables 2 and 3 show consumption and production in past periods and estimates for 1975. These estimates for 1975 are made upon two sets of assumptions, the first that prices would remain at the level of 1961-63, the second that some lower level would prevail.

The need for the second assumption is clear from inspection of the tables. At 1961-63 prices there would be a heavy fall off in demand in developed countries, principally because of use of substitutes. Total demand is estimated as 415 to 550 thousand tons as against 755 in 1966. Total world demand would be in the region of 700-900,000 tons, of which 50-70,000 tons would be for abaca. However at these prices it is estimated that total production would be 1,300-1,500,000 tons - with 140-155,000 tons of abaca. Clearly such a situation is not feasible and prices would have to fall. The tables appear to hope that present (or 1966) levels of output could be maintained at a reasonable level of prices. The study Group on Hard Fibres have instituted an informal international export quota system for sisal and henequen. They appear to hope that output and price can be maintained at their present levels.

4. In concluding discussion on hard fibres, F.A.O. stated that "it is extremely difficult at this stage to estimate what new horizons might open out for hard fibres by 1975 at a very low price,. Apart from possible new uses, utilization in paper, plastics and padding could well expand more considerably than projected here.

Except on the most optimistic assumptions, however, it must be concluded that significant unfavourable repercussions on hard fibre export earnings and producer incomes, particularly in those less-developed areas

where hard fibres represent the principal cash crop and or source of foreign exchange, are likely by 1975. Producing countries will have to make every effort to reduce their costs through increased efficiency at all stages of production and marketing, so as to improve the competitive position of hard fibres in those outlets where substitution by synthetics is determined chiefly by price considerations. International co-ordination of planting and cutting policies may well be required to keep supplies as much in line with demand as possible, while, should production move significantly ahead of demand, emergency international action might well be needed. If this tendency could not be restrained, the possibilities of diversifying agricultural production on the land primarily devoted to hard fibre cultivation would probably be needed.

5. Prior to 1967 about 1,000 acres of abaca were grown in West Malaysia, but since then production has slumped and only 70 acres were reported in 1968. In the Jengka Report it was reported that yields obtained in East Malaysia were as follows:-

1st year - 19 tons/acre equivalent to 0.4 tons fibre.
 2nd year - 63 tons/acre equivalent to 6.9 tons fibre.
 3rd year - 43 tons/acre equivalent to 4.7 tons fibre.
 4th year - 36 tons/acre equivalent to 3.9 tons fibre.
 5th year - 40 tons/acre equivalent to 4.4 tons fibre.

Thereafter yields decline by some 3 tons/acre per year.

If yields of this type could be obtained, 2-3,000 acres of the crop would yield 8-12,000 tons of fibre. From what has been said earlier it is likely that this increase, 10-15 percent of world production could flood the market unless some new use opens up. Because of the small scale of the market and its uncertain future, it would appear wise not to consider this crop unless some peculiar technological advantage in production exists in this area.

- Sources 1. F.A.O. Agricultural Commodities Projections to 1975 and 1985.
 2. F.A.O. Commodity Review and Outlook, 1968 - 1969.
 3. Jengka Triangle Report.
 4. Commonwealth Secretariat - Industrial Fibres. 17.

Table 2 - Hard Fibres: Estimated Consumption by End-Uses ^{1/}, 1953-55, 1961-63 Averages and 1966, and Demand Projections for 1975

	1953-55 Average	1961-63 Average	1966 preliminary	1975 at 1961-63 prices	1975 at low prices
(.....Thousand tons.....)					
<u>Developed countries</u>					
Ropes, cables, nets	140	110	90	35- 50	50- 90
Binder twine	220	185	180	45- 90	60-100
Baler twine	135	295	300	150-200	300-350
Tying twine	45	55	55	35- 40	50- 60
Woven goods ^{2/}	10	15	20	15- 20	20- 25
Padding, paper, other	75	100	110	135-150	150-165
Total	<u>625</u>	<u>760</u>	<u>755</u>	<u>415-550</u>	<u>630-790</u>
<u>Centrally planned countries</u>					
Total	<u>5</u>	<u>20</u>	<u>33</u>	<u>40- 65</u>	<u>60-85</u>
<u>Developing countries</u>					
Ropes, cables, nets	15	25	35	30- 45	40- 55
Tying twine	10	20	30	35- 40	40- 45
Woven goods ^{2/}	55	100	115	125-135	135-145
Padding, paper, other	5	30	40	55- 65	75- 80
Total	<u>85</u>	<u>175</u>	<u>220</u>	<u>245-285</u>	<u>290-325</u>
WORLD TOTAL	<u>715</u>	<u>955</u>	<u>1 008</u>	<u>700-900</u>	<u>980-1 200</u>
of which:					
<u>alaca</u>	131	110	101	50- 70	80-100
<u>sisal/honequen</u>	536	788	846	580-740	835-1 000
<u>other hard fibers ^{3/}</u>	48	57	61	70- 90	65-100

^{1/} Except in columns 4 and 5, world consumption is taken to equal world production. Year to year stock changes are thus considered to be only temporary, and are not taken into account. For the assumptions made with regard to synthetic substitution against the cordage uses shown above, see Tables 4 and 5 below.

^{2/} Including bags and sacks, carpets and rugs, and mats and matting.

^{3/} Cantala (maguey), coroa, phormium, istle, letona, fique, and aloe.

Table 3 - Hard Fibers: Estimated Production, 1953-55, 1961-63 Averages and 1966 and Projections for 1975 Under Different Assumption.

	1953-55 Average	1961-63 Average	1966 preliminary	1975 at 1961-63 prices	1975 at low prices (to clear market)
(. Thousand tons)					
<u>Sisal and Henequen</u>					
Tanzania	176	212	225	270-300	
Brazil	74	170	190	320-370	
Mexico	102	161	176	185-200	
Angola	34	64	66	75- 85	
Kenya	38	65	60	70- 80	
Mozambique	25	29	31	35- 40	
Other Latin America	44	45	40	55- 80	
Other Africa	11	24	37	55- 65	
Other Asia	32	18	21	25- 35	
Total, sisal and henequen	<u>536</u>	<u>788</u>	<u>846</u>	<u>1 090-1 255</u>	<u>835-1 000</u>
<u>Abaca</u>					
Philippines 1/	116	104	95	125-130	
Other Asia	4	4	3	10- 17	
Other Latin America	11	2	3	5- 8	
Total, abaca	<u>131</u>	<u>110</u>	<u>101</u>	<u>140-155</u>	<u>80-100</u>
<u>Other hard Fibers 2/</u>					
Latin America	39	49	47	54- 65	
Africa	3	2	6	7- 13	
Asia, Oceania	6	6	8	9- 12	
Total, other hard fibers	<u>48</u>	<u>57</u>	<u>61</u>	<u>70- 90</u>	<u>65-100</u>
TOTAL, ALL HARD FIBERS	<u>715</u>	<u>955</u>	<u>1 008</u>	<u>1 300-1 500</u>	<u>980-1 200</u>

1/ Balings plus 10 percent.
 2/ Cantala (maguey), caron, fique, istle, letona and phormium tenax, aloe.

NR/V/7

VISIT TO: Mui Tong Mui Coffee Powder factory - Kluang.

ON : 4th December 1969

BY : R.A.J.H., F.A.S.

The above factory was visited to get an insight into the local coffee processing industry. The manager informed us that it was a family concern and the second largest in Kluang. The factory had been in operation for over 40 years and had recently its location.

We could get no idea of monthly throughput which varied with the time of year - more being sold around Hari Raya and Chinese New Year. However, at 2 p.m. when we visited, no operations were being carried out. Capacity was said to be 60 katties of made coffee powder in 2 hours.

All coffee used was local Liberica coffee, bought through an agent in Batu Pahat. Buying price varied between \$105 - \$140 per pikul. The beans were bought fermented and ready to roast. We examined a sample of beans, and on being told that 1st and 2nd grade beans were obtainable, commented that the sample was second grade. We were however, informed that it is of top quality. The beans in the sample were of various sizes, many with dried pericarp still attached and many broken. Not a sample that in any way would be acceptable on the world market.

Two grades of coffee powder are manufactured in two types grinding. The top quality is pure roasted and ground coffee, both coarse and very fine ground. This is sold at \$1.80 per kati packed in tins, locally manufactured from other tins, and sealed with a polythene cover. 1 katti, 5 katties and 13 katties tins are packed. This quality is retailed at \$2.00 per kattie and the bulk is sold to coffee shops.

The second, lower grade is sold at \$1.20 per kattie and retailed at \$1.40 per kattie. This grade consists of a mixture of 60 katties roasted coffee (80 katties fresh coffee) 24 katties sugar, 5 - 6 katties margarine, and 20 katties of either ground maize or ground soya beans. There is a good demand for this grade amongst Malays and rural people who have acquired the taste and appreciate the low price.

Variations in the price of coffee are met by varying the quantity of maize/soya bean, the price of which is about \$50 per pikul. If prices of raw materials are high, then the coffee is packed in polythene

- 2 -

bags which are much cheaper than the tins. We were told that the wholesale selling price was never varied.

The machinery used is extremely simple, manufactured by the family who said they also sold equipment to other coffee powder factories.

Coffee roasting is done over wood fires in two steel bowls stirred continually by electrically driven paddles. At this stage, the sugar, maize/soya, margarine is added - 15 minutes before the end of the roasting period.

Packing is done by hand into the tins which arrive with separate tops. A simple hand press then is employed to squeeze the polythene cover and the rims onto the tin. Labelling and stacking are all that remain.

We were not informed when the last session had taken place, but the fires and the roasting pans were cold. Everything was encrusted with a burnt black mixture of something - presumably coffee powder.

Competition in the area was increasing - "so many small new factories being set up - and many selling at 20% below our price." We were later informed after having left - that previously this brand of coffee powder was considered the best obtainable in Johore. Its place has been taken among the cognoscenti by a brand manufactured in Muar. We were unable to obtain any idea of the output but this had remained constant for many years, according to the manager.

We were presented with a sample to try.

FAS/RI/7/12/69

NR/M/12

DATE: 4th December 1969

TIME: A.M.

Meeting with Kluang District Agricultural Officer Tan Choo Liak.

HELD AT: Kluang District Office.

PRESENT : Tan. Sole, Harrison.

After initial introductions and explanations of the S.E.J. project Mr. Tan talked about the district and gave us a list of acreages of crops in the district.

Rubber smallholders	-	80,000 acres.
" estates	-	not disclosed
Oil Palm smallholders	-	470 acres.
" estates	-	42000 acres.
Paddi	-	1100 acres.
Vegetables	-	200 acres.
Coconut	-	208 acres.
Cocoa	-	400 acres.
Coffee	-	400 acres.

Records of rubber in particular seemed to be very inaccurate.

After some more general discussion in which we found out that no particular aspects of agriculture were being encouraged. The junior agricultural assistants were said to visit the kampongs in each area every 3 or 4 days but extension efforts were largely ineffective because of the conservative habits of the villagers. Details from Chinese smallholders of their yields and production were unobtainable because any government official was regarded with great suspicion. Interest in patchouli fluctuated as does the market price, which was now \$30 a picul but sometimes went up to \$80 a picul.

Mr. Tan then suggested we visited Pakloh estate to see cocoa growing under oil palm. At the estate we were introduced to the Chinese manager Mr. Quek a very lively talker with a unique accent. The state is 3900 acres of oil palm and employs some 200 labourers. Much of this estate consists of very old (20+) oil palms which the Singapore owners are not interested in replanting. The manager considered the youngest palm under which cocoa could be planted would be 7 or 8 years old. The original planting material which is of Upper Amazon strain came from Serdang at 32 cts. per pod. Now the estate keeps its own seeds from specially healthy and high yielding trees. The seeds are taken from ripe pods as soon as possible after picking and planted in polythene bags of soil.

Almost 100 per cent germination is achieved in a few days. The seedlings are kept under slatted shade for four months when they are ready to transplant. Throughout the cocoa plants life it is sprayed with insect and fungicides of different recipes every two weeks except when it would interfere with pollination of the flowers. The seedlings are planted 12 feet apart between the palms in 30 feet rows so that there are 120 plants per acre. The plants are fertizied with 2 ounces every 3 months of nitrophoska or CCM 66 for the first year, thereafter $\frac{1}{2}$ lb of CCM 44 per 6 months. The manager considered that this was insufficient when the plants were 3 or more years old and this dose could be doubled. No lime has been given, the soils were said to be Rengam type on which cocoa was doing very well, on a poorer soil type the cocoa did not look so well. It was markedly noticeable that where light got in through the palms or at the edges of roads the cocoa was set back compared with the fully shaded plants. The first planting had been made in 1963 and continuous planting since then so that 400 acres of palms were underplanted. The aim is to under plant the whole estate.

Some of the oldest trees were yielding 30 - 40 fruits each and it took 12 fruit to make 1 lb. of dried beans and for every 3 lbs. of beans they received about \$1. So far 7 - 8000 lbs of beans had been harvested from 200 acres of the mature cocoa this year. The manager said that 5 labourers could harvest 3000 fruits per day using ladders and knives to cut off the pods. Approximately \$9000 had been spent on maintenance of 240 acres of cocoa. Women were paid \$3.50 per day and men \$5 - 6 per day. His annual variable costs per tree were 30 cts and in order to make a profit he needed almost 1 lb. of dried beans per tree. The trees all seemed very healthy, free from insect or fungal attack and nutritional deficiencies. The planting material was said to be all the same kind but 2 forms were noticed a red fruited and green fruited types while immature. The major pests were mealy bugs and squirrels. After the pods are picked the beans are fermented for 3 days with turning every day then they are dried on a single hot plate, bagged in jute sacks and sold to Van Huiten in Singapore, who manufacture chocolate products there.

NR/M/9

DATE: 3rd October 1969

TIME: A.M.

Meeting of Consultants with Mr. Tan Guan Chye State Assistant Agricultural Officer for Johore Bahru District.

HELD AT: State Secretariat

PRESENT: Harrison, Sole, Tan.

After initial introduction and explanation concerning our presence and the project. Mr. Tan outlined his areas of responsibility on the map and also in the field of agriculture. Most of this sections time is taken up with extension work which mostly takes the form of visits to farmers at their request but some courses and lectures are given. The results of research comes from K.L. and is passed on to the farmers by this branch.

The group settlement schemes are mostly growing rubber and R.R.I. people give extension services to these schemes.

Mr. Tan explained in general terms the variety of crops found in Johore Bahru District. Then he talked in more detail about Penggerang peninsula. Boats can be obtained either from Kong Kong at \$4 return fare or from Changi (Singapore) at \$3 return, also a car ferry is available from Changi at \$4 per car. On Penggerang the perennial crops are rubber and coconuts and the Chinese farmers have pigs and poultry. Very few vegetables are grown most are shipped over from Singapore.

Mr. Tan told us something of the work of the Crop Testing Station at Kong Kong. This station is the direct responsibility of the Federal agronomist, Vivie Kanadan from the Coconut Research Station at Parit Botak, Batu Pahat. He has a State District Agricultural Assistant, Khoo Su Chin to supervise the work and the station is daily managed by a Junior Agricultural Assistant. Arrangements were made to visit the station that morning.

Visit with Khoo Su Chin to Kong Kong Crop Testing Station:

The site at Kong Kong was chosen as the soils were typical of South Johore, they probably belong to the Harimau/Ulu Tiram types series.

Most of the trials are very simply carried out often just 2 plots each 1/5 of acre, one with fertilizer and one without. In some cases plots were replicated to allow different rates of fertilizer application to be tested. Also management techniques were being

....2/-

developed to suit local conditions but this seemed to be on a rather haphazard basis. Maize was being tried as there is a good demand for it from the animal feed manufacturers who at present import maize from Thailand. So far results with maize are poor probably due to a combination of both unsuitable varieties and inadequate management. On the other hand groundnuts proved very good yielders, giving 200 pickuls per acre. Some chillies, sweet potatoes and ladies fingers, both local and Japanese varieties, were being tried. Of the perennial crops Manila Hemp was not yielding well and had not, infact, been harvested although 4 years old. Both dwarf and tall coconuts showed marked responses to fertilizers, the dwarf varieties are yielding after only for years. These however have a lower oil content than the tall varieties and are more suitable for table purposes. There were also trials of oil palms.

- Tea - About one acre of well tended tea bushes with good shade, the tea was said to be poor quality. No processing had been done at all and so no objective judgement had been made.
- Coffee - Trials of both Robusta and Liberica types were bearing fruit. The Robusta coffee was well covered with berries but some were attacked and spoilt by some kind of borers. The Liberica type was more resistant to the borers. In general it was felt they could do well with improved management.
- Cocoa - Young healthy trees just beginning to fruit were well shaded and should give good yields. Initially there may be problems of low pollination rates and fruit setting. It remains to be seen whether the trees will suffer from die-back in the next year or so.
- Citrus - Many varieties tried: pomello, limes, mandarin and several lemon varieties but none were doing very well. Nutritional deficiencies were very obvious as were attacks from a number of kinds of pests. Management techniques need complete revision, as do fertilizer rates, types and frequency of applications.
- Rambutans - These trees showed responses to fertilizer in their growth but their fruit harvest were not compared. Some pockets of nutritional deficiency were evident but little had been done to sort out this problem.
- Durian - Young trees responded well to fertilizer.

- Passion fruit - These had only been planted for one year and were bearing a heavy crop of fruit. This fruit was not being harvested as it apparently does not suit the local taste. No records of harvest were made and no uses were known.
- Tapioca - Trials of several varieties were in their initial stages. Not far from this station 5,000 acres have been cleared for a commercial tapioca plantations and planting material were seen being transported into the area.
- Other fruit - Miscellaneous other fruits were also being tried with some success.

RAJH/RI/8/11/69

NR/V/4

DATE: November 6th 1969

TIME: All day

Investigation of farming patterns and practices on the West Coast of Johore.

HELD AT: J.B., Pontian, Muar, Yong Peng, Kulai, J.B.

PRESENT: Harrison, Sole.

Near Pontian large areas of pineapples are grown on a peaty soils, in some places pineapples have been between young rubber trees. Also a few cases were seen, where rubber was planted out in pineapple fields. Neither system would seem to be very satisfactory as the two crops require very different soil conditions. The rubber would seem to be a catch crop only tapped during times of high prices. In another area sago plants were planted out in the pineapple fields. Sago will do well on peaty soils but quite rapidly develops alot of foliage which would shade out the pineapple leaving a pure stand of sago.

In the Pontian area a few small holders prepare banana fibre for manufacture into twine and string. On interviewing a holder's wife she said they sold the dried fibre to a Chinese for 12¢ a kati. After processing, the twine retailed for 30¢ per kati. The preparation seemed to be very simple, it is just cut from the stems and dried in the air over bamboo poles.

Considerable numbers of areca nut palms are interplanted between the coconuts. The nuts are gathered by the small holders and sold to a Chinese processor. The Chinese man shells them slices the nuts into thick sections and dries them in the air. He also grades them and eventually sells them to another Chinese for \$80 a pickul. They are then exported through Singapore.

The smallholders growing coconuts also raise considerable number of turkeys but these seem mostly for home consumption. One rubber small holder had a large flock of improved chickens under his rubber trees.

A few acres of coffee were intercropped with coconuts of moderate height. The coffee was of the Liberica type and looked very healthy but

had not yet started to bear fruit.

Two small scale oil mills were visited. One mill only crushed copra which was bought from smallholders and broken into small pieces on concrete yards and laid out to air dry. The dried copra was then crushed and a 60% rate of extraction was achieved. The remaining cake was fed to pigs and also sold for food. The other mill a slightly larger establishment, crushed both copra and oil palm kernels. The mill consumed 200 tons per month oil palm kernels purchased from Franzer Oil Palm estates and got a 30% oil extraction rate. Six hundred tons of locally obtained copra were processed at 50% extraction rate per month. The oil was put into barrels and sent to the Lam Soon Margarine factory in K.L. Both these mills were primitively maintained and employed a large amount of hand labour to shift the various materials. Palm kernel oil was generally mixed with.

On the return journey near Kulai several hundred acres of young oil palm were seen to be inter-cropped with an unusual blueish variety of tapioca.

RAJH/RI/27/11/69

Rice in West Malaysia.

Rice forms the major staple in the Malaysian diet. The country has however traditionally been an importer of this commodity. Actual imports fluctuate from year to year, but in the past decade have averaged about 350,000 tons per year (about 40 percent of total rice consumption) and have cost about \$140 million per year. Official policy is now to increase rice production to the point of self sufficiency by 1975 or earlier. There are two major schemes to increase rice production sharply through double cropping: the Muda scheme in Kedah and Perlis scheduled for completion in 1970, and the Kemubu project in Kelantan. Both are expected to be operative in 1975. Smaller schemes are also proposed to extend double-cropping in other states. Efforts are also being made to develop improved varieties to increase yields.

Consumption of rice per head in W. Malaysia is around 220 lbs per annum but does appear to have fallen slowly in the past decade. Using a three year moving average, consumption has been as follows:-

<u>Years</u>	<u>Average per Capita consumption (pounds)</u>
1958/60	255.584
1959/61	255.584
1960/62	253.12 .
1961/63	254.016 .
1962/64	250.432 .
1963/65	248.416 .
1964/66	229.152 .
1965/67	219.968

It is expected that this trend will continue. Using assumptions of 3 percent growth in population, 2.5% growth in per capita incomes and income elasticities ranging from -0.2 to 0.0 the projected per capita and total consumption for rice (assuming constant prices) were estimated as in Table 1.

Table 1. Projection of Rice Consumption to 1990.

Per Capita (tons)				
Inc. Elast.	-0.2	-0.1	0.0	
1967	0.0985	0.0985	0.0985	
1970	0.0969	0.0977	0.0985	
1975	0.0942	0.0963	0.0985	
1980	0.0910	0.0947	0.0985	
1985	0.0874	0.0929	0.0985	
1990	0.0834	0.0909	0.0985	
Total (thousand tons)				
Inc. Elast.	-0.2	-0.1	0.0	
1967	865.5196	865.5196	865.5196	
1970	935.5852	942.1303	949.4415	
1975	1048.6000	1072.5017	1096.4035	
1980	1174.9553	1222.9995	1271.0441	
1985	1308.4316	1390.9464	1473.4616	
1990	1447.0040	1577.5102	1708.1870	

This indicates that total rice consumption will increase by about 75% in the period to 1990 (assuming an income elasticity of -0.1), while per capita consumption falls slightly to .0909 tons (203 lbs) per annum. In the Nathan Transport Study it was assumed that total consumption would be 1,040,980 tons in 1975 and remain at that level through 1985. This implies an income elasticity of demand of about -1.2 and appears to be highly unrealistic.

Production projections were also made in the Nathan Study for the period to 1985 as shown in Table 2.

Table 2.

Year	Land Area Planted			Production	
	Single Crop	Double Crop	Total	Padi	Rice
('000 acres).....		('000 tons)....	
1966	651.3	104.4	860.2	853.0	568.098
1970	630.0	175.0	980.0	1,129.2	752.472
1975	341.7	460.0	1,261.7	1,646.5	1,096.569
1980	248.8	580.0	1,408.8	2,113.2	1,407.391
1985	234.3	613.2	1,460.7	2,410.2	1,605.193

These production and consumption estimates thus predict that self sufficiency in rice should be attained by 1975. The production estimates are based upon increased use of double cropping principally resulting from the Muda and Komubu schemes. They also assume an increase in yield of padi from 1.15 tons per acre in 1970 to 1.65 tons in 1985. The major increase in production occurs before 1975 as the two irrigation schemes come into operation, the main factor beyond that time being increasing yield.

At present the Government guarantees a minimum price of \$16 per pikul of padi. The Trengganu Report provided the following data on milling costs:-

Value of padi at farm	\$16 per pikul
Transport to mill	65 cents
Cost of milling	<u>\$ 1.97</u>
	\$18.62
Value of second grade rice	\$ 2.31
Cost of first grade rice	\$16.31 for 0.6 pikul
	= \$27.18 per pikul
Assuming transport & port charges	= \$ 1.82 " "
F.O.B. Cost	= \$29.00 " "
	= \$488.00 per ton.

- 3 -

The average price of rice imported into W. Malaysia since 1962 has been:

<u>Year</u>	<u>Price \$ per ton</u>
1962	427
1963	413
1964	384
1965	384
1966	438
1967	533
1968	566.

Thus at prices prevailing prior to 1967 the guaranteed price to domestic producers was above the domestic price. In its Commodity Review for 1969 F.A.O. expected prices to be lower this year. It further states that "the medium term prospects for trade and prices will primarily be influenced by future developments in production. The high-yielding varieties which are likely to cause considerable changes in the pattern of supply and demand (international?), have so far had greater impact in importing than in exporting countries. Rice output has been encouraged also in several developed countries. Although a temporary return of scarcities owing to crop failure cannot be ruled out, the developments in progress are already leading to lower imports, higher export availabilities and even surplus stocks. In such circumstances, adjustment of national production policies and programmes to the changing supply and demand pattern will be increasingly necessary.

Thus we may expect prices to fall back to earlier levels in the near future. A major factor in causing fluctuations in world prices is the small proportions of total production which enters world trade, 6.5 million tons out of total output of 284 million tons i.e. only just over 2 percent. Thus import demand and export supplies tend to be residuals in many cases.

The F.A.O. in the note quoted earlier suggest that the primary influence in future trends will be production. However changes may take place in consumption, particularly substitution of bread for rice. This appears to have been occurring in Malaysia and may be an important reason for the apparent sharp fall in rice consumption in the past four years. Table 3 shows the growth in wheat imports since 1965.

Table 3

<u>Year</u>	<u>Wheat Imports (tons)</u>	<u>Value M\$</u>
1966	173,754	38,566,637
1967	272,592	62,454,972
1968	354,640	76,823,712

.... / 4 ..

- 4 -

World wheat prices have fallen this year and stocks, particularly in North America are at high levels. There is some prospect of countries such as Malaysia obtaining wheat at prices below those paid by millers in North America and W. Europe. At present bread prices in Malaysia are lower than in U.K. or U.S. (and presumably Europe as a whole). A relative fall in wheat prices might increase the growth of bread consumption in S.&E. Asia as a whole and reduce the rate of growth of demand for rice.

Thus the future price of rice appears more likely to be in the region of \$400 per ton than the guarantee equivalent of \$490. In these circumstances exports by Malaysia will be subsidized unless the guaranteed price is reduced. Given the above projections stimulation of additional rice production in areas such as Johore, outside traditional producing centres appears inadvisable. Any such proposals should be evaluated in terms of a 'shadow' price based on the import price level. For this purpose M\$400 per ton of milled rice appears to be the best estimate.

Material Used.

- F.A.O. Commodity Review 1969
- F.A.O. Provisional Indicative World Plan for Agriculture.
- Dept. of Agriculture - Statistical Digest.
- Dept. of Statistics - Foreign Trade Statistics.
- Robert Nathan & Assoc. - Transport Study.
- NEDECO - Trengganu Report.

JCE/BN/18/12/69.

... of crop is followed, planting according to advice on market conditions
 SRJ/3/D 12 ... said that 3 acres was all the ... but it was constantly ...
 ... essential for a long term
 TO: Project Manager and Divisional Heads.
 FROM: F.A. Sole

Visit to Bukit Batu vegetable area - 11th and 13th April, 1970.

Two visits were made to the area which lies to the left of the main road at about 33rd milestone. It extends approximately 135 acres and is divided into 3 acre lots. At the moment there are 12 to 15 farmers working on the land which was opened up in about June last year. The area consists of small hills which look fairly steep but the slopes have not yet been ascertained. Soil type is not known but to our untrained eye could be either a coarse Rengas or paramount. Small valley bottoms between the hills have streams running through. Water is taken from this for irrigation.

Sheet
129 1/2
ml

Most of the farmers live in Kelapa Sawit and travel out to the area daily by motor-cycle or car. Previously the area is said to have been pineapple growing pre-war and it is thought that tapioca was grown during the Japanese occupation. Since then the land has been abandoned till last year. A group of vegetable growers led by one of their number, Liew Chee Hong, applied for the land when their previous land in Kelapa Sawit was taken back by the land owner. 45 farmers have been given 3 acres each for which they pay \$10 per year per acre. Apparently title will be confirmed after 3 years.

The main crops grown are cucumbers, chillies, hairy squashes, long beans, sword beans and a few brinjals. All these are sold in Singapore. No leafy vegetables are grown as they cannot compete in freshness with Singapore's own leafy vegetables.

4 farmers, with whom we spoke, operated their land with a total of 3 family workers per plot, hiring some casual labour particularly at harvesting and replanting times. The land was originally prepared by tractor and disc plough operated by a local contractor who charged \$60 to \$70 per acre for disc ploughing

3 times. Netset rotation of crops is followed, plantings being carried out according to advice on market conditions from the local dealers. It was said that 3 acres was all the family could manage at one time but it was constantly reiterated that at least six acres was essential for a long term enterprise as the land was rendered infertile by the very high cropping intensity practised.

On new land, 2 lorry-loads of chicken manure consisting \$200 to \$250 per load and 15 bags (40 kilos each) of artificial fertiliser at \$13.50 per bag is applied per acre (analysis 15N - 15P - 15K). After this first application only half the total amount of each is applied to every crop. Chicken manure is applied 3 times/artificial fertiliser is applied twice to each crop. Chicken manure was stored in sheds under cover to stop leaching and loss of nutrients. Spraying of insecticides is carried out regularly on all crops. The main insecticides used are Diptorex and Basudin 60E. The cost is reported to be about \$24 per acre for spray materials. Beans are grown on ridges and staked with Chengai stakes, imported from Indonesia and bought in Singapore at 3¢ each. 9,000 stakes per acre are used and they last about 2 years, or 6 crops. About 12 katis of seed are used on one acre. Most of this is saved from the previous crop but when it has to be bought for various reasons it costs \$2.50 per kati.

Yields were quoted as follows:

	<u>Yields about</u>	<u>Price range</u>
Long beans	9,000 katis	5 to 20¢ per kati
Short beans	8 - 12,000 katis	10 to 40¢ "
Cucumber	8 - 16,000 "	3 to 20¢ "
Hairy squash	16 - 20,000 "	4 to 10¢ "
Chillies (red)	3,000 katis	10¢ to \$1.50 "
(green)	4,500 to 6,000 katis	10¢ to 30¢ per kati.

	<u>Usual price</u>	<u>No. of plants per acre.</u>
Long beans	15¢	9,000
Short beans	20¢	8,000
Cucumber	8¢	8,000
Hairy squash	10¢	4,000
Red chillies	50¢	3,000
Green chillies	20¢	3,000

3 crops per year were obtained from cucumber, squash and long beans and 1 crop per year from chillies although the chilly yielding season extend over 4 to 5 months. Chillies were a risky enterprise as they were attacked by an unknown fungus. From the look of the infection it would appear that this could be controlled by the use of Bordeaux mixture or some other copper fungicide. This would, however, entail washing of the chillies before marketing to get rid of the coating left by this fungicide. Beans were attacked by a small stem borer which was still evident although frequent spraying of insecticide is carried out. This was apparently ineffective but it is suspected that spraying is mostly carried out during the heat of the day and absorption of the systemic insecticide may be more effective if spraying is done early or late in the day.

No advice was apparently available to the farmers and none was actively sought. We were asked questions on the effectiveness of spraying, fertilisers, watering and diseases. The farmers use their sprays and fertilisers on a trial and error basis, trying each at varying rates and strengths.

Most of the credit requirements of the farmers operations would appear to come from the local dealers in Kelapa Sawit. Certainly production credit is available from this source but it is thought that small personal loans were made as well. In return crops are marketed through the credit supplying dealers. There is a slight price differential between dealers but apparently not enough to warrant anyone shopping around for a better price.

We met one dealer Liew Chin Hin who claim that since the inception of the scheme his business had increased by 50% and that this was common to dealers in Kelapa Sawit. He supplied agricultural inputs as well as buying the crop but was not in the position to give advice on the use of these inputs.

Both the dealer and the farmers said they were satisfied with the way things were going.

FAS/RH

DAR. S. 355

SEJ/3/B

3rd July, 70.

The Project Manager,
South East Johore Project Tanjung Penggerang and
Johore Tengah Regional Master Plan Study,
677 Jalan Petri,
P.O. Box 241,
Johore Bahru.

(Attn: Mr. I.L.A. Ysselmuiden)

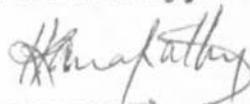
Dear Sir,

With reference to your letter to Inche Law Wei Min dated 30th June, 1970, I have the following comments to make:-

2. With regard to the crops and the required pH range, we feel that apart from maize, sorghum, soya beans and groundnuts, the rest of the crops like rubber, oil palm, sweet potato and tapioca, the pH range quoted by you is high and these crops will not require any liming in any upland soils. With regard to the crops like maize, sorghum, etc., about 2 tons of lime initially and 5 cwts per annum per acre would be sufficient.

3. In spite of the low requirement of lime, the finding of limestone deposit in Gumong Sumalayang in South East Johore could be of great benefit to other areas in Johore especially to the South West coastal area. Large quantities of limestone are required for the other acid soils as well as peat occurring along the west coast of Johore. The rate required per acre on about 700,000 acres the area mentioned would be an average of 2 tons per acre. Calculating on this basis, a very large quantity of limestone powder would be required.

Yours faithfully,



(K. KANAPATHY)

Ag. Asst. Director (Research).
for Director of Agriculture,
West Malaysia.

KK/scl.

555 ✓

The Requirement for Agricultural Lime

Soils in the humid tropics are normally highly acid and those in South East Johor are no exception. The average pH's of soils in the area range from 4.4. to 5.0. The effect of these conditions on agricultural crop production varies from crop to crop. The major reason for adverse effects of low pH on some crops is that they do not efficiently take up other required nutrients from the soil in such conditions and growth is therefore stunted.

A number of crop failures in maize and sorghum trials have been reported by the Federal Experiment Station because of low pH levels. Responses to applications of lime have been shown both by F.E.S.⁽¹⁾ and R.R.I.⁽²⁾ in a series of trials on maize, sorghum, groundnuts and soyabeans, and both these bodies recommend use of lime for these crops. One maize trial carried out by the RRI⁽²⁾ gave the following results:-

Treatment	Yield lb/ac.	Additional Crop lb/ac.	Value (\$)	Cost of Additional Lime	
				\$35/ton	\$60/ton
cwt Mg lime 1908					
0 cwt "	2504	596	57.50	8.75	15.00
5 cwt "	2806	302	26.09	8.75	15.00
0 cwt "	3027	221	19.09	8.75	15.00

In addition 2 cwt double superphosphate, 2 cwt urea and $\frac{3}{4}$ cwt muriate of potash were applied.

The precise amount of lime indicated as optimal in trials varies somewhat according to initial soil conditions. In general, however, the major diversification crops have been found to require soil pH in the following ranges for satisfactory growth:-

Crop	pH range for satisfactory crop growth
Rubber	4.5-6.0
Oil Palm	5.0-6.5
Maize	5.5-7.5
Sorghum	5.5-7.5
Soyabeans	6.0-7.0
Groundnuts	6.5-7.5
Sweet Potato	5.5-7.5
Tapioca	6.0-7.5

In order therefore for a range of short-term crops to be grown it is advisable for the pH of the soil to be raised to a level in the region of 5.5-6.5. The most common method of doing this is by application of limestone. The quantities required for this purpose vary depending upon the structure of the soil, but for soils typical of the South East Johor Area, with initial pH's of about 4.7, a first application of 2-3 tons of lime per acre would be required. This would have to be supplemented by periodic further additions of lime averaging one-third to a half of the initial dressing per year, ie. about one ton per year.

References:-

- (1) Federal Experiment Station - Proceedings of the Malaysian Maize and Sorghum Co-ordination and Improvement Workshop - November 1969.
- (2) E. Pushparajah and Wong Phui Weng - Cultivation of Groundnuts and Maize as Intercrops in Rubber. - Paper delivered to Crop Diversification Conference - November 1969.