SOME ASPECTS OF PRODUCTION AND MARKETING OF SUNFLOWER IN KENYA

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By

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A Thesis submitted in part fulfillment for the Degree of Master of Science (Agric.) in Makerere University, Kampala.

April, 1974

This thesis is my original work and has not been presented for a degree in any other University.

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This thesis has been submitted for examination with my approval as University Supervisor.

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PROF. G.E. KORZAN
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The contents represent my personal work and as such I take responsibility for any errors of ommision and interpretation of facts therein.

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ABSTRACT

This thesis is mainly the outcome of a field survey based on administration of questionnaire, verbal interviews as well as on-the-spot observation and analysis of available published information. The first task was to establish the degree of current production, and possible potential production.

Sunflower has been grown in Kenya for many years but has never achieved much prominence as an oil crop; in fact the bulk of present production is exported to European and American countries as bird feed. Formerly, almost all of Kenya's needs for edible vegetable oils and fats were imported, but with the growth of population and incomes coupled with the current squeeze on the currencies of developing countries, importation is no longer easy nor desirable. The need for self sufficiency in vegetable fats and oils, in the short run, with a possibility of breaking into the export market has therefore become more apparent.

Several oil crops could have been selected for study, but sunflower was singled out because

of its present fairly widespread adoption compared to other oil crops, its good adaptation to local climatic and edaphic variations, and its lower comparative need for capital inputs. After establishing the present extent of growing and potential growing areas it was necessary to examine the economics of the industry at the farm level.

It was found that the profitability of sunflower is very low, mainly because low yields due to low level of inputs, especially fertilizers. This situation is attributed to a possible belief that sunflower needs little fertilizer but more important is the fact that under the present price and yield levels, returns to fertilizer in sunflower are low. To break this circle, it is concluded that it is important to breed higher yielding varieties than the present ones, and to encourage greater use of fertilizers through better pricing of sunflower seed.

The cost of marketing the seed was very high for the small scale producers mainly because small quantities of produce were moved over long distances making unit costs very high. Strengthening of cooperatives and pooling of resources privately by individuals could rectify this situation. Related

to the marketing of sunflower is the very important aspect of redistribution of incomes. Per capita consumption of edible fats and oils is higher for high income groups than for low income groups. Sunflower can and does grow in marginal areas where the opportunity cost of labour is very low. Promotion of sunflower growing in these areas can provide gainful employment for labour which could otherwise be unemployed or underemployed, and at the same time help in the transfer of incomes from the richer to the poorer. Steps must be taken to check production in the larger areas, where the majority of farmers constitute the "rural elite" and promote it among the smaller farmers. Various measures of doing this are examined and it is concluded that the best way would probably be greater extension effort and credit among the smaller farmers, especially in the marginal areas who more than anybody else need a means to better livelihood.

CHAPTER 1

INTRODUCTION

The Role of Agriculture in Economic Development

Economic development is defined as "the process by which a population increases the efficiency with which it provides desired goods and services, thereby increasing per capita levels of living and general well being of its members". (1) The role of agriculture in economic development has been well described by various authors, notable among whom are J.W. Mellor (2) and W.H. Nicholls (3). Various authors advocate either giving priority to agriculture or to industry and this disagreement has not been adequately resolved. Before adding our opinions to the already existing ones on this issue, let us first of all briefly examine the major characteristics of agriculture in underdeveloped economies and the possible contributions that agriculture can make.

The need for food, coupled with the low efficiency in agricultural production inherent in underdeveloped economies dictates that a large proportion of the total labour force be engaged in agriculture. In order to feed more people a better

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The need for food, coupled with the low efficiency in agricultural production inherent in underdeveloped economies dictates that a large proportion of the total labour force be engaged in agriculture. In order to feed more people a better

diet, productivity in agriculture needs to be raised significantly. The capacity to increase productivity due to increased labour input is limited, since underdeveloped economies are usually characterised by underemployment, and frequently total unemployment. Moreover, this labour force on the land has few if any, other employment opportunities. A rise in productivity therefore requires capital and changes in technology.

Development calls for a transformation of the economy from one which is primarily agricultural to a more mixed economy. For significant transformation to occur, agriculture, the most predominant sector has to make contributions of both capital and labour to the other sectors. This places a dual stress on agriculture: it has to raise productivity and also to make significant contributions to other sectors of the economy.

A.J. Youngson says that "every economy has an agricultural and a non-agricultural sector, and one of the most important aspects is the changing, complex but always intimate relationship between the two".(4). Rising agricultural

productivity supports and sustains agriculture in several ways. First, it permits agriculture to release part of its labour force for industrial employment while meeting the increasing food needs of the non-agricultural sector. The rate at which this can occur depends on (a) the proportion of total labour force engaged in agriculture (b) the rate of growth in the total labour force and (c) the rate of growth in non-farm job opportunities.

Most developing countries have upto 80% of their total labour force in agriculture, and to absorb labour from agriculture the non-agricultural sector has to grow at a very fast rate. If for example in a country with 80% of the population in agriculture this population is to be reduced by 10%, the other sectors have to grow at 40% in order to accomplish this. In practice, actual absorption of labour from agriculture only comes in the very late stages of development - take the case of Japan where labour was actually drawn from agriculture only in the very advanced stages of her economic development. All that the non-agricultural sectors can do in the early stages is to absorb the increased labour force due to increases in population, and not all countries manage to do this. In the early stages,

population growth tends to accelerate, resulting in problems of absorption. Similarly, the greater the growth in the labour force, the greater the growth in job opportunities outside agriculture that is needed in order to actually draw labour from agriculture. This rate is slow in the early stages due to constraints of capital formation and availability and the efficiency with which available capital is utilized.

Provision of food for the non-agricultural sector is of primary importance if this sector is to grow at a healthy rate. High food prices would lead to wage agitations because the non-agricultural sector is notable for its strength and activities in trade unionism. A productive agricultural sector would therefore be able to supply food at reasonable prices and improve terms of trade between the agricultural and non-agricultural sectors. In the same context a productive agricultural sector, where the bulk of the population lives would provide a wide market and create effective demand for industrial products. Industries would therefore be able to take advantage of economies of scale and hence lower the production costs. Here in Kenya we are obviously a long way from this situation.

The greatest role that agriculture plays in economic development in the early stages is the earning of foreign exchange, mainly through the export of raw materials such as fibres and oils to the industrialized countries. Foreign exchange is needed for the purchase of capital goods for industrial production. Lack of foreign exchange in the early stages acts as a very effective constraint for industrial development because practically all capital goods have to be imported. Agricultural earnings also provide savings and tax revenues which can be invested in industry or used for provision of services such as health, roads and electricity.

The above discussion is based on generalizations based on observations of the development process in European countries and to some extent, Japan. Many of the generalizations hold true for the majority of developing countries today, but there is one crucial difference, the transfer of labour from agriculture to industry. A look at Kenya's example will reveal that job opportunities outside agriculture have not grown at a rate that would actually draw labour from agriculture. The table below illustrates the point.

TABLE 1

REPORTED WAGE EMPLOYMENT (NUMBER IN THOUSANDS) OF PERSONS IN KENYA, 1960 - 1970 *

YEAR	TOTAL (1)	AGRICULTURE (2)	OUTSIDE AGRICULTURE (3) i.e 1-2
1960	622.2	271.8	350.4
1961	589.8	252.3	337.5
1962	579.8	245.5	334.3
1963	539.2	219.7	319.5
1964	575.4	208.3	377.1
1965	582.1	202.4	379.1
1966	585.4	188.1	397.3
1967	597.5	172.7	424.8
1968	606.4	173.0	433.4
1969	627.2	178.7	458.5
1970	644.5	183.7	460.8

Source: Adapted from Statistical Abstract, Kenya 1960 - 1971.

* Figures are for large scale farms only and the decline after 1963 is due to Settlement Schemes, many of which were established on large scale farms.

Between 1960 and 1970, the job opportunities outside agriculture expanded by 31%. This, over a period of eleven years represents an average growth rate of under 3 per cent per annum while population growth is estimated at about 3.5 per cent per annum. Kenya has a further employment paradox in that whereas there is a hue and cry over unemployment, some sectors have an actual labour shortage. (5) This is associated with educational values and the changes it embues on the job seeking populace, who drift to the towns in search for better paid jobs. It is our contention here that the situation is brought about by the low or nil opportunity cost of labour. If there were more job opportunities, wages would rise proportionately to demand.

It is unlikely that industrialization will make a significant impact on the rural labour force in the forseeable future and the short and medium run goals point to agriculture. The crucial question for Kenya is how to modernize agriculture while involving as large a percentage of the rural population as possible. By modernization we mean the raising of productivity and efficiency of utilization of resources, that is land, labour and capital.

Several measures have been tried in Kenya and elsewhere in Africa with varying degrees of success. Such measures have included irrigation, land transfers, settlement schemes and land registration. In terms of employment generation, irrigation heads the list in Kenya but the cost is prohibitive, being as high as K£350 per acre (6). Whereas the potential for irrigation in Kenya is high, this measure is unlikely to expand due to the high capital cost. A more prominent measure in Kenya are the Settlement Scheme where former alien owned large scale farms were broken up into small units. This has, over the years yielded interesting results as table 2 below indicates. (See also Appendix 1 for employment generations of various measures).

TABLE 2

COMPARISON OF RESOURCES (KSH) REQUIRED TO PRODUCE K£100 OF OUTPUT ON SETTLEMENT AND LARGE SCALE FARMS IN KENYA 1964 - 1968 AND 1967 - 1971

SURVEY YEAR	SETTLEMENT FARMS			SURVEY YEAR	LARGE FARMS		
	MACHINERY	WAGES	MATERIAL INPUTS		MACHINERY	WAGES	MATERIAL INPUTS
	KSH PER FARM				KSH PER FARM		
1964/65	113	272	517	1967/68	475	329	533
1965/66	112	254	425	1968/69	455	313	555
1966/67	61	289	349	1969/70	433	339	537
1967/68	35	250	296	1970/71	425	306	530

Source: Statistical Digest - March 1972.

The indication here is that settlement farms (which have smaller acreages) are more efficient producers than large scale farms. This is attributed to the higher crop/livestock ratio on settlement schemes as compared to large scale farms. The implication here is that a shift from larger to smaller farms, accompanied by higher crop acreages

would be a desirable short term measure to intensify agriculture.

Mechanisation has been tried in countries like Nigeria, Uganda and Tanzania, involving huge subsidies from public funds but has proved unprofitable due to high cost especially because of non-productive travelling time, poor servicing facilities, inexperienced drivers and other factors. Mechanisation, despite this, can increase employment on small farms by breaking seasonal labour bottlenecks. Mechanisation can also increase labour demand at certain periods, for example if cotton acreage are expanded, labour demand at harvest time could be increased proportionately. Here in Kenya, large scale farms have been mechanised economically for many years without any subsidies at all from the government and this has only been on the large scale farms. Where situations warrant it, mechanisation should be undertaken. More important is the need to develop intermediate technology such as small tractors, oxen ploughing etc. to enable small farmers to overcome their labour bottlenecks.

In conclusion, we would like to point out that although the shorter term goals are for

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broadening and strengthening the industrial base, the need for industrialization has become more obvious of late because of inflation, world currency fluctuations and terms of trade between developed and underdeveloped countries. Over-dependence on primary products, as is the case with many developing countries is not conducive to sustained economic growth. Prices of many primary products such as coffee, tea and sisal tend to fall or fluctuate violently, making economic growth erratic. Whereas many developed countries can control their production processes and make adjustments where and when necessary, many developing countries can not do this due to the very nature of agricultural production. Developing countries direct their efforts mainly to increasing the quantities of their primary products and only manage to buy less and less of manufactured goods from developed countries. For example in 1963, a Kenyan farmer needed to sell six hundred and fifty bags of maize or four hundred thirty bags of wheat or three tons of coffee to buy a tractor. In 1973, the same farmer needed to sell one thousand three hundred bags of maize or eight hundred and eighty bags of wheat or six tons of coffee to buy the same tractor. (7) Prices of

primary products fall due to low income elasticities of demand and due to technological changes causing substitution with synthetic products as in the case of sisal and rubber. In other cases, technologies for using less of the same raw materials are devised. Prices of manufactured goods tend to rise because of inflation and also because constant research keeps improving the quality of industrial goods. In contrast, the quality of primary products for example sisal tends to be the same year in and year out. Because of this, developing countries are having less and less impact on world trade each successive year. This trend must on the long run be broken, and in the absence of oil and other precious primary products, this can only be done by industrialization. Industrialization involves constant innovations in terms of new products and new techniques of production. Research for these goes on in industries and at present the majority of these are located in the industrialized countries; consequently growth will only take place in these countries, leading to a sort of vicious circle. The longer term goal points to industrialization while the short term and medium term goals point to improving agriculture so that it supports and sustains industrial growth.

STRUCTURE OF KENYA'S AGRICULTURE

Kenya's arable land stretches from a narrow margin at the coast upto the slopes of Mt. Kenya, an area marked by the diversity of its geographical environment and the wide variation in climate and soils, factors which have produced a very diverse pattern of agriculture. The bulk of Kenya's farming is concentrated around the coast and the "highlands" which support on one hand a highly mechanised modern large scale farming sector and on the other a fairly monetised small scale farming sector with such enterprises as coffee, tea and dairy cattle among others.

In 1970, there was a total of 3175 large scale farms with 376 of them above 1,000 hectares (8) (A large scale farm is taken as any farming unit above 20 hectares or approximately above 50 acres). The small scale sector, which supports the bulk of the population comprised of 777273 holdings with nearly 2.5 million hectares of arable land. (9) Ownership of land varies. In Central Province and parts of the Rift Valley, ownership is by freehold, for which title deeds have been issued. This is in accordance with the Swynnerton Plan (10) which envisaged land consoli-

dation and adjudication as the first step towards modernization of traditional African agriculture. In other parts of the country, land consolidation has been slower, but is being pursued along similar lines. Foreign enterprises own land on a leasehold basis, while in some other areas land is owned traditionally by clans.

Agriculture is the major industry in Kenya, providing the bulk of exports and contributing a large share of wage employment. Raw or processed agricultural products account for nearly 60% of all exports. In 1964, the non-monetary sector accounted for 22.3% of the Gross Domestic Product (GDP) while the monetary sector contributed 15.8%. The table below illustrates this point.

TABLE 3

GROSS DOMESTIC PRODUCT 1964 AND 1970 FOR KENYA

PERCENTAGE OF TOTAL PRODUCT AT CONSTANT (1964) PRICES

G.D.P. AT FACTOR COST	1964	1970
A. Outside Monetary Economy		
Agriculture	23.3%	19.1%
Total for Outside Monetary Economy	27.0%	23.3%
B. Monetary Economy		
Agriculture	15.8%	14.3%
Total for Monetary Economy	59.2%	60.9%

Source: Statistical Abstract Kenya, 1971

Coffee is by far the largest single export crop, accounting for about one third of the total export value. Other important crops and enterprises in their order of importance are tea, meat and meat preparations, pyrethrum, sisal and a very rapidly expanding horticultural and floricultural industry. (See appendix for detailed information of Kenya Exports).

SUNFLOWER IN THE WORLD ECONOMY

The sunflower (Helianthus annuus) belongs to the family compositae of flowering plants and is an annual, which depending on its variety can grow up to a height of fifteen feet. Dwarf varieties with high oil content have been developed in the Soviet Union and Eastern European countries. The most important part is the head, a plate shaped structure which contains the seeds, which are the most important part of the plant.

World production currently stands at about 9.2 million hectares, with rapid expansion which is attributed to the following reasons: (a) Spread of Russian varieties, producing nearly twice as much oil to other countries and therefore changing the economies of the crop. (b) Increased demand for vegetable oil in developing countries. Classical oilseed crops such as groundnuts are more expensive to grow and harvest and produce less oil per hectare. This tends to shift the balance in favour of sunflower. (c) Drought resistance by sunflower, making them attractive in many countries. (d) Fairly high prices for oil and oilseeds. (11) The table below shows World Production from 1966 to 1972.

TABLE 4

PRODUCTION OF SUNFLOWER SEED IN THE WORLD 1966 - 1972

YEAR	PRODUCTION in 1000m tons
1966	8615.8
1967	9476.1
1968	9378.9
1969	9444.2
1970	9392.0
1971	9296.9
1972	10,010

Source: United States Department of Agriculture, World Agriculture Production and Trade, July 1972.

Sunflower is not a particularly demanding crop with regard to fertilizers, but it has an extensive root system which draws available nutrients from the soil, leading to a belief that it requires no fertilizers. Very heavy fertilization, however, results in some lodging in the taller varieties.

The crop is sown with conventional maize planters or is planted by hand, especially by the small scale farmers. Land preparation is similar to that in maize, but the plant population for optimum results varies according to variety. Time of sowing is generally from the middle of June to late July. This serves two purposes: first, all other crops are sown and secondly, sunflower ripens when the conditions are dry, thus avoiding rotting. More will be said about planting dates later.

USES

The most important use is the extration of oil. In Kenya, seed is the more important product, but this is gradually changing. In the world market, however, oil extration for edible purposes is the most important product. Sunflower produces edible oil "equal to the finest olive oil in quality, food value, lack of taste, colour and keeping qualities". (12) The oil is very suitable for margarine production and is considered to be of very good quality. The oil is also used in the manufacture of high quality salad oil, cooking and frying, canning and medicinal purposes. It is also used for the manufacture of soaps and cosmetics.

Oil is extracted from the seed which contains between 32% to 60% of oil. The seed is also used as poultry feed and also directly as cattle feed due to its high protein content (upto 20%). Occasionally, the seed is roasted and used for human consumption in the same way as groundnuts are used. After the seed is removed the head is dried, then crushed and fed to cattle and poultry. The crude protein of the crushed head varies from 12% to 15%. After the seed is crushed for oil, the residue, which has a protein content of between 35% and 54% is used as feed cake and is the major by product. In some countries, the stalks are processed for cellulose which is then used for manufacture of fair quality paper. This however is not done in many countries. A major use to which the stalks are put by small scale farmers after drying is the provision of fuel for cooking and other purposes. Green sunflower stalks are also used for silage and is comparable in quality to maize.

SUNFLOWER INDUSTRY IN KENYA

The Growing Areas and Extent of Production

Sunflower is grown in many areas of Kenya in very small plots by peasant farmers and the seed

is used for feeding birds. Very little of this produce ever enters the domestic market. However, it is grown as a commercial crop in the districts of Trans Nzoia, Uasin Gishu, Kakamega, Bungoma, West Pokot, Busia and in small quantities in Nakuru and Nandi.

According to estimates of the Maize and Produce Board, Kakamega district accounts for 65% of total production in small scale areas, whereas 26% of total production is grown in the Trans Nzoia District.

Map 1 shows the growing districts. Published information as to annual production figures is often scanty and not continuous. District production figures are at best erratic and can not give an overall picture. However, some indications of production in Kenya is given below:

TABLE 5

ACREAGES AND YIELDS OF SUNFLOWER IN KENYA

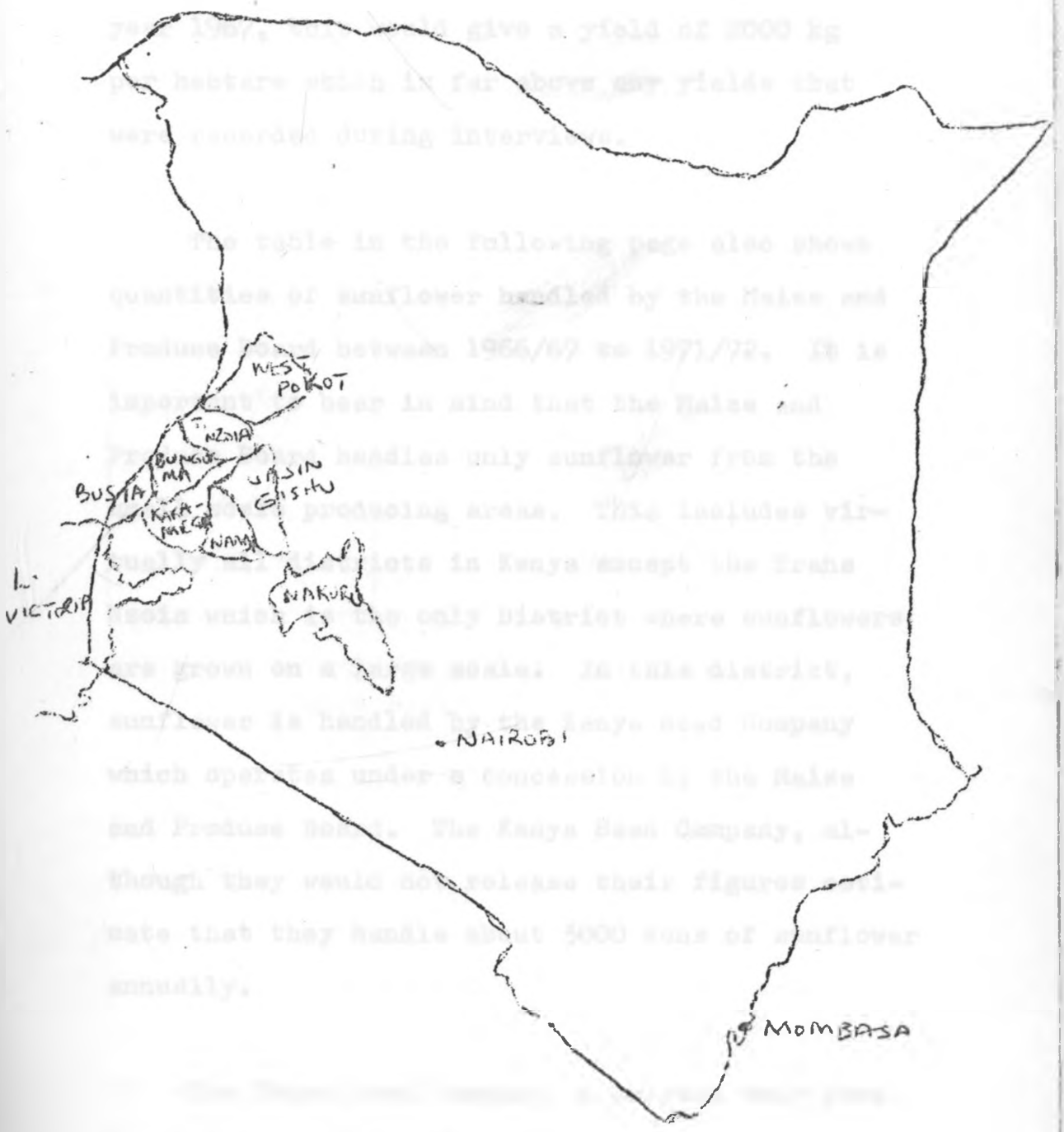
YEAR	AREA (HECTARES)	PRODUCTION (METRIC TONS)
1960	6000	2000
1961	5000	2000
1962	5000	2000
1963	3000	3000
1964	3000	3000
1965	2000	3000
1966	2000	3000
1967	2000	4000
1968	3000	3000
1969	4000	3000
1970	4000	3000
	Total 43000	34000
	Mean 3580	2833

Source: FAO, World Crop Statistics 1960 - 1972

MAP NO. 1

SUNFLOWER GROWING DISTRICTS

IN KENYA 1973



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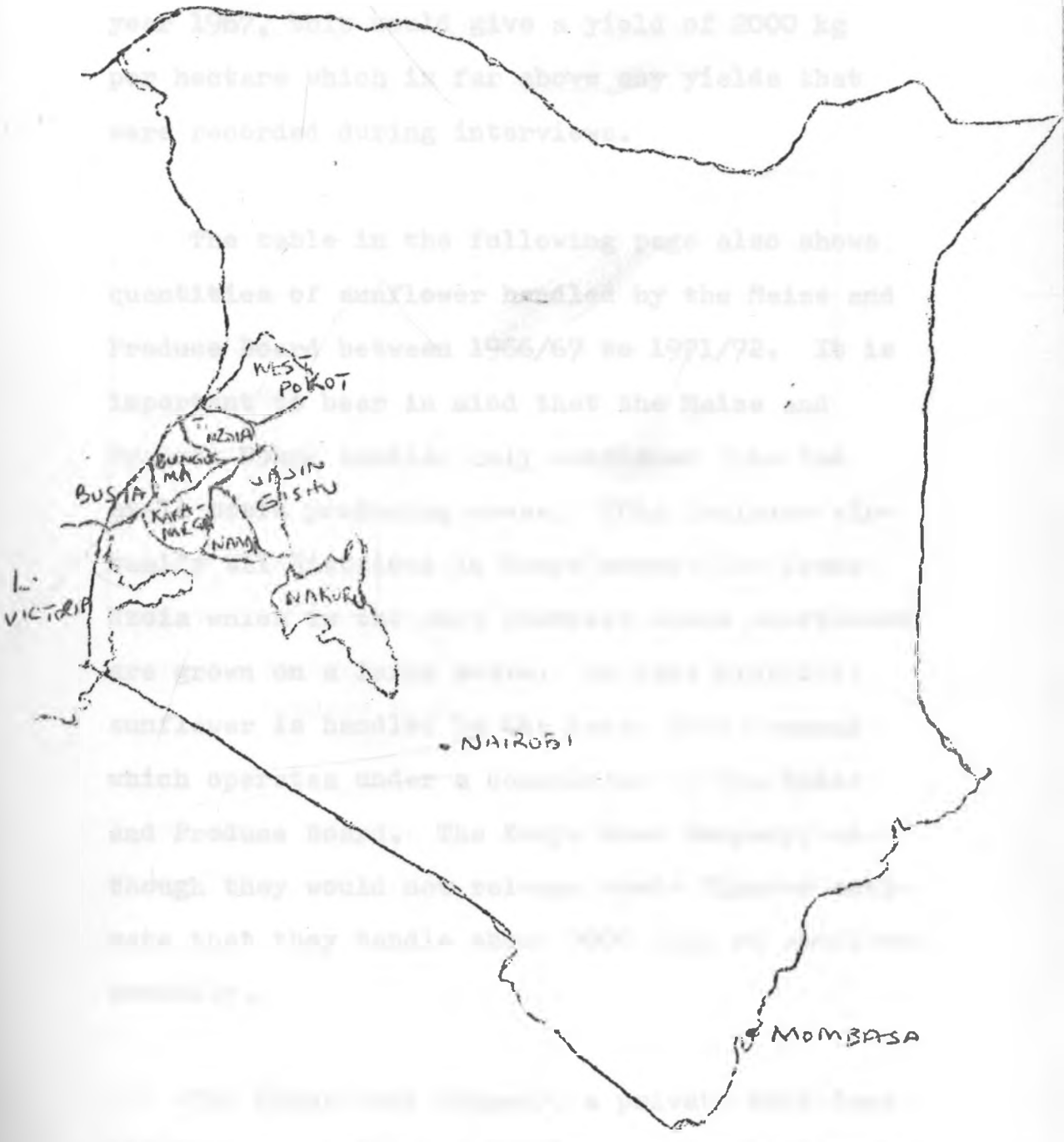
IN KENYA 1973



The accuracy of this information is gravely doubted by the author. For example, taking the year 1967, this would give a yield of 2000 kg per hectare which is far above any yields that were recorded during interviews.

The table in the following page also shows quantities of sunflower handled by the Maize and Produce Board between 1966/67 to 1971/72. It is important to bear in mind that the Maize and Produce Board handles only sunflower from the small scale producing areas. This includes virtually all districts in Kenya except the Trans Nzoia which is the only District where sunflowers are grown on a large scale. In this district, sunflower is handled by the Kenya Seed Company which operates under a concession by the Maize and Produce Board. The Kenya Seed Company, although they would not release their figures estimate that they handle about 3000 tons of sunflower annually.

The Kenya Seed Company, a private body does its own exportation of sunflower. Available published information also shows exports of sunflower seed from Kenya as ranging from 935 tons to 3164 tons. The figures are shown in the appendix table

TABLE 6

QUANTITIES OF SUNFLOWER HANDLED BY THE MAIZE AND PRODUCE BOARD OF KENYA BETWEEN 1966/1967 AND 1971/1972

YEAR	QUANTITY (TONS)
1966/67	282.8
1967/68	1563.8
1968/69	2872.4
1969/70	3522.4
1970/71	2837.8
1971/72	2147.3

Source: Figures supplied by the Maize and Produce Board.

3 and compiled from 1961 to 1972. The values range from about K£40,000 to about K£137,000.

Taking all the above figures into consideration a national output for sunflower can be estimated at about 5000 tons per annum. Considering the yield levels in the country currently running at around 900 kg per hectare as this study indicates for the larger and better managed farms, and the very low yields in the smaller farms, then the

national acreage is probably close to 10,000 hectares. This figure could vary from year to year, and so would the yields due to natural and other factors.

In order to assess objectively the role of sunflower in the Kenya economy, it would have been desirable to assess the extent of utilization and consumption of sunflower seed locally. There is some sunflower grown in the country that never enters the market. Some farmers grow sunflower but use the seed to feed their livestock, mainly cattle and poultry without actually selling any sunflower seed in the market. Many farmers feed their stock on poorer quality sunflower seed while selling the rest of the seed. Only 2% of the farmers interviewed grow sunflower exclusively as a fodder crop.

CHAPTER 2

THE PROBLEM

Sunflower has been known as a crop in Kenya since the turn of the century (12), but has never achieved much importance as a cash crop. However, the need for and the prospects of expanding the sunflower industry in Kenya is quite hopeful from several points of view. In the first place, Kenya imports large quantities of vegetable oils and fats. The table below shows the quantity and value of Kenya's imports from 1961 to 1970.

TABLE 7

QUANTITY AND VALUE OF NET IMPORTS OF ANIMAL AND VEGETABLE FATS AND OILS INTO KENYA, 1961 - 1970

YEAR	QUANTITY (METRIC TONS)	VALUE K£
1961	10469	773,000
1962	14875	1,041,000
1963	14873	660,000
1964	12145	903,000
1965	18009	1,810,000
1966	15251	1,591,000
1967	10258	867,000
1968	16121	1,184,000
1969	19373	2,201,000
1970	19242	1,956,000

Source: Statistical Abstract 1971

During the same period, Kenya's exports of vegetable fats and oils are as shown in table 8.

TABLE 8

EXPORTS OF ANIMAL FATS AND OILS FROM KENYA 1961 - 1970

YEAR	QUANTITY (METRIC TONS)	VALUE K£
1961	140	21000
1962	326	33000
1963	184	37000
1964	206	39000
1965	232	53000
1966	177	39000
1967	112	33000
1968	113	38000
1969	185	46000
1970	351	68000

Source: Statistical Abstract 1971

Kenya exports more of oil seeds and oil nuts and kernels, which is shown in appendix table 4. Exports of sunflower seed from Kenya are shown in appendix table 3. If more vegetable oils were

produced domestically, it is quite clear the positive effect this could have on foreign exchange.

The paint and varnish industry uses vegetable oils as one of its basic ingredients. The already established paint factory in Kenya presents evidence of the attempt of the expanding building industry. Although sunflower is not quite suitable for the manufacture of paints and varnishes due to its chemical composition, this still shows the need for oil crops in the country, and several oil crops such as soya beans, linseed and castor are grown in varying degrees.

The case for increasing the supply of vegetable oils by expanding the sunflower industry has been highlighted by recent developments in Kenya. A shortage of edible fats and oils has arisen because of a virtual stoppage of supplies of cotton seed from neighbouring Uganda and Tanzania, the former suppliers. The shortages have been duly reported in the local press (13, 14). At the same time, the price of sunflower seed increased by as much as 55% from Sh.26 per bag to Sh.40 per bag (15). At the same time, a huge mill, capable of processing upto 30,000 tons of

sunflower per year is being set up at Nakuru (16, 17). Notwithstanding the scattered information of sunflower production and marketing in Kenya, little is really known about the industry. For example why is it that some farmers in the Western Province grow sunflower with some degree of success while others do not produce the crop? Information is needed on the profitability of sunflower production relative to other competing and complementing crops. The ease of adapting current farming systems to sunflower from the farmers' standpoint needs investigating.

Several other things point to the need for study of a national edible oil crop. It has for example been observed that the consumption of fats and oils per head of population in developed countries is higher than in the less developed countries. Table 9 illustrate the point.

The proportion of food calories derived from fats and oils also shows a clear relationship to income, as shown in Table 10.

TABLE 9

CONSUMPTION OF EDIBLE FATS AND OILS PER HEAD OF POPULATION IN SELECTED COUNTRIES, 1962

COUNTRY	QUANTITY IN POUNDS
United Kingdom	50.5
Canada	42.5
Ceylon	7.9
India	8.6
Uganda	4.6

Source: Commonwealth Secretariat, Vegetable Oils and Oilseeds 1970 (18).

TABLE 10

PERCENTAGE OF FOOD CALORIES DERIVED FROM FATS AND OILS IN SELECTED COUNTRIES AND REGIONS WITH DIFFERENT LEVELS OF GROSS DOMESTIC PRODUCT (GDP)

COUNTRY	PER CAPUT GDP IN DOLLARS	% TOTAL CALORIES FROM FATS AND OILS
U.S.A.	2684	41.4
Canada	1787	40.8
Turkey	212	16.0
Central Africa	80	16.2
South East Africa	78	12.2
East Africa	76	15.5

Source: FAO: Agric. Commodity Projections for 1975 and 1985.

It is apparent that the proportion of calories derived from fats increases with the level of income, representing 15% of total for countries where per capita income is below 200 dollars to over 40% where incomes are above 1,000 dollars.

Assuming that incomes will rise with development in Kenya and that food habits will change with the changes in incomes, then there is reason to believe that demand for fats and oils will increase. Even assuming no changes in food habits, the growth in population, currently running at 3.5% per annum in Kenya would in itself increase the demand for fats and oils, along with other foodstuffs. However, changes in feeding habits can not be ruled out as has been clearly well set out by Engel's Law. A look at Kenya's Urban populations can indicate changes in food habits.

The need for agricultural diversification is recognised in many countries in order to reduce overdependence on one or few crops which produces potentially unstable conditions due to fluctuations in both prices and quantities of commodities. At the national level, sunflower could contribute much more due to increased foreign earnings, but this

can not be in the very near future. Over the longer term however, the contribution may be considerable depending on world price and demand. At the farm level, farmers have similarly to guard against price and quantity fluctuations. Although some commodities, such as coffee may not fall in prices due to international agreements, farmers in coffee areas still need to diversify in order to find alternative sources of increasing their incomes, because they can not do this by increasing the quantity of their coffee. (This is not stictly the case because different agronomic practices can raise the quality and quantity, but the scope for this is narrow). As will be seen later on, sunflower has a wide range of adaptability and can be used for diversification in many areas.

An equally important aspect is the suitability of sunflower to marginal areas, among others. This has immense implications. This means that people living in these areas can have a means of earning incomes which can be used in the improvement of the quality of life, procurement of education and other developmental purposes. As was seen earlier, consumption of edible fats and oils increases with incomes, and sunflower could be a tool in the transfer

and redistribution of incomes from the more affluent to the poorer. This will be discussed later.

Creation of employment is a persistent theme in Kenya's economic planning and sunflower can help do this, firstly by increasing the use of labour on the farms and, secondly by creation of employment through the processing and distributive industries. The first can be done by utilization of on farm labour or through careful enterprise combination to fit into the farm labour demand profile. This has not been examined in this work due to the length of time allowed in the conduct of the study, but this is an aspect that needs investigation.

Finally, sunflower can and does contribute to the dairy and beef industries in the country. Feedstuffs are an expensive item any farmer's budget and sunflower seedcake can produce a cheap and suitable feedstuff. Beef is at a premium these days both on the domestic and foreign markets and a cheap feed could give a much needed boost in the production process. Sunflower could also help in modifying the fluctuating availability of maize as a feedstuff and also for human consumption by offering as a ready

substitute for maize to which priority is always given for human consumption.

REVIEW OF LITERATURE

In this section, we shall examine available work that is of relevance to sunflower that has been carried on locally and elsewhere.

One of the earlier works is by Hurt (19) which was written in 1946 immediately after World War II when Britain needed edible oils than she needed guns. In this work, Hurt praises the merits of sunflower and paints it as the "answer" to Britain's edible oils problems. In this same work, the quality of the oil, its food value, other uses plus a detailed account of cultural practices are clearly spelt out.

Blackman (20) writes along similar lines and emphasises the advantages of dwarf varieties as being capable of mechanical harvesting, shorter growing season and more drought resistance. In another work (21), he describes cultural practices with particular emphasis in sowing, growing and harvesting and suitability to soil types and nutrient requirements. He further examines the suitability and adaptability of conventional maize equipment for use on sunflower.

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Putt (22) has written a very comprehensive handbook in which he examines such factors as rotation, the use of herbicides and the use of modified combine harvesters for harvesting of sunflowers. He also examines the demand and consumption of sunflower in a North American context.

Givan and Trotter (23) examine the economis of production of sunflower in the cotton belt of the United States and compare sunflower with wheat and cotton. Bear (24) writes along similar lines and examines the more common varieties in the United States.

On the local scene, Weiss (25) discusses prices, yields and other characteristics and lists the results of some trials he carried out on four local varieties, plus the results of trials he carried on planting dates in one district of Kenya.

Ravagan (26) briefly examines local cultural practices and the problems associated with growth of sunflower. Suttie (27) also gives an account of local cultural practices and gives the chemical composition of the plant in respect to the seed and stover and uses these as the basis for calculating the nutrients removed from the soil by a modest crop.

In another work, Moberly (28) publishes the results of a trial of sunflower headbran as a supplementary feed to lactating dairy cattle. An evaluation of the seedcake, we feel, should have been more useful because of its extensive use.

Dougall (29) gives the crude protein, digestible crude protein, nutritive ratio, total digestible nutrients and other results of sunflower at heights of ten, thirteen, twenty six and forty inches of height. He does not however, distinguish as to the variety he was dealing with, or more seriously the age of the crop. He forgets that plant height can be affected by such factors as drought and fertilization among others.

In a series of experiments carried out at the University Farm, Faculty of Agriculture, University of Nairobi, van Eijnatten (30) examines various agronomic practices such as weeding at various stages, dry matter increases and yields and defoliation at various ages and heights and the effect on the seed yield and oil content on sunflower. He also compares several local varieties on their germination, lodging and seed yield among other characteristics.

It is quite obvious from the above review of

literature that most of the existing works on sunflower have centred around the cultural practices of producing sunflower and its merits relative to other oil producing crops. These works further indicate that this crop has a great potential as a source of fats and oils, particularly the edible ones. It is also important to note that some of the current production of sunflower never enters into domestic markets. However, no reliable data are available as to the extent of this. It is also recognised that far more diversification is needed both among farmers particularly the small farmers and the country at large with respect to import substitution and expansion. Sunflower has the potential to contribute in both cases.

If one were asked to hypothesize about the merits and potential of sunflower production, many untested statements could be formulated, all of which may be worthy of investigation. However, given time and other constraints which will be discussed below, it is the purpose of this study in general to inquire into the production and marketing problems of sunflower with special emphasis on its profitableness and adaptability among both small and large scale farmers.

As specific objectives, the following are cited:

(1) An assessment of the extent of production and the potential areas of production in Kenya.

(2) An assessment of the costs of production of sunflower and its competitive position as compared to other enterprises, and the factors contributing to this situation.

(3) An examination of the present marketing, transportation and storage channels as they relate to the sunflower industry in Kenya.

(4) An assessment of the present and future demand of sunflower products on the local situation.

LIMITATIONS

In carrying out any piece of research work, there are problems which are general and particular to the area of study. In this case, the lack of data were acutely felt and this study is almost certainly the only one of its type ever carried out in Kenya. Whatever information were available were either discontinuous series and often of doubtful veracity. A more serious problem is that this work is almost outdated before it is actually published.

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Prices of fuels and other inputs have increased greatly in the past few months, making the present costings low. However, a piece of work is only revelant to a particular time and place.

In particular, certain other problems were encountered. The duration of the research was perhaps the most limiting. A period of ten months was allowed to gather and analyse data and then write up the results. Needless to say, this was difficult to meet and a delay was inevitable. This time period had the effect of reducing the study to a mere survey, with some aspects of the production process left uninvestigated.

The area of research proved too extensive, requiring very heavy expenditures for travel. The bulk of the research was carried out in the three districts of Trans Nzoia, West Pokot and Bungoma, each of which lies at least two hundred and fifty miles from Nairobi, the base.

METHODOLOGY

Right from the outset, it was recognised that information collected over one season would not be enough or representative and it would have been

desirable to do this over two growing seasons. However, in the light of the above constraints and to meet the objectives set out earlier, several approaches were adapted.

A preliminary visit was made to the growing area in the middle of June 1973 in order to be acquainted with the area. Field work started from the middle of July 1973 to the end of November 1973. The frame of sampling was not easy to establish since there was no register kept of sunflower growers. As a consequence any farmer growing sunflower at that particular time was eligible for interviewing. This method had two inherent weaknesses. First, it did not allow the opinions of farmers who had pulled out of the sunflower business to be gathered. Secondly, farmers who had just entered the business could have been interviewed with the possibility of leaving out more experienced farmers. Fortunately, no new entrants into the sunflower business were encountered in any area.

Fifty farmers were considered as a manageable sample, given the wide geographical area over which sunflower is spread. In Trans Nzoia district, sunflower is a well established cash enterprise and is

grown on a large scale. Most farmers in this district keep fairly reliable records and could be relied upon to yield desired information. In other districts, sunflower is grown on small plots with no records kept and with farmers relying on their memory. Consequently, and at a risk of statistical invalidity, but bearing in mind the time constraint, it was decided that twenty five farmers, half of the sample were to come from among the large growers from Trans Nzoia, the only district where sunflower is grown on a large scale. The other half were to come from the other districts. This arrangement allowed important information to be gathered from those who could yield if fairly correctly while giving a balanced view of the industry as it exists in Kenya.

Costing was a straight forward issue where records were available and these were studied and analysed to give the desired information. The small scale farmers proved difficult in this respect. Cash inputs were at a minimum, with the farmers using their own labour, sometimes hired labour, and also using their own oxen and seed left over from the previous season. In all these cases, labour was valued at the appropriate wage rate in the district. The wage rate taken was the one ruling at the

farm level as opposed to wage rates in institutions. Ox cultivation was valued at the hiring out rate in the particular district. Seed was valued at its opportunity cost, that is the price it would have fetched if it were sold.

Random sampling was done in all cases, with several visits paid to each farmer either by the author or by trained interviewers who helped to administer a questionnaire schedule that was drawn up.

Marketing authorities from various from various institutions were personally interviewed by the author. Those visited were the Maize and Produce Board of Kenya, the Kenya Seed Company and the Kenya Farmers Association. In addition, traders in the various buying posts were visited and their opinion sought over various aspects of sunflower marketing. In all, fifteen traders were interviewed.

CHAPTER 3

PRODUCTION

Potential Areas of Production

In considering the potential for the production for growing any crop, its climatic and edaphic requirements as well as its economic attractiveness must be considered. There are two basic economic questions which must be answered.

(1) What is the market for this crop or a similar one?

(2) Can it be produced competitively?

In this chapter we will examine first the climatic and edaphic requirements and the costs of production and competitiveness of sunflower. The marketing aspects will be examined in the next chapter.

Available findings indicate that sunflowers have no particular preference for soil type but do not do well on waterlogged land or poorly drained areas, and soil fertility is not a critical factor. On this soil factor alone, very few areas in Kenya would be unsuitable for sunflowers.

The more basic factor is rainfall. E.A. Weiss says that "sunflowers will crop on soils which are too dry or too poor for maize and wheat. The crop will do well on maize land and provided a suitable variety is chosen, on wheat land" (32). Sunflower, therefore can grow successfully on any land suitable for maize, and due to its drought resistance, on other areas less suitable for maize. Only moderate rainfall, well distributed over the growing season is required.

The exact potential can not be accurately assessed before a water balance sheet for the crop has been worked out. Apart from that, drought resistant varieties have neither been tested nor developed locally. Dwarf varieties, which are generally faster growing than the giant varieties have not been tested for their suitability to local rainfall variations and distributions. The nature, intensity and distribution of local rainfall zones has not been studied adequately in order to take advantage of specific crop requirements. In Kenya, for example, many areas receive heavy rainfall over very short periods of time, with the rest of the year receiving little or none. Varieties which take advantage of these conditions have neither been developed nor tested. It is quite possible, like in the case of maize to

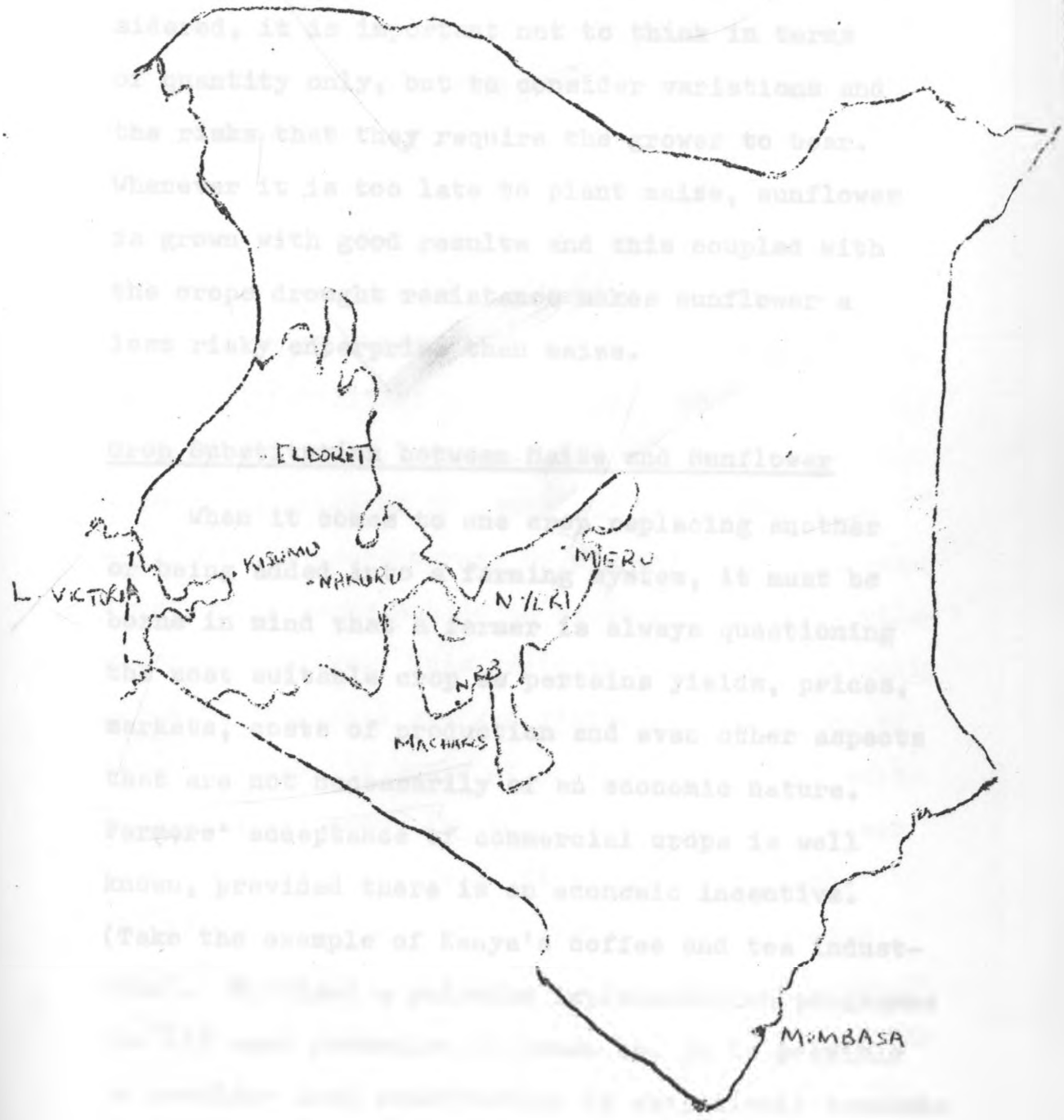
breed varieties suitable for local conditions.

For the time being, therefore, it is more realistic to confine the potential areas of growing sunflowers to those areas already under maize, and perhaps to a 10% extension all round. The 10% extension is purely an estimate which is felt to be rather modest. Map 2 however, shows the maize growing areas with no attempt made to indicate the 10% extension.

This virtually covers the whole of the Central Province, and Western and Nyanza Provinces. It then includes substantial areas of the Rift Valley and smaller parts of Eastern Provinces. Some small quantity of sunflower is also grown in the Coast Province. The potential for sunflowers in this province would include most, and ran parallel to the rainy coastal belt. In the drier parts of the country, maize is grown along moist river beds, and so of course would sunflower. Sunflower can also be grown under irrigation, but the extent to which this is economical is beyond the scope of this study. Further, there are grave doubts if current prices of sunflower could justify such expensive inputs.

MAP NO. 2

MAIZE GROWING AREAS IN KENYA 1973



When the question of rainfall is being considered, it is important not to think in terms of quantity only, but to consider variations and the risks that they require the grower to bear. Whenever it is too late to plant maize, sunflower is grown with good results and this coupled with the crops drought resistance makes sunflower a less risky enterprise than maize.

Crop Substitution between Maize and Sunflower

When it comes to one crop replacing another or being added into a farming system, it must be borne in mind that a farmer is always questioning the most suitable crop as pertains yields, prices, markets, costs of production and even other aspects that are not necessarily of an economic nature. Farmers' acceptance of commercial crops is well known, provided there is an economic incentive. (Take the example of Kenya's coffee and tea industries). Provided a suitable implementation programme for oil seed promotion is drawn up, it is possible to consider crop substitution in exclusively economic terms. However, this is not quite possible in the case of maize and sunflower because the smaller farmer views maize first and foremost as a food crop and as such maize will always receive priority,

even in marginal areas. For a large scale farmer who is usually in farming purely as a business, the choice is governed by the returns he gets from each enterprise.

Current yields levels for hybrid maize run at 2500 kg per hectare (33). Taking the price of maize to be 36 cents per kilogramme, the gross margin is 900 shillings per hectare. Sunflower yields on the best farms are about 900 kilogrammes per hectare; at a price of 70 cents per kilogramme this would give a gross margin of 630 shillings per hectare. This works out to an equivalent of 1750 kilogrammes of maize. This yield level is substantially below the national average yields for maize quoted above. Since the costs of production are not substantially different for the two crops, it is clear that maize is the more profitable crop to grow. The implication is that sunflower can only begin to replace maize where maize yields are substantially below the average (assuming the same prices used for the computation). This would be in areas near the fringes of the maize growing areas and in marginal areas.

To the smaller farmer in the marginal and other

areas the situation might not be so simple. Maize is basically a food crop and as noted above is always given priority. Sunflower therefore could find a place as a cash crop but not to the exclusion of maize. In these areas the place of maize as a food crop is always reserved out of necessity. The economic choice facing a farmer is therefore the production of a maize surplus for cash or sunflower. In West Pokot district (a marginal area neighbouring the arid Turkana district), maize serves as a medium of exchange. During "lean" seasons, the Turkana people readily trade their livestock and labour in exchange for quantities of maize. The stock, usually goats, can then be sold for cash. In this particular district maize and sunflower are grown together; maize as a food/cash crop and sunflower solely for cash.

What are the economic implications in a country where the staple food is maize? Is it desirable that sunflower displace maize in some areas and to what extent would this happen? The answer to the first question is that expansion of sunflower production would be beneficial to the country because the foreign exchange position would be improved either by cutting the import bill or increasing foreign

earnings through the export of sunflower products. This would not be attained if the expansion of sunflower led to a need of importing maize, which leads us to the second question. It is our view that expansion of sunflower would not greatly affect the position of maize in the country, first because substitution would occur in the marginal areas which do not account for a lot of production and secondly because expansion would be into more arid areas. Apart from that adoption and research into higher yielding maize hybrids is continuing with a tendency of raising maize yields in the country. For this reason we feel that sunflower expansion would not substantially affect the marketed output of maize.

Characteristics of growers

Small and large scale farmers differ markedly in their cultural methods, size of holding and in the number and type of enterprises on their farms and the level of inputs.

The large scale farmers have larger farms and also larger acreages of sunflower. The average size of sunflower acreages in the big farms was found to be 64.72 acres ranging from 10 acres to 200 acres, with a standard deviation of 56.4 acres.

The small growers had a mean acreage of 2.65 acres ranging from 0.5 acres to 10.0 acres with a standard deviation of 2.28 acres.

On the large farms operations such as land preparation and planting were all mechanised. The smaller growers used mainly hand labour with the hand hoe as the principal implement, while in several cases oxen were used. Some small growers, especially those adjacent to large farms used tractors hired from contractors or government tractor hire services. The method of planting the crop differed between the smaller growers and the larger growers. The larger growers used planters and seeders while the smaller growers used hand planting. Hand planting results in uneven depth which in turn leads to uneven germination. Weeding in all cases was by hand, and so was harvesting in all cases except one; where a combine harvester was used. The method of hand harvesting is by cutting off the head and then impaling it on the stem until the head is sufficiently dry to be threshed.

Differences in agronomic and cultural practices were noted between large and smaller growers. The smaller growers in the majority of cases used seed

carried over from the previous season or borrowed from neighbours, while the large growers in all cases used dressed certified seed. The large farmers accorded sunflower a distinct place in the rotation, while the smaller growers had no definite rotation schedule. The larger growers made sunflower the first crop after pasture, while the smaller growers sometimes intercropped with beans and potatoes in widely spaced rows.

The importance of sunflower on the farm business also differed according to the number and type of enterprises on the farm. On the large farms, sunflower was frequently the third most important enterprise after dairying and commercial maize. Where seed maize was included, then sunflower was the fourth enterprise. Among the smaller growers sunflower invariably came second to maize, but this was not always on a commercial basis as we saw earlier on. The larger growers on the whole were well conversant with the types and growing characteristics of available varieties and their prices. In all cases different varieties were grown as pure stands. The smaller growers also showed remarkable knowledge about the available varieties but only 24% of the farmers had intimate knowledge about these varieties and their characteristics.

Considerable variability in the level of inputs emerged especially regarding seed and fertilizers. Other differences also emerged between the small and large farmers, but these were due to the higher labour costs on the large farms. Table 11 and 12 show the average production costs for both the small and large scale growers.

Production costs and gross margins

The costs and margins shown below were calculated from averages calculated from samples of 25 farmers both for the small and large scale farms. An average of 10 bags to the acre, calculated from the large scale farmers was used, whereas an average of 4 bags per acre was used for the small farmers, also calculated from the sample. (Each bag weighs 40 kg.). Each bag was valued at 28 shillings.

Late towards the end of 1973 prices for sunflower seed were raised from 28 shillings per kg bag to 40 shillings for the same quantity. Since the crop was just beginning to be sold, this had the effect of greatly raising the gross margins above the levels calculated above. Since the costs of production were the same, the gross margins changed as follows:

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TABLE 11

MEAN PRODUCTION COSTS IN KSHS. PER ACRE OF SUNFLOWER AMONG 25 LARGE GROWERS IN TRANS-NZOIA DISTRICT, KENYA, 1973

ITEM	COST IN KSHS.	
	Old Land	New Land
Land preparation	100.00	120.00
Seed	11.00	11.00
Planting	20.00	20.00
Fertilizer	25.00	-
Weeding	24.00	24.00
Harvesting	16.00	16.00
Drying	12.00	12.00
Transport	7.50	7.50
Gunny sacks	30.00	30.00
Total Cost	245.50	240.50

TABLE 12

MEAN COSTS OF PRODUCTION IN KSHS. PER ACRE OF SUNFLOWER AMONG 25 SMALL GROWERS IN BUNGOMA, KAKAMEGA AND WEST POKOT DISTRICTS, KENYA, 1973

ITEM	COST IN KSHS.
Seed-bed preparation	22.00
Planting	10.00
Seed	3.50
Fertilizer	16.20
Weeding	12.00
Harvesting	8.00
Drying	6.00
Transport	24.00
TOTAL COST	113.20
Gross Margin	21.30

Ranges in costs are shown in appendix 6.

For the large scale growers from 34.50 to 234.50 and for the smaller growers from 21.30 to 78.70.

These costs must only be taken for 1973. Early in 1974 prices of fuels and fertilizers went up, and may go up again by the middle of the year due to the current oil situation. It is not possible at this stage to anticipate the nature of these changes and their effect on the overall production picture, but one thing which seems certain is that the exceedingly good prices for sunflowerseed will atract more producers, all other things being equal.

Discussion

Input levels, Profit margins and Profitability of Sunflower Production

An examination of tables 11 and 12 first of all reveals that although the smaller farmer is a low cost producer, he gets less per acre of sunflower than his counterpart, on the large farms. The reasons for this are the low technical efficiency of production among the small producers which in turn affects the economic efficiency. The following discussions will not consider the new price changes because as we indicated the cost pic-

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ture is still very uncertain. Prices of fuels and lubricants, expected to change in the very near future may entail upward changes in production costs.

There are basically two factors which affect profitability if costs are held constant: yields and prices. Several factors affect yields in sunflower, one of which is the level of fertilizer application. The mean cost of fertilizer application among the large farmers was 25 shillings per acre and 16 shillings per acre among the small farmers. Table 13 shows the frequency distribution.

Although it was emphasised that the size of sample is rather small, the two tables bring out the fact that the level of fertilizer application is low. The larger scale farmers showed more variation in fertilizer application. The standard deviation was 11.4 shillings while the coefficient of variation was 45.96%. The small growers had a standard deviation of 5.2 shillings and a coefficient of variation of 23.21%.

A t test of the means of the two samples shows that the level of fertilizer application is signi-

TABLE 13

FREQUENCY DISTRIBUTION OF COSTS OF FERTILIZER APPLIED PER ACRE OF SUNFLOWER AMONG 25 LARGE SCALE FARMERS IN TRANS-NZOIA DISTRICT, KENYA, 1973

COST(SH. PER ACRE)	NO. OF FARMERS	% OF TOTAL
10 - 19	8	32
20 - 29	11	44
30 - 39	3	12
40 - 49	1	4
50 - 59	1	4
60 and over	1	4
Total	25	100%

TABLE 14

FREQUENCY DISTRIBUTION OF COST OF FERTILIZER APPLIED PER ACRE OF SUNFLOWER AMONG 25 SMALL SCALE FARMERS IN BUNGOMA, KAKAMEGA AND WEST POKOT DISTRICTS, KENYA, 1973

COST(SH. PER ACRE)	NO. OF FARMERS	% OF TOTAL
0	8	32
5 - 9	7	28
10 - 15	10	40
TOTAL	25	100%

ficant at the 1% level. Further, the relationship between fertilizer and yield was examined and the following regression equations were established:

For the large scale farmers $Yi = 7.12 + 0.12x$

and for the small farmers $Yi = 3.83 + 0.17x$

where Yi = yield in bags per acre

X = cost of fertilizer in shillings

Substituting these two at an expenditure level of 10 shillings, the large farmer would obtain 8.3 bags while the smaller farmer would obtain 5.5 bags. This is probably because the larger farmers use better quality seed and better cultural practices than the smaller farmers. At 50 shillings expenditure the larger farmer would achieve a yield level of 13.12 bags while the smaller farmer would achieve 12.33 bags per acre. This shows the rapid compensation that fertilizer makes over poor seed and cultural practices.

The above relationships are based on the value of fertilizer application and not the type and nutrient content of the fertilizers. This is however, felt not to be a hindrance because the price of

fertilizer is always based on the nutrient content. Too much weight, however, should not be laid on these relationships firstly because of the sample size and secondly because there was no way of controlling the other variables.

Below are shown the results of field trials in which the types of fertilizer was tested while all the other factors were held constant.

TABLE 15

RESULTS OF SEVEN FERTILIZER DEMONSTRATION TRIALS ON SUNFLOWER IN KAKAMEGA DISTRICT, KENYA, 1972

Treatment NPK	0-0-0	0-40-0	40-40-0
Average yield kg/ha	839	1173	1621
Increase over control		334	782
Value of increase		209/-	489/-
Cost of Fertilizer		64/-	144/-
Net profit		145/-	345/-
Value/cost ratio		3.3	3.4

Source: Ministry of Agriculture/FAO Fertilizer Programme Report # 4 1972 (34).

TABLE 16

RESULTS OF TWO FERTILIZER DEMONSTRATION TRIALS ON SUNFLOWER IN WEST POKOT DISTRICT, KENYA, 1972

Treatment NPK	0-0-0	0-40-0	40-40-0
Average yield kg/ha	1026	1466	1745
Increase over control kg/ha		440	719
Value of increase		275/=	449/=
Cost of fertilizer		64/=	144/=
Net Profit		211/=	305/=

Source: As Table 15

The two trials were set out for demonstrations on small farms and farmers plots were used. The two tables show that an expenditure of 64/= per acre can bring about a profit of between 145/= and 211/= shillings, whereas an expanditure of 144/= can bring about a profit of between 305/= and 345/= per hectare. The two tables also show the importance of using a combination of nitrogeneous and phosphatic fertilizers. Many farmers tended to use phosphatic fertilizers probably because phosphatics are generally cheaper than nitrogeneous fertilizers. However, even phosphatic alone gave good results in the two trials.

It may be useful at this stage to see what the effect would be if the farmers in our sample used the same value of fertilizer as the one used in the trials. Using our regression equations the small farmers would obtain a profit of 132 shillings while the larger farmers would obtain 135 shillings profit per hectare at an input level of 64 shillings, using average yields. This still shows a short fall of at least 13 shillings using the minimum profit value of 145/= from the two tables (maximum is 211/=), which shows that the answer for low yields is to be looked for elsewhere apart from fertilizer alone.

The effect of yields on gross margins is considerably greater than that of fertilizers. In Appendix table 7, the effects of these two variables on the gross margins are examined, and that of yields comes out as the greater of the two. A variable cost of production of 215/= (from our sample less gunny sacks) was used to show the gross margin at various price and yield combinations.

The importance of yield in determining the level of gross margins is clearly shown here. At 3 bags per acre, even the price of 32 shillings per bag still shows a negative gross margin. As one moves

towards the right, that is as one attains higher yields, the increase in gross margin is far greater than when one moves up along the price line. To illustrate the point, at a price of 32 shillings per bag, the gross margin between 3 and 15 bags per acre changes by 384 shillings (i.e from 119 to 265). At fifteen bags i.e the highest yield level, the gross margin between the lowest and highest price changes by 240 shillings (i.e from 265 to 25), thus showing the great importance of yield levels in affecting gross margins.

Other Inputs

Labour and seed inputs could affect the yields of sunflower depending on the rate of seeding in the case of seed and the timing in the case of labour. Weeding labour input was compared between the small and large scale farmers. The mean labour input per acre for the small farmers was 5.2 man days while for the large farmers it was 6 man days per acre. Thus coefficients of variation were 35% and 24% respectively for the large and small scale farmers respectively. Labour input, if not well timed can affect yields. In all cases, weeding was done between three and four

weeks after germination. In our view, this is good timing in weeding, and compares favourably with field tests carried out on the Nairobi University Farm which show that weeding at 4 weeks after germination is favourable (35). In all cases, weeding was done only once and this has no adverse effect because after the initial weeding, sunflower shades out other weeds because of its tallness.

Seed inputs were also compared between the large and small scale farmers. On the whole, the large farmers incurred greater costs for seed than the small farmers. The mean seed cost for the large farmers was 11.20 shillings with a standard deviation of 3.1 while for the smaller farmers the mean cost was 3.50 shillings per acre with a standard deviation of 2.5. This apparent disparity is accounted for by the fact that, whereas the large farmers used dressed, certified seed, the smaller farmers used in the majority of cases seed carried over from previous seasons. Quantity wise, the large farmers used about 3 kilogrammes per acre while the smaller farmers used about 4 kilogrammes per acre.

In this case, it appears that the quantities of

seed used by the two types of farmers did not differ significantly, but the difference was in the quality. Although the germination rates of dressed and undressed seed have not been tested, it is reasonable to assume that dressed seed would germinate better than undressed seed. To compensate for the poor germination, the smaller farmer had to use more seed. Looking at the cost of the seed, it appears that the smaller farmer is not very willing to invest in expensive, seed but uses slightly more seed weight for weight than the larger growers. This is probably tied to the lower profit margin that the smaller farmer gets, and the question of risks. The smaller farmer probably would rather use inferior seed which involves no cash outlay rather than buy expensive seed which alone may not significantly improve his yields.

Planting dates

Optimum planting dates depend on the type of varieties planted. For late maturing varieties such as Kenya White and Grey Striped which take about 5½ months, optimum planting dates are in June. For early maturity varieties such as Hungarian White, Comet and Black which take 4½ months, optimum planting dates are in July. These dates are given for

"normal" seasons only and do not take into consideration seasonal variations. A sunflower crop could be planted two months after the normally recommended time and yet be within the "optimum" for that particular season. Three of the fifty farmers considered planted in June, thirty two in July and thirteen in August while two could not remember their planting dates.

All the farmers interviewed gave preference in land preparation and planting to the maize crop. Sunflower is planted only after the maize crop has been planted or when it is too late to plant maize. Seed maize and commercial maize are more profitable enterprises than sunflower as shall be seen later and this explains the reason for the preference given to these two crops. When considering the types of varieties planted by farmers for the 1973 season, and taking into consideration the fact that the rains were about two weeks late, then only twenty two of the fifty farmers or approximately 45% were within the optimum planting dates. There was no case of early planting, and the latest was six weeks. 50% of the farmers planted between three and four weeks late.

Below are shown the results of trials on the effect of planting dates on yields:

TABLE 17

EFFECT OF PLANTING DATES ON YIELD CARRIED OUT IN UASIN GISH DISTRICT, KENYA, 1966

DATE	YIELD (lbs/ac)	
June 4th	875	
June 26th	794	
July 17th	468	L.S.D. 5% 204
August 7th	212	1% 278
		c.v. 23%

Source: E.A. Weiss (36).

The table shows that June is the best month for planting, but as said earlier sunflower is never given this much priority. Early planting enables sunflower to take advantage of good moisture conditions facilitating early vegetative growth. Early planting, however, has to be balanced against the need for abundant sunshine during ripening time to facilitate maturation and drying of the head.

Lodging

Lodging is a common problem with sunflowers especially with the tall local varieties. The tall characteristic makes sunflower particularly suscep-

tible to wind and hailstrom damage. This also militates against heavy fertilization which tends to make plants top heavy and easy to blow over.

Estimates by farmers of reduced yield due to lodging ran between 5% and 10% in an average year, but during a bad year it can be as high as 60%. A fallen plant receives little sunshine, is eaten by field rats or mice and ends with a rotten head due to contact with moist ground. Fallen plants end up with small or no heads at all because the donductive tissue is broken. Fallen plants are difficult to harvest and impede the growth and harvesting of other normal plants, all of which have the effect of lowering yields.

Lodging was not a common problem or complaint to many farmers, and this was not unexpected due to the low levels of fertilization that are currently maintained. The spread of early maturing varieties, which was generally of a shorter habit also made this problem less severe. However, with greater price incentives, farmers might take their sunflower crop more seriously and plant earlier and fertilize more than before, in a bid to increase yields. This will tend to create heavier plants and any loss due to lodgfng will be more economically

felt. The remedy for this is to breed stronger and shorter varieties, a point that will be discussed under recommendations.

Seed Shattering

Shattering of seed can be a serious problem but can be avoided by harvesting and threshing when the moisture content of the head is just right. Losses due to shattering were estimated by farmers to be about 5% of total seed weight. In extremely bad cases, this loss can be total.

Shattering occurs when the crop is left too long in the field. Evidence of shattering can be seen by the number of volunteers after a sunflower crop. As van Eijnatten (35) has shown with the cultivar "Giant White", shattering of the seed becomes of importance when the moisture content of the basket falls below 80%.

Farmers cut the heads of their sunflower crop and spike them before the heads are quite dry. These are then removed and bagged and threshed after completely drying out. Often, some loss occurs just before the heads are moved from the field, but if the heads are left too long, the whole seed

shatters when touched. If the moisture content is well estimated then this loss can be avoided or minimised. A proper "safe" moisture content needs to be determined for every variety.

Bird damage

Birds do not pose a serious problem in the larger scale areas, or in areas where there are many small growers close to each other. However, where there are small widely scattered plots of sunflower, bird damage can and does reach alarming proportions, usually leading to complete decimation of some plots. It was not possible, to objectively determine the extent of bird damage on any plot but from the number of birds seen converging on sunflower plots this damage must have been considerable.

Birds are very partial to sunflower and many small farmers employ one man full time in order to scare away birds. The problem is akin to that faced by small scale wheat growers. This would raise a problem when the crop is being introduced. Profitability would be greatly reduced and the innovators would be discouraged, and spread or adoption would be nipped in the bud. They would have to grow fairly large stands or many plots

together to avoid loss and to expend labour in scaring away the birds. Early planting, i.e. planting before other farmers would also have to be avoided so that crops would not ripen in isolation, which would give the same result as a lone plot.

The Comparative Profitability of Sunflower

In this section, profitability of sunflower will be compared with those enterprises found along side it in many farms, namely commercial maize, seed maize and dairying. On the large scale farms, sunflower came after dairying, seed maize and commercial maize. On some large farms sunflowers came after dairy cattle and maize, that is, where seed maize was not grown. On the small farms, sunflower was either second after maize or third after dairying and maize.

Table 19 clearly shows the economic inferiority of sunflower as compared to the other enterprises. As was pointed out earlier, the new prices could change this position, making sunflower production more attractive than commercial maize. But taking the former position, the gross margin for sunflower must more than treble in order to

TABLE 18

COSTS, OUTPUT AND MARGINS FOR SEED MAIZE, COMMERCIAL MAIZE, DAIRYING AND SUNFLOWER IN TRANS-NZOIA DISTRICT, KENYA, 1971/72

ENTERPRISE	COSTS (sh per ac)	OUTPUT (sh per ac)	GROSS MARGIN (sh per ac)
Seed maize	522	928	406
Commercial maize	280	400	120
Dairying*	158	478	320
Sunflower**	245	280	45

Source: An Economic Survey of African Owned Large Scale Farms in Trans Nzoia (37).

* Stocking rate at one dairy unit per acre

** As calculated earlier in this study

compete favourably with maize, and of course competing crop prices may also rise.

Early in 1974, new prices for maize were announced which would make maize slightly more lucrative than sunflower. The course of events could now follow the lines discussed earlier on, under crop substitution.

Production of Sunflower: Some case studies

In this section we shall examine the practices of a few farmers and show why we think they are successful in growing sunflower.

Farmer A is about 49 years old and has grown sunflower for 7 years. His farm is 1300 acres and lies 5 miles south of Kitale township. He keeps 250 head of dairy cattle, grows on average about 300 acres annually of commercial maize and 100 acres of seed maize. In 1973, his sunflower acreage was 150 acres. In 1972, he had 170 acres of sunflower and he used the variety "Giant White". In 1973, he switched to the variety "Comet" because it lodges very little and as a consequence the seed does not get stained. Stained seed fetches very little. He grows sunflower principally as an insurance crop against possible poor yields in the maize crop and most important against possible poor maize prices which in his experience is the more frequent occurrence. Normally, he plants his sunflower crop in the middle of June after he has finished planting and weeding for maize. In 1973, he planted his crop at the beginning of July because the rains were a little late. He normally plants his sunflower either on newly broken land

or on land formerly occupied by seed maize. His reason for planting sunflower after seed maize is that sunflower can utilize the residual nutrients in the soil because he uses "a lot of fertilizer on seed maize and this does not get finished". He normally ploughs his fields twice followed by a disc harrowing to get a fairly good seed bed for his sunflower crop. He uses a mechanical planter and sets the machine such that he allows for a distance of 15 inches between plants and 24 inches between rows. At this spacing, he does not have to do any thinning. He weeds his crop between 3 and 4 weeks after germination or at 2 weeks if he thinks the weed growth is too rapid for the crop. He weeds only once. During the growing season, he thinks that lodging poses the greatest problem because yields are lowered and he also gets stained seed which fetches lower prices. He normally attains yields of 12 bags per acre.

Farm B is 4782 acres and is owned and managed by the Agricultural Development Corporation. The farm keeps a herd of 1356 dairying cattle and in 1973 grew 912 acres of commercial maize and 356 acres of seed maize. Sunflower has been grown on the farm for the past four years and is normally

planted in June or July. In 1973 200 acres of the crop were sown on the 26th and 27th of June. Sunflower is always planted in a new field and is always followed by maize. The method of land preparation is by ploughing followed by harrowing which is done twice. Planting is mechanised and a seed rate of 5 kg per acre is used, but later on this crop has to be thinned. Fertilizer is applied direct in the seed bed at a rate of 50 kg per acre. Weeding is done at four weeks after germination, but sometimes this is not necessary if the land is well prepared. The crop is harvested around October when there is fine weather and a lot of sunshine, and the planting date is always chosen with this consideration in mind. Harvesting is by means of a combine harvester, and the seed is either sun dried or occasionally put through the drier. The seed is transported to the market seven miles away either by the farm lorry or the farm tractors.

Farm C is 1300 acres and lies 3 miles south east of Kitale township. It is owned by a cooperative and 300 head of dairy cattle are often kept on the farm, with 200 acres of commercial maize together with abput 50 acres of seed maize. Land is ploughed twice then borrowed once and then planting is done by a planter. The planting date is

greatly influenced by the shortage of tractors but is normally done in June. In 1973, planting was done in early July with a seeding rate of 3.5 kg per acre with a fertilizer application rate 55 kg per acre. Weeding is done at 2 weeks after germination, a stage at which the seedlings can not be bent over or smoothered. The crop is harvested and threshed when the weather is fine. Threshing is done in a special shed with clean bags spread all over the floor in order to avoid staining which would lower the quality and hence the price. The seed is then sun dried. The average yield on the farm over the past three years has been 15 bags per acre.

Farmer D has a small holding of 24 acres in the West Pokot district of Kenya. His holding is 22 miles North West of Kitale, which means that his farm receives a fair amount of rainfall each year as opposed to the rest of the district. In 1973 he had 2 acres of sunflower and 4 acres of maize. He also keeps two zebu cattle and 20 goats. He normally hires oxen to plough his land, and occasionally he hires a tractor from neighbouring large scale farms. Planting is done by hand and he uses his own seed. In 1973 he applied about 15 kg

of fertilizer left over from the maize crop and also some goat manure. Weeding is done at 4 weeks of age, or if in his opinion the crop needs weeding. Harvesting and threshing are by hand, and the farmer sells his produce direct to the Kenya Seed Company at Kitale. Yields in 1972 were 8 bags per acre.

Certain features are common among these farmers. First, the large farmers were very emphatic about early planting, particularly so that ripening coincides with fine weather. Rainy weather during harvesting results in reduced yields due to rotting of seed. Fertilizer application in all cases, even for the small farmer was above average, and so were the yields. Farmer A, however, did not apply fertilizer, but reckoned that this was no handicap because he planted his sunflower crop (and always does) after seed maize in order to utilize the residual fertilizer. Seed maize is well priced, and heavy fertilizer application is still profitable, even when all the nutrients are not used up. The larger farmers were also careful about any factors that would lead to lower quality seed which in turn would fetch lower prices. As such, planting is done so that ripening is at a time of fine dry weather and threshing is done over

bags or mats to avoid staining of the seed. Varieties which lodge very little such as "Comet" and "Hungarian White" were also accordingly selected for this reason. White seeded varieties are also better priced than the black seeded types. Farmer A tries to reduce his variable costs by sowing sunflower in a field previously occupied by seed maize. On farm B, cost is reduced by better land preparation on new fields so that later on there would be little or no subsequent weeding. Whereas efforts are made to reduce the variable costs, fertilizer application is not sacrifised. Even farmer A makes up for it in his own way.

In conclusion, the important factors are the choice of suitable varieties, proper land preparation, early and well timed planting and adequate fertilizer application. Cost is minimised either by avoiding weeding by proper land preparation or by spacing in which thinning is later avoided. The method of threshing to avoid broken and stained seed is also of importance to obtain good quality and high prices.

CHAPTER 4

THE MARKETING OF SUNFLOWER IN KENYA

Relationships Between Marketing and Economic Development

An efficient marketing system has been described by Mosher (38) as one of the essentials for modernising agriculture. An efficient marketing system obviates the need for self sufficiency and encourages specialization. The extent of specialization depends on exchange; exchange in turn depends on the performance of marketing efficiency. Specialization also enables consumers to choose from a wide range of goods and does not expose the community of consumers to natural hazards which might wipe out a particular basic commodity. Where no proper marketing channels are not well developed, monopolies and wide fluctuations in prices are possible. Fluctuations occur due to different quantities of commodities offered for sale.

An efficient marketing system facilities exchange which in turn permits specialization and economics of scale which make possible reduction in costs. In underdeveloped economies, agricultural marketing is a simple affair, in developed economies specialization and intensification of

marketing services arises in order to serve for non-agricultural populations and to exploit export markets.

The basic importance of marketing lies in the fact that it links sellers and buyers and hence stimulates output and consumption, the essentials for economic development. Better marketing can be an aid to increasing farm output by reducing marketing margins, therefore, raising farm incomes and increasing effective demand for farm products. In providing an efficient link between consumers and producers, the marketing system must function smoothly to reflect back to the producer the needs of the consumer, provide the machinery, facilities and practices required and provide the necessary incentives to get the farm to produce for the market. The channels must also undertake the actual physical movement of produce from the point of production and to store the product in the form desired by the consumer.

Marketing Channels

The marketing of sunflower in Kenya, like that of many other crops is under the control of a statutory body, in this case the Maize and Produce Board.

In Trans Nzoia district, the only district in Kenya where sunflower is grown on a large scale, the Kenya Seed Company, a private concern operates at a concession from the Maize and Produce Board. The agents for Maize and Produce Board are the Kenya Farms' Association.

In Trans Nzoia district, most of the large scale farmers sell direct to the Kenya Seed Company, with only a handful selling to the Kenya Farms Association. The Kenya Seed Company, (hereafter referred to as the Company) have their own processing and packing plant situated at Kitale. The processing in this case is simply the separation into different grades and cleaning, and dressing seed from particular growers which is then sold to farmers for planting. The top qualities of seed are exported by this same company as bird feed mainly to the Netherlands, the United Kingdom, West Germany and the United States of America. Other important importing countries are Belgium, Baharain, Italy, Sweden, France, Canada and Denmark. The rejects and poor quality seed is sold to local oil seed crushers.

The Kenya Seed Company make initial payments and later on pay pool payment on consignments of more than 50 bags. The pool payment is that addi-

tional payment which is made after the initial payment. The final payment is dependent on variety and is made after the quality is assessed. Delivery to the Company is made only after a permit has been issued by the Company office. This permit is issued after the seller has satisfied several conditions, the most important of which is the moisture content of the crop. Badly discoloured or unwinnowed sunflower seed receives low prices.

The smaller scale farmers have different marketing channels for their produce. Those near Kitale sell direct to the company but do not participate in the pool system. Others further afield sell to their cooperative societies which in turn sell to the Company or to the Kenya Farmers' Association, or their agents. The majority of small scale farmers, however, sell to the KFA or their agents. Small farmers of course sell in small quantities unlike their large scale counterparts.

The KFA, who are the agents for the Maize and Produce Board accept small quantities from farmers in second hand gunny sacks, whose cost is supposed to be refundable to the farmer. This, however is not always the case. In small buying posts, shop-

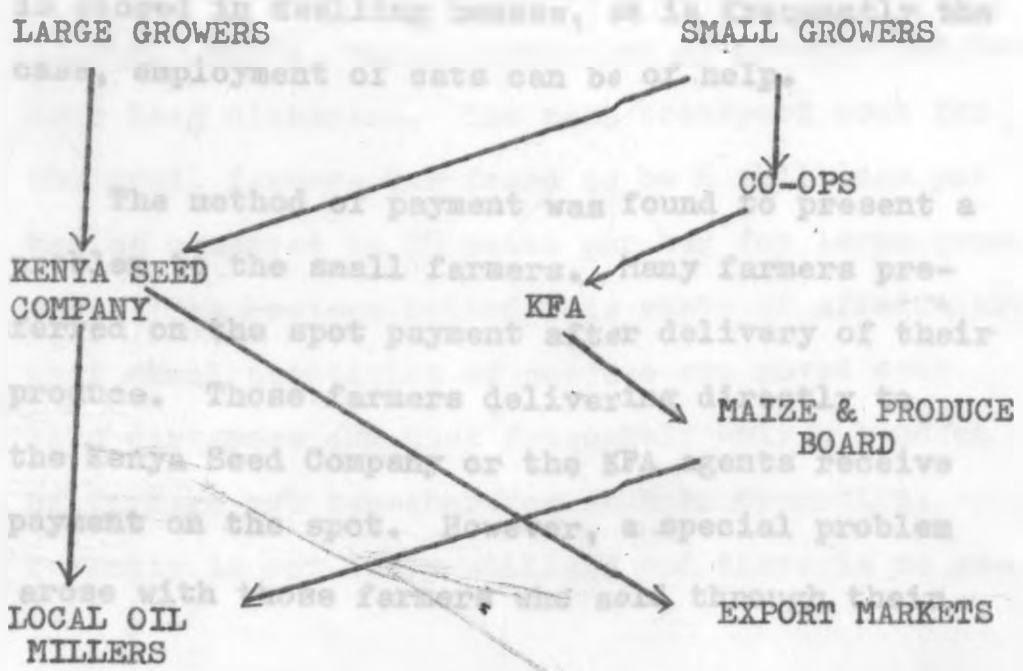
keepers are appointed as agents and this has its own limitations.

All exportation of sunflower seed from Kenya is handled by the Kenya Seed Company. This Company over the years has built up a reputation for its sunflower seed in the importing countries and Kenya seed sells at a premium there. Seed export from Kenya is solely for bird feeding.

Below is a diagrammatic presentation of the marketing channels for sunflower in Kenya.

DIAGRAM 1

MARKETING CHANNELS FOR SUNFLOWER IN KENYA
1973



Problems in the Marketing Chain

Storage and Payments

The problem of storage was examined both at the farm and collection level and was found to be of different magnitudes. At the farm level the problem was more of quality than capacity. Losses due to fungal decay or pests were reported but were found to be mainly minimal due to the short duration of storage. Sunflower is sold off as soon as it is sufficiently dry. Estimates of losses ranged between one and three per cent by farmers themselves. Whereas it was not possible to objectively assess the actual loss, it was felt that these losses can be prevented by proper drying of the seed and storage under dry conditions and any elementary rat proofing methods of storage sheds. Where produce is stored in dwelling houses, as is frequently the case, employment of cats can be of help.

The method of payment was found to present a problem to the small farmers. Many farmers preferred on the spot payment after delivery of their produce. Those farmers delivering directly to the Kenya Seed Company or the KFA agents receive payment on the spot. However, a special problem arose with those farmers who sold through their

cooperative societies. Many of these societies are usually short of funds and have to wait until the sale of their produce before they can pay their farmers. Disposal of produce was delayed in five of the eight cooperatives investigated because of lack of funds to hire transport. This led to losses during storage discussed above and created risks and higher costs that led to lower prices to farmers than where alternative marketing channels were employed. This also had the effect of pushing farmers into the hands of speculators who were able to pay on the spot at lower prices but then resold at higher prices elsewhere. This of course lowered prices unduly and discouraged production.

Transport

Transport costs are very high for the small farmer. Often, small quantities of produce are moved over long distances. The mean transport cost for the small farmers was found to be 6 shillings per bag as compared to 75 cents per bag for large growers. The reasons behind this state of affairs are that small quantities of produce are moved over long distances and that frequently only a handful of farmers get together for such an operation. Capacity is not fully utilized and there is no re-

turn load and as such the total cost has got to be met from the produce thus transferred. In addition to this, transport is not readily available for the smaller growers as compared to the bigger grower who frequently use farm tractors or have their own lorries. Many small growers rely on human transport or use bicycles. As said earlier, where human transport was used, the costing was done at the same rate as any other labour in the particular district.

The table next page, shows the frequency distribution of farmers' distances from their nearest buying centre.

Buyers and their practices

The nature of production in the small growing areas tends to give rise to correspondingly poor marketing practices. Deliveries to buyers is uneven and in very small lots which had to be repacked again. For small farmers 40 kilogramme bags are accepted, but many farmers will actually deliver in portions of this quantity. Many agents in small centres are shopkeepers and perhaps to make up for the effort of repacking or in order to increase their profit margins or both, tended not to reflect prices

TABLE 19

FREQUENCY DISTRIBUTION OF FARMERS DISTANCES FROM THE NEAREST BUYING CENTRE IN WEST POKOT, TRANS-NZOIA AND BUNGOMA DISTRICTS, KENYA, 1973

DISTANCE IN MILES	LARGE FARMERS	SMALL FARMERS
1 - 5	8	0
6 - 10	8	3
11 - 15	7	8
16 - 20	2	9
21 - 25	0	2
Over 26	0	3
MEAN DISTANCE (mls)	8.55	17.12

fairly down the line. Due to the fact that sunflower is a minor line in shopkeeping sellers of sunflower would not receive priority and sometimes would find the buying places closed. Due to the high transport costs, farmers of course would be reluctant to send their produce back to the farm and in fact would only be too glad to sell off their produce even at a somewhat lower price. The extent to which this practice went on was hard to verify, but it was a general complaint by many small farmers. This is attributable to the fact that only

one agent was available at a particular place and had therefore virtual monopoly of the buying. As was said earlier, this would lead farmers to sell to speculators who would buy at a lower and and resell at a higher price. A solution to this would of course be to increase the number of buyers and stricter control in marketing.

Processing of Sunflowerseed for Oil in Kenya

This is outside the scope of this study and we will only mention the location of these plants. There are five factories in Kenya capable of processing sunflower, in addition to the new proposed one. None of these is exclusively devoted to the extration of sunflower, and any one of them will accept any available oil seed. One plant situated at Mombasa deals predominantly with coconut processing and imports from Tanzania to augument locally available supplies. The others are based in Nairobi, Nakuru and Kisumu. The major vegetable oil raw materials in Kenya are cotton seed and sunflowerseed oil, and to some extent groundnuts. Cotton seed is a by product of cotton production for fibre, while groundnuts are primarily for confectionery purposes.

Most of the sunflowerseed grown in Kenya is

processed in Nakuru. The Kenya Seed Company sells its inferior quality seed to a processing plant in Nakuru while the Maize and Produce Board sells to the oil millers throughout the country. No sunflowerseed milling concern is in the major growing areas.

Demand for Vegetable Fats and Oils in Kenya

The analysis of the demand for sunflower and its products are inevitably linked with the analysis of edible vegetable fats and oils because this is the basic use to which sunflower is put. Other uses, for example that of the cake for feedstuffs will not be given much attention because this is a by product of the mother industry-oil processing.

The analysis is fairly simplistic and published data is used. It was not possible to conduct household surveys to determine the extent of local consumption; neither was it possible to determine the extent of domestic production over the years of all types of vegetable oils in Kenya due to lack of proper documentation. For this reason, the available information on the extent of external trade does not indicate whether the fluctuations in imports are due to fluctuations in local production

or are triggered off by consumer behaviour. In some years for example, imports decrease by as much as 48% in quantity while in other years imports increase by the same percentage. Despite these weaknesses in available information several factors emerge clearly and are discussed.

The relationship between income and per capita consumption of edible fats and oils for food purpose was discussed under the "problem" in chapter 2. However, it can be added that current increases of vegetable oils in the world are ahead of increase in world population. Per capita consumption of edible fats and oils for the world stands at about 10.5 kg but this figure masks great variation in consumption from region to region and from country to country as was indicated in tables 7 and 8.

It is now appropriate to assess the present position of the fats and oils industry in Kenya. In Kenya, an examination of published data shows that the highest import are is that of fats and fat raw materials, followed by oils and oils raw materials. The oil raw materials are mainly cottonseed and palm kernels. For edible oils and their raw materials, the imports are mainly from Uganda and Tanzania. The soap and soap raw materials are imported from

countries outside East Africa.

On the oilseeds side, Kenya imports about three thousand tons of copra from Tanzania and about one hundred and fifty tons of soyabeans from Uganda. Kenya produces five hundred tons of sesameseed and imports about two hundred tons from Uganda and Tanzania. Kenya imports from Uganda and Tanzania about three thousand tons of vegetable ghee and some quantities of margarine and hydrogenated fats and oils. The most important oil is palm oil of which Kenya imports an average of fifteen thousand tons annually.

The above discussion is based on a perusal of East African Customs and Excise Annual Trade Reports and the Kenya Statistical Abstracts from the years 1960 to 1972. Between the years 1961 and 1969, imports grew at an average rate of 16.2% annually, and ranged from minus 48% to 40%. The reasons for this are not clear; they could be due to changes in local supplies, increased demand or due to government policy. However, this average annual growth rate is fairly within the expected rate taking into consideration an annual growth rate of the economy of 6% and a 3% population growth and an income elasticity of 0.8. Table 17 shows the elasticities and consumption per head in Kenya for selected commodities.

TABLE 20

CONSUMPTION PER CAPITA AND INCOME ELASTICITIES FOR SELECTED COMMODITIES IN KENYA 1961-1963

ITEM	ELASTICITY	CONSUMPTION PER CAPITA (kg/yr)
Fats and Oils	0.76	3.2
Vegetable oils	0.8	1.8
Butter	1.0	0.4
Others	0.6	1

Source: FAO Commodity Projections 1975-1985 (38)

The change in total demand can be obtained by multiplying the elasticity of demand by the change in incomes and the change in population. For example taking the case of vegetable oils we obtain.

Change in total demand = Quantity Elasticity x Change in income x Change in Population.

Taking the appropriate quantities and values and using an average growth rate of the economy of 6% at 1964 prices and an annual change in population of 3%, it comes out that all other things being equal, the demand for vegetable fats and oils should grow at an annual rate of 14.4%. The average growth in

imports between 1961 and 1969 was 16.2% which is well within the projected rate. Taking the present importation of roughly fifteen thousand tons for edible purposes, then the demand is likely to grow by about three thousand metric tons per annum. It is clear that at present the present production of sunflower just barely manages to cover the growth rate, and even then not all of Kenya's sunflower goes towards oil production.

Sunflower Marketing and Income Transfers

This section should be taken to represent the effect of growing and marketing of all oilseeds, including sunflower which can grow in the marginal areas. Sunflower will only be used as an example.

The relationship between consumption of edible fats and oils shows that higher income groups spend more on edible fats and oils, and this relationship holds at all levels of incomes, but changes more slowly at high incomes. The implication is that sunflower can serve, in part, in the redistribution of incomes provided that such policies may be drawn up and implemented to achieve the desired goals, several factors need to be known. For example, it needs to be established as to what extent the urban and rural poor communities consume edible fats and

oils. Most important it needs to be known who at present are the major growers of sunflower and the position of their incomes compared to the rest of the population. At present in the Trans Nzoia district, large scale farmers grow sunflower in fairly large acreages and with economic incentives could expand production fairly rapidly. These farmers are already very well of, and compare favourably with urban elite; in fact they are the rural elite.

The major significance of sunflower as far as income redistribution lies in the fact that it can be grown with good results in the marginal areas. Again sunflower does not have high investment costs and this would find favour with small farmers who are in many cases undercapitalised. In the rural areas and more so in the marginal areas the people who live there have little or no means of living. This in essence means that the opportunity cost of their labour is very low. A crop or any enterprise for that matter that requires little capital outlay would be very attractive indeed because the major input would be labour. Sunflower is such a crop and is not hampered by the serious diseases or pests. Some parts of the Eastern, Rift Valley and

Coast Provinces of Kenya receive enough rainfall for a reasonable crop of sunflower but do not raise a good maize crop. A district like Machakos is a case in point. With the development of hybrid varieties of sunflower, this area can be extended further afield. The incomes derived from such a crop would be used for provision of services such as health and education. Small farmers in the high potential areas should welcome an additional crop. In the highly populated areas of the country, the opportunity cost for labour is also low and would find gainful utilization in sunflower growing.

CHAPTER 5

SUMMARY OF FINDINGS AND RECOMMENDATIONS

The national production of sunflower in Kenya is about 5000 metric tons annually, grown on about 10,000 hectares. The major producing districts are Trans Nzoia, Bungoma and Kakamega with West Pokot and Uasin Gishu as lesser producers. Potential areas of production include all maize growing areas, with the possibility of some areas which are risky for maize production because of limited rainfall.

Given the prices prevailing in the middle of 1973, the profit margins for sunflower were generally low mainly due to low yields. For this reason, sunflower was found to be a relatively unprofitable crop and can only be expected to start replacing maize in marginal areas where maize yields are considerably below average. New prices were announced for both maize and sunflower shortly before this study was concluded and it is not known what effect this change in prices will have on future production. These prices have made sunflower a more lucrative crop and it is possible that this may raise the production of the crop. For the smaller growers, transport costs are very high and further reduce

profit margins, and if the costs become lower, production could increase rapidly.

The major cause of the low profitability in sunflower is the low level of yields which in turn can be attributed to the low input in fertilizers. This study's results show that profitable sunflower production depends on raising the level of yields. To obtain higher yields, the results further indicate that farmers must increase their expenditure on fertilizers and make substantial improvement in their management in order to obtain higher yields from existing expenditures.

Demand for vegetable oils in Kenya is likely to grow at a rate of about 3000 metric tons per annum or 14% of the current level of imports of vegetable oils for all purposes. This assessment, based on imports, was felt to be inadequate because it does not take into consideration domestic production which could not be assessed due to lack of proper documentation. Sunflower is likely to be expanded for edible purposes and will partly replace cotton seed, the present major source. Cotton seed, being a by product of lint production has its own supply problems, in addition, Kenya's traditional sources of cotton seed namely Uganda and Tanzania

have drastically reduced their exports to Kenya because of rising demand in their respective countries.

The present sunflower industry in Kenya is based largely on seed production for bird feeding, for which local large seeded varieties are well suited. This is however a narrow market which may not allow much expansion. In order that the sunflower industry in Kenya is expanded for oil production purposes, efforts should be directed towards the selection and breeding of high oil bearing varieties. Initially, trial of varieties grown in other countries should be given priority rather than experimenting solely with local varieties. Those varieties found suitable should be released as soon as possible. The long term goal, however, is to breed high oil bearing varieties suited to local conditions. Breeding and experimentation should take cognizance of local climatic and edaphic variations. Related to this aspect of high oil yielding varieties is the need to develop high yielding varieties. These two goals may or may not conflict.

It is important to keep in mind that sunflower is more drought resistant than maize. Further

effort should be directed towards increasing this drought resistant characteristic so that sunflower production can extend still further into the dry areas. This calls for research into the water utilization of the crop and a good knowledge of local rainfall variation so that suitable varieties should be developed for each ecological zone. Varieties should be tested in each zone for maturity, yield and other related characteristics.

Many areas of Kenya receive rainfall for only a few weeks in a year. Early maturing varieties which attain maximum vegetative and germinative growth should be developed in order to take advantage of short rainy seasons. Shorter varieties have the advantage of being amenable to mechanical harvesting and this should also receive consideration because of the added advantage of being even more drought resistant due to smaller leaf surfaces. Although mechanical harvesting may not be an important consideration for the small farmer, it is of importance to the larger grower, and reducing the tall habit of sunflower should be included in the research priorities. This would also overcome lodging and permit more fertilizer application and hence higher yields. This point of raising yields

must be central in all breeding and research because it is the only way together with satisfactory pricing that profitability can be increased.

The adaptability of sunflower to farming systems needs to be investigated. Such effects as labour utilisation and demand, the effect of resource allocation at the farm level and all other related aspects need to be examined. The work to be done is substantial and needs considerable outlay of capital and personnel which should be justified due to the important position this crop is likely to assume at the national level. All important crops in Kenya are based on sound research and marketing personnel. Cases in point are maize, research for which is undertaken at several research stations and also crops like coffee, tea, wheat and pyrethrum. All of these crops have shown tremendous improvement over the years because they have been supported by qualified personnel. At present, only a handful of scientists at the University and government research stations are working on sunflower improvement and they can not adequately tackle all there is to be done. Greater efforts in terms of personnel and funds need to be directed towards a national oil crop, giving priority to sunflower which at the moment looks

most promising.

The present pricing system for sunflower is based on different varieties and the prices they fetch on the international market for bird feeding. This is well and good for the present sunflower industry which is based on bird feeding. But once oil production assumes more importance then the logical step is to base pricing on oil content. The higher oil yielding varieties should receive higher prices, which would encourage their spread and adoption by farmers. This would also encourage more efficient production since, on adopting higher oil bearing varieties, the oil production per hectare would be higher.

Even larger incomes for large growers may have little re-distributive effect since many of these growers are already fairly well off. These larger growers are more likely to increase their acreages quicker than the small growers and hence add to their affluence which would make the gap between them and the smaller garmers wider. This of course raises the question of how income transfers can be chanelled towards desired directions. Clearly, one does not wish to force a group of farmers to produce or not to produce a certain

commodity, and the question of subsidies to the smaller farmers might not be feasible. The more acceptable alternative would be a very intensive campaign to encourage sunflower growing among the smaller farmers. This promotional drive should be applied selectively in the areas suited to sunflower and particularly in the marginal areas with few or no alternative cash earning enterprises. With the new announcement on prices, such a campaign would have a good chance of success since it would be easy to demonstrate profitability.

With reference to marketing, institutionalized marketing may not be the best arrangement when trying to promote a crop, unless such an institution is involved in the processing or final disposal of the crop. In the present case, the Maize and Produce Board neither processes nor exports sunflower and is an unnecessary middleman in the marketing chain. With the setting up of a sunflower processing factory in Kenya, it is felt that a closer contact between the growers and the processors would lead to faster spread of the crop. The factory would also be assured of a steady supply of seed and would be in a position to offer higher prices than government institutions which would still need to cover

their costs. The danger inherent in a system of processors working directly with growers is that the processors might concentrate their efforts on a few growers, probably the larger once in a bid to cut down costs and this would defeat the income transfer goals. But it is believed that given proper guidelines, flexible marketing systems would lead to a faster spread of sunflower than rigid beuracratic institutions.

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APPENDIX 1

EMPLOYMENT GENERATION AND POPULATION SUPPORTING CAPACITY AND PROGRAMME COSTS OF VARIOUS AGRICULTURAL PROGRAMMES IN KENYA

PROGRAMME	EMPLOYED PERSONS PER 1000 HECTARES	SUPPORTED PERSONS PER 1000 HECTARES	COST PER HECTARE (SH.)
Modernisation of traditional Agriculture	1072	2906	100
Subdivision Settlement	319	562	1000
Irrigation development	2807	4529	7160
Transfer of farms intact	116	na	760

Source: Odero-Ogwel, FAO, Rome

APPENDIX TABLE 2

VALUE AND PERCENTAGE SHARE OF KENYA'S PRINCIPAL EXPORT COMMODITIES IN 1970

COMMODITY	VALUE IN K£ 000	PERCENTAGE TOTAL
Coffee, not roasted	22259	31.1
Tea	12704	17.7
Sisal fibre and ton	1865	2.6
Meat and Meat preparations	2853	4.0
Pyrethrum flower extract	2162	3.0
Hides, skins, fur & undressed skins	1653	2.3
Wattle bark and wattle extract	28	1.6
Pineapples, tinned	669	0.9
Cotton, raw	1226	1.7
Wool, raw	373	0.5
Cashew nuts	1588	0.2
Beans, peas & lentils	512	0.7
Oilseeds, oil nuts & kernels	527	0.7
Butter and ghee	234	0.3
Maize, unmilled	4	-
Other	8771	14.0

Source: Statistical Abstract, Kenya, 1971

APPENDIX TABLE 3

QUANTITIES AND VALUES OF SUNFLOWER SEED EXPORTS FROM KENYA, 1961 to 1972

YEAR	QUANTITY (TONS)	VALUE K£
1961	1577	53232
1962	9356	39953
1963	1112	55297
1964	1212	53149
1965	1361	68441
1966	1088	63796
1967	1201	81848
1968	2697	137678
1969	2024	88094
1970	3164	156366
1971	2458	134673
1972	1978	113799

Source: East African Customs and Excise, Annual Trade Reports.

APPENDIX TABLE 4

EXPORTS OF OIL SEEDS AND OIL NUTS AND KERNELS

FROM KENYA 1961 - 1970

YEAR	QUANTITY (M TONS)	VALUE K£
1961	7076	407000
1962	6996	324000
1963	13140	657000
1964	9782	460000
1965	8580	449000
1966	9743	506000
1967	7072	371000
1968	9959	638000
1969	6924	350000
1970	803	527000

Source: Statistical Abstract, Kenya, 1971

APPENDIX TABLE 5

RANGES IN COSTS OF PRODUCTION PER ACRE OF SUN-FLOWER ON LARGE SCALE FARMS

ITEM	RANGE (sh. per acre)
Seed	6 - 10
Fertilizer	15 - 60
Weeding	15 - 40
Harvesting	15 - 20
Drying	10 - 15
Gunnies	27 - 42

APPENDIX TABLE 6

RANGES IN COSTS OF PRODUCTION PER ACRE OF SUN-FLOWER ON SMALL SCALE FARMS

ITEM	COST IN SHILLINGS
Seed bed preparation	7.00 - 8.00
Seed	2.10 - 4.90
Fertilizer	0 - 15.00
Weeding	7.00 - 15.00
Transport	16.00 - 32.00

APPENDIX TABLE 7

CALCULATED GROSS MARGINS PER ACRE OF SUNFLOWER AT DIFFERENT PRICE AND YIELD LEVELS

Price per bag in Shillings	GROSS MARGIN IN SHS PER ACRE				
	3 BAGS	6 BAGS	9 BAGS	12 BAGS	15 BAGS
32	-119	-23	73	169	265
28	-113	-47	37	121	205
24	-143	-71	1	73	145
20	-155	-95	-35	25	85
16	-167	-119	-71	-23	25

APPENDIX TABLE 8

SOME CHARACTERISTICS OF SUNFLOWER VARIETIES IN KENYA

VARIETY	Days to flower	Days to Harvest	Height of head (cm)	Potential Yield kg/ha	Potential Yield lbs/ac
Kenya White	78	160	360	1800	1600
Hungarian White	82	129	235	2000	1780
Grey Stripe	77	160	345	1800	1600
Dark Stripe	82	122	180	1600	1420
Comet	82	140	250	1700	1510
Black	87	129	240	1500	1340

Source: Kenya Seed Company, Kitale, Kenya, 1973

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APPENDIX TABLE 9

QUANTITIES OF SELECTED IMPORTS OF OILS, CAKES, ETC. INTO KENYA 1960-1964 (METRIC TONS)

ITEM	1960	1961	1962	1963	1964
Oilseeds, oilseeds & Other vegetable residues	2941	2550	4526	5575	2408
Margarine & Shortenings	355	1192	918	646	281
Oils from fish & Other marine sources	2782	5273	13316	7839	468
Animal oils, fats & greases	33372	44619	48485	42251	69826
Linseed oil	358	751	1029	1176	1768
Soya bean oil	-	263	23	-	-
Groundnut oil	11	1.3	21	47	59
Olive oil	286	271	259	194	399
Palm oil	4907	29551	2480	28948	27261
Coconut oil	11396	11255	26146	4106	4281
Palm kernel oil	1172	405	546	250	718
Castor oil	215	232	661	846	372
Oils from seeds, nuts & kernels	104	149	160	202	-
Oxidized, blown or boiled oils	810	781	852	1008	498
Hydrogenated fats & oils	1672	4063	11161	5206	-
Acid & fatty acids	7221	7294	7532	7590	15486
Others	31	46	54	46	37
TOTAL	67708	109106	118165	105929	123860

Source: East African Customs and Excise - Annual Trade Reports 1960 - 1964.

APPENDIX TABLE 10

QUANTITIES OF SELECTED IMPORTS OF OILS, SEED, CAKES, ETC.-

INTO KENYA 1965 - 1970 (METRIC TONS)

ITEM	1965	1966	1967	1968	1969	1970
Oilseeds, oilcakes + other vegetable residues	104	1693	1028	2211	-	2309
Margarine + Shortenings	15	9	478	981	772	455
Oils from fish & other marine sources	6331	340	641	786	1093	6649
Animal oils, fats & greases	77205	48016	35261	5478	8472	84609
Linseed oil	2717	1862	1808	3590	3424	2679
Soya bean oil	1494	2828	62	5376	35700	6713
Groundnut oil	6	95	25	91	67	-
Olive oil	174	341	284	412	317	255
Palm oil	47040	44413	21606	62836	121128	77824
Coconut oil	16019	31473	15453	4585	9070	63158
Palm kernel oil	454	719	3486	466	468	971
Castor	449	481	386	456	444	581
Oils from seeds, nuts + kernels	-	416	398	496	523	995
Oxidized, blown or boiled oils	296	452	1120	613	1309	356
Hydrogenated fats + oils	21	436	6	38	16	-
Acid & fatty acids	27984	11744	21199	24905	24423	30532
Others	22	1001	-	2008	11814	-
TOTAL	180302	145417	103238	115228	294938	278084

Source: East African Customs & Excise - Annual Trade Reports 1965 - 1970.