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FERTILIZER AND SEEDS DEMAND
IN KENYA FROM 1982/83 TO 1990/91

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Abstract

The paper discusses fertilizer use and demand while taking into account nutrient requirements, variation in application rates by districts and marginal returns to fertilizer use.

The paper also addresses the problem of availability and cost of fertilizers and seeds in the rural districts of Kisii and Nyeri. It also examines the margins in the distribution of fertilizer and seeds.

In addition, the paper discusses policy alternatives to promote fertilizer use and to ascertain adequate seed availability for the most important crops.

Table of Contents

	Page No.
1. Introduction	1
2. Objectives of the Paper	2
3. Main Findings	2
3.1 Fertilizer Use by Crop and Farm Size	2
3.2 The Gap Between Present and Recommended A Application Rates by Crop	4
3.3 Regional Variation in Application Rates	5
3.4 Import Requirements from 1982/83 to 1990/91	6
3.5 Returns to Fertilizer Use by Crop	7
3.6 Availability of Fertilizers	8
3.7 Availability of Seeds	10
3.8 Margins in Seed and Fertilizer Distribution	12
4. Policy Implications	14
5. Bibliography and Data Sources	16
6. Tables	20

LIST OF TABLES

Page

1. Estimates of Fertilizer Use by Crop and Farm Size for Financial Year 1st July 1982 - 30th June 1983
2. Estimates of Nutrient Use by Crop for 1982/83
3. Estimates of Hybrid Maize Area and Fertilizer Applied in 1982/83
4. Area Projections for Selected Major Crops 1982 to 1990
5. Hybrid Maize Area Projections 1982/83 to 1990/91
6. Estimated Area of Hybrid Maize Planted in Seven Districts of West Kenya, 1983
7. Estimated Area of Hybrid Maize Planted in Seven Districts of West Kenya, 1984.
8. Estimated Areas of Total Maize, Hybrid Maize and Fertilized Maize.
9. Estimates of the Gap between Present and Optimal Levels of Nitrogen Application for Major Crops per Hectare
10. Estimates of the Gap between Present and Optimal Levels of Phosphate Application for Major Crops per Hectare.
11. Levels of N, P, K Application per Hectare on Smallholder Coffee by District 1982/83.
12. Levels of Nitrogen Application per Hectare on Smallholder Tea by District in 1982/83.
13. The Gap between Present and Optimal Levels of Nitrogen Consumption for Maize, Coffee and Tea in 1982/83.
14. The Gap between Present and Optimal Levels of Phosphate Use for Maize, Coffee and Tea in 1982/83.
15. Projections of Nitrogen Nutrient Use per Hectare for Selected Major Crops to 1990/91.

List of Tables (Cont.)

16. Projections of Phosphate Nutrient Use per Hectare for Selected Major Crops to 1990/91
17. Projections of Total Nitrogen Nutrient Requirement by Crop to 1990
18. Projections of Total Phosphate Nutrient Requirement by Crop to 1990.
19. Projections for Total Potash Requirement by Crop to 1990.
20. Estimate of Total Nutrient Requirements of Nitrogen, Phosphate and Potash 1982/83 - 1990/91.
21. Estimates of Marginal Returns to Fertilizer Use per Shilling Used for Fertilizer Application on Major Crops 1978/79 - 1983/84.
22. Official Prices for Selected Crops in Kenya 1970/71 - 1983/84.
23. Fertilizer Prices per 50kg bag f.o.r. Nakuru.
24. First Estimates of Smallholder Fertilizer Use in Four Districts of Kenya in 1983.
25. Estimates of Annual Fertilizer Sales to Smallholder Farmers Through Major Distribution Channels in Nyeri and JKisii Districts, 1983.
26. Levels of Fertilizer Sales in Shops in Nyeri and Kisii Districts in 1983.
27. Range of Prices per 50kg bag for Major Fertilizer Types in Nyeri and Kisii in September 1984.
28. Range of Prices per Kilo for Major Fertilizer Types Sold by Shops in Nyeri District September 1984.
29. Transportation Cost per Person and per Fertilizer Bag from Market Centre to Nearest Main Town in Nyeri and Kisii Districts in September 1984.

30. Estimated Total Value of Agricultural Inputs Sold by Shops in Nyeri and Kisii Districts in 1983.
31. Kenya Seed Company - Hybrid Seed Maize Sales - 2kg. Units
32. Acreages Applied for Inspection and 1000kgs Sealed for Selected Cereal Crops and Grasses in Kenya 1971/72 - 1983/84
33. Acreage Applied for Inspection for Selected Non-Cereal Crops 1976/77 - 1983/84
34. Wheat Seed Sales in Kenya by Kenya Seed Company
35. Imports and Local Production of the Most Important Vegetable Seeds in 1982.
36. Hybrid Seed Maize - Total Sales Kenya, 100kg Units.
37. Kenya Seed Company Hybrid Maize Seed Pricing Structure Countrywide 1979 - 1983/84.

I. INTRODUCTION

The key to Kenya's agricultural production in the long-run is intensified land use. Kenya's agricultural sector is characterised by a wide variety of production systems reflecting different ecological zones, population densities, land tenure systems and institutional structures. There is an acute shortage of good agricultural land. based on rainfall patterns, 9.3 per cent of Kenya is officially classified as high potential (zone 2), and a further 9.3 per cent as medium potential (zone 3). At present, Kenya has about 0.49 ha of high potential land equivalent per capita (Tidrick, 1979). If the current population growth rate of about 4 per cent per annum continues, then at the turn of the century, the per capita high potential land equivalent will be no more than 0.2 to 0.3 ha.

The use of high yielding varieties, fertilizers, and other land-saving technologies is one way to achieve greater productivity per unit of land. There is substantial scope for increased use of improved seeds, fertilizers and better cultural practices. Experiences in other developing countries suggest that countries with a rapid rate of food production growth must achieve a 15 to 20 per cent annual compound rate of growth in fertilizer use. (Meller, 1985). Such high rates of fertilizer use are explained by foreign exchange, stock and distribution policies.

This paper aims to estimate the likely rate of growth in the use of fertilizers and major types of seeds to 1990/91, and to suggest policies to accelerate growth of demand for agricultural inputs. Accelerated growth in fertilizer use is deemed to be desirable by the government (Kenya, 1987).

2.0 OBJECTIVES

1. To estimate the allocation of fertilizer imports and nutrient application between crops, and between the estate and smallholder sectors in 1982/83.
2. To estimate the difference between levels of use by crop in 1982/83 and levels of use being recommended by research stations or those currently being used by the estate sector, so as to measure the gap between actual and potential levels of fertilizer consumption in 1982/83.
3. To examine inter-district differences in application rates for major crops.
4. Based on estimates of area change and growth in fertilizer use per hectare, to estimate levels of nutrient requirements and fertilizer imports from 1982/83 to 1990/91.
5. To estimate marginal returns to fertilizer use over the last six years for major crops.
6. To investigate availability and cost of fertilizers and seeds in the rural trading centres of two districts, Kisii and Nyeri, and examine margins in the fertilizer and seed distribution systems.
7. To suggest policy alternatives to boost fertilizer consumption and to ensure adequate seed availability for major crops.

3. MAIN FINDINGS

3.1 Fertilizer Use by Crop and Farm Size

The three major cash crops, coffee, tea and sugar, used approximately 95,000 tons in 1982/83, or 60% of total fertilizer used in that year. Two major food crops, maize and wheat, required a further 42,000 tons, or 26%, leaving only 23,000 tons (14%) for all other crops ~~as~~ such as

tobacco, potatoes, barley, rice, sunflower and pineapples (Table 1). This suggests so-called 'minor crops' like beans, bananas, cotton, groundnuts, pyrethrum and millets, which cover together at least half a million hectares of medium and high potential land, receive virtually no fertilizer at all.

We estimate only 30,000 tons was used on hybrid maize in 1982/83 (Table 1) with 600,000 hectares of hybrid maize in that year (Table 5). This means an average rate of use of about 1 bag/hectare on hybrid maize. We assume almost no fertilizer at all is used on composites.

Note: From here on in the report, maize refers to hybrid maize unless otherwise specified.

About 38 percent of fertilizer consumption was on estates in 1982/83, 20 percent on large farms and 42 percent on small farms (Table 1). We estimate 60 percent of smallholder consumption to be on coffee, sugar and tea, and 20 percent on maize.

Of total nutrient use in 1982/83, 51 percent was nitrogen, 44 percent phosphate and 5 percent potash. Major crops using nitrogen are coffee, tea and sugar while the cereals (maize, wheat and barley) make up over 60 percent of the use of phosphates. Potash is used mainly on tea, coffee and tobacco (Table 2).

Using hybrid seed sales to measure maize area, which agrees closely with estimates of the CBS crop forecast surveys for districts in Western Kenya, nearly half of the 600 000 hectares of maize in 1982/83 was in Rift Valley Province, 20 percent in Western Province, 16 percent in Nyanza Province, and 14 percent in Central (Table 3).

We estimate Rift Valley Province, with 50 percent of the maize area, uses 70 percent of the fertilizer applied to maize, while Nyanza Province with 16 percent of the area uses 3 percent of fertilizer applied to maize (Table 3).

The crops likely to show greatest hectare expansion over the period 1982/83 to 1990/91 are maize, sunflower and rape, barley and potatoes (Table 4). Coffee and tea will increase only slightly, and tobacco and sugar not at all. Wheat is expected to decline owing to increasing subdivision of high altitude large farms.

3.2 The Gap Between Present and Recommended Application Rates by Crop

The largest gap between present and recommended levels of nutrient use is in maize where present levels of use vary between 3 percent (nitrogen) and 5 percent (phosphate) or less of recommended doses in Nyanza Province, to the highest level of 43 percent (nitrogen) and 60 percent (phosphate) in TransNzoia (Table 9 and Table 10). Inter-rated Rural Surveys (RS) confirm very low levels of use in most districts. However, even National Agricultural Research System (NARS) recommended levels are well below levels currently being used by 'best farmers' around Kitale, so recommended levels are probably well below economic optimum levels in many areas. This is partly due to inter alia a lack of precise information on fertilizer response functions.

For cash crops, the gap is much less. For sugar and estate tea, levels of use are already close to the recommended levels. Smallholder tea is still only at 33 percent of recommended levels (Tables 9 and 10 and 13 and 14). For coffee, cotton and groundnuts, no blanket recommendations exist as they vary with soil type. However, for coffee, judging by estate levels of use, smallholders are probably using no more than 35 percent of recommended levels, and estates only 72 percent (Tables 13 and 14). Current levels of use on potatoes and other horticultural crops, bananas, beans, cotton and groundnuts also appear to be extremely low from the limited evidence available.

Maize alone would require an additional 41,525 tons of nutrients (21,505 tons of nitrogen + 20,020 tons phosphate), or between 65,000 tons and 105,000 tons of fertilizer types DAP and 20-20-0 respectively, to fill the gap between present and recommended levels of fertilizer consumption (Tables 13 and 14). For policy, it may be helpful to remember 100,000 tons as the gap between present and recommended levels of fertilizer use on maize.

The gap for coffee is estimated at only 15,000 tons of nutrients, or a quarter of the size of the gap for maize, and the gap for tea at 7,000 tons of nutrients, including potash (Tables 13 and 14). 80 percent of the gap is among smallholders for coffee and 100 percent for tea. This means roughly 50,000 tons of additional fertilizer should be applied to these crops to reach recommended rates of nutrient use, of which 43,000 tons should go to smallholders.

3.3 Regional Variation in Application Rates

There is wide regional variation in levels of smallholder fertilizer application in coffee and tea. For coffee, levels in Muranga are twenty-six times higher than in Meru, and five times higher in Kiambu than in Nyeri (Table 11). A major explanatory factor is probably differences in levels of payout for cherry between cooperative societies, which vary between Kshs. 2 and Kshs.6 per kilo for cherry, according to Coffee Research Foundation (CRF) estimates. For tea, however, levels of nutrient application are higher in Meru than Muranga, and levels of use are two or three times higher in Central Province districts than Rift Valley, Western and Nyanza districts (Table 12). To account for these differences will require further research which might try to link differences in application rates to levels of fertilizer use on coffee, the other major cash crop, to test Desai's hypothesis from Indian experience about the effect of lead crops on the diffusion of fertilizer use to other crops (Desai, 1982, pp.12-13).

There is an even greater variation between districts in fertilizer use on maize than on coffee and tea (Tables 13 and 14). Levels in Trans Nzoia are over forty times levels of use in Kisii and the rest of Nyanza Province. Levels of use in Nandi/Kericho are less than a quarter of levels in Trans Nzoia and Uasin Gishu. Reasons may be related to the history and impact of large-scale farming around Kitale and Eldoret, and possibly also the extension impact of the Kenya Seed Company in those areas. The lack of available supplies in smaller packaging, absence of information available to smallholders, and the greater number of suppliers and stockists in large farm areas, may also contribute to higher levels of use in large farm areas.

3.4 Import Requirement from 1982/83 to 1990/91

To estimate projected import requirements to the years 1990/91, we assumed that present recommended levels of nutrient use would only be reached by the year 2000 for maize, coffee, smallholder tea, horticultural crops (including potatoes), unirrigated cotton and groundnuts. So intermediate levels between present levels of use and recommended levels were used as the basis for projections to 1990/91. A constant rate of growth of fertilizer use was then used for intermediate years between 1982/83 and 1990/91 (Tables 15 and 16). The estimates showed little difference when a straight line projection was used instead of a constant growth rate. In areas of low use, higher growth rates are assumed because they are starting from such a small base. For other major crops, including sugar, wheat, barley, irrigated cotton and rice, which are already using recommended levels of use, no change in use was projected to 1990/91. Our analysis assumes no severe foreign exchange constraints on fertilizer imports¹ no major input-output price ratio changes and no major shift in technical coefficients of the production functions for major crops.

Projections of total nutrient requirements show nitrogen and phosphates with a 7 - 12 percent per annum growth rate overall between 1982/83 and 1986/87, slowing down slightly to 7 - 9 percent for the second half of the period to 1990/91 (Tables 17 and 18). This means that the Ministry of Agriculture's method of assuming a 10 percent annual growth rate in demand for purposes of import allocations is probably not far from the mark. These aggregate growth figures conceal almost stagnant demand for some crops (sugar, wheat, tobacco, irrigated rice and cotton), slowing rising demand (4-5 percent per annum) for coffee and tea, and huge growth in demand for maize (20 - 30 percent per annum) over the period 1982/83 to 1990/91. Without a 20 - 30 percent per annum growth in fertilizer use in maize, it will not be possible to achieve even a 10 percent rate of growth in total fertilizer use.

¹ This stems from commodity aid in form of fertilizer which has been readily available from donor countries.

The government Food Policy paper of 1981 sought a 20 percent increase in fertilizer use on food crops over two years between 1981 and 1983 (Sessional Paper No.4 of 1981 on National Food Policy, p.17). We believe targets for both maize and potatoes should be set higher than this owing to the extremely low base from which growth in fertilizer use begins in most areas.

Potash requirements are expected to grow slowly at 6 - 7 percent per annum, with additional requirements entirely for coffee and tea (Table 19). Potash is not a major nutrient required in Kenya, given reasonable soil endowments of potash.

The total fertilizer requirement is estimated to grow from approximately 160,000 tons in 1982/83 (Table 1) to about 301,000 tons in 1991/92, reaching 185,000 tons in 1984/85, 221,000 tons in 1986/87 and 256,000 tons in 1988/89 (Table 20). With a straight line projection from 1982/83 to 1990/91, the corresponding figures for 1984/85, 1986/87 and 1988/89 were 185,000, 221,000 and 260,000 tons respectively.

The proportion of phosphates in total nutrient use is expected to rise slightly from 43 percent to 46 percent of the total, largely due to the rising importance of use in maize which is expected to increase its share from 18 percent to 30 percent of total nitrogen used between 1982/83 and 1990/91, and from 30 percent to 41 percent of total phosphate used (Tables 17, 18 and 20).

3.5 Returns to Fertilizer Use by Crop

The returns to fertilizer use vary among crops due to differences in crop prices and response rates to fertilizer applications. Marginal returns such as maize, wheat and sunflower. In 1983/84, returns per shilling spent on fertilizer were estimated to be Kshs. 10 - Kshs. 14 for tea and coffee, but Kshs.3 for maize and wheat, and only Kshs.1.2 for sugarcane (Table 21). While returns on nutrient application in tea have increased dramatically since 1978/79, for other crops returns have tended to fluctuate by about 20 percent around the mean, being less than Kshs.1 (i.e. unprofitable) for sugarcane for much of this period. Clearly, these aggregate estimates conceal substantial differences in the level of returns between, and within, districts for a particular crop.

Using the FAO Fertilizer Program data from 1972, Mwangi showed a net return per shilling spent on fertilizer in maize as being between Kshs.4.50 - Kshs.7.00 for eleven different districts, with only Machakos below this level at Kshs.1.30 per shilling, probably due to low and uncertain rainfall (Mwangi, 1978, p.41). FAO fertilizer trials on potatoes from 1968 - 1974 also show high returns, between Kshs.6.7 and Kshs.10.00 in RVP, Central and Eastern Provinces (Muriuki, 1982, p. 19). The returns have fallen since 1972 primarily due to the rapid rise in fertilizer costs since the oil price rises in the 1970s.

3.5 Availability of Fertilizers

Levels of fertilizer and seed sales by cooperative unions and by shops in 1983 were estimated by use of a small survey in Nyeri and Kisii districts in August and September 1984, which covered all input sales by 62 shops in Kisii and 50 shops in Nyeri. The major findings are presented by Schilute (1983) entitled, "The Role of Shops in the Distribution of Agricultural Inputs to Smallholder farmers in Nyeri and Kisii Districts of Kenya in 1983" The next two sections of this paper draw heavily on those findings.

First estimates of fertilizer sales in three districts of Central Kenya, based on sales by cooperative unions, and Kenya Farmers Association (KFA) sales to retailers and direct to non-estate farmers, show that cooperatives supplied 73 percent of the total The Kenya Tea Development Authority (KTDA) 17 percent (specifically for tea), shops 6.4 percent, and KFA direct sales to farmers 6.2 percent (Table 20). Levels of application per hectare of high potential land equivalent were twice as high in Nyeri and Muranga as in Kirinyaga.

Based on the shops survey and all other available sources, estimates of total fertilizer sales to smallholders in Nyeri and Kisii districts is made in Table 25. The direct survey results for shop sales correspond quite closely with the rough estimates based on KFA sales to retailers in Table 24. Fertilizer sales were ten times greater in Nyeri than in Kisii, and fertilizer applied per hectare of high

potential land equivalent was fourteen times higher in Nyeri than Kisii (Table 25). If all fertilizer supplied by KTDA is put on tea in Kisii, the level of fertilizer use on the non-tea area of Kisii would be just 1.4 kgs of fertilizer, or less than 1 kg. of nutrient, per hectare of high potential land equivalent. A major factor in this district differential is the absence of an effective cooperative organization in Kisii, but reasons for low levels of use by Kisii farmers must be sought beyond this.

The coffee cooperatives and the KTDA accounted for over 80 percent of all fertilizer sales in the two districts (Table 25). This seems to support Desai's hypothesis (Desai, 1982, pp.12-13) that the way fertilizer spreads is first through application on a limited number of crops by a small number of farmers.

Shops have a crucial role in ensuring input availability. The number of KFA retail outlets and cooperatives stores are relatively few. Typically, the KFA has between one and three outlets in a district of several hundred square kilometres, and cooperative societies, typically, only 20 to 30 centres. Cooperatives also often limit sales to members. Thus, for many farmers, the only sales outlet for agricultural inputs within 10km - 30km. from their houses are the local shops (dukas). When sales levels through shops are low - just 11,000 bags in Nyeri and 1,250 bags in Kisii (Table 25) - many farmers are either travelling large distances to find fertilizers or are not using them at all. Most shops were selling small quantities - less than 100 bags each (Table 26).

In both Nyeri and Kisii, there was a considerable range in prices at which fertilizers were sold both in 50Kgs bags and, in Nyeri also, on a kilo by kilo basis. Highest prices per bag were 27 - 44 percent higher than lowest prices (Table 27). In Nyeri, the per kilo price of Di-ammonium phosphate (DAP) varied between Kshs.6 and Kshs.8.50, and for 20-20-0 between Kshs.4 and Kshs.7.50 (Table 23). In both districts, there were numerous complaints by rural stockists of acute shortage of fertilizers during the preceding twelve months which hampered sales. In particular, shortages were noted for calcium ammonium nitrate (CAN) and 20-20-0.

3.7 Availability of Seeds

The number of rural shops selling hybrid maize seeds was similar in the two districts - 47 in Nyeri and 42 in Kisii. In both districts, there were large numbers of both small stockists, selling less than one hundred 10kg. packets a year, and large stockists selling over six hundred packets a year. The extensive stocking of seeds and high sales levels (Table 30) indicates an effective retail distribution system for hybrid seed and indicates the inadequacy of the fertilizer distribution system by comparison.

Prices of maize seed were almost uniform throughout both districts, at close to Kshs.72 for 10kgs and Kshs.18.50 for 2kgs., as recommended by the Kenya Seed Company. The growth of 2kg. packages has been spectacular in the last five years (see Table 31), reflecting in part the accelerating partition of land with growing population pressure. The extensive sale of hybrid maize on the kilo by kilo basis in Nyeri, by splitting up the 10 kilo bag, may well represent an attempt to lower prices to farmers. At Kshs.8 or Kshs.7.50 per kilo for hybrid maize seed, both the stockist and the farmer gain a price advantage over selling in the 2kg. bag.

In Nyeri, there were frequent complaints about shortages of 511 and 512 series bhybrid maize seed in the period since early 1983. Because there is only one seed company in Kenya, the country is highly vulnerable to management problems, capital shortages or shortages of trained personnel in the seed company, which became a Government parastatal in 1984 when ADC acquired 52 percent of the shareholding. The shortage of seeds is partly explained by a lack of strategic reserve for seeds.

Vegetable seeds (tomatoes, cabbages, etc.) were distributed by shops and co-operatives extensively in Nyeri, at nearly seven times the rate of Kisii (Table 30). Higher levels of demand in Nyeri reflect greater market opportunities in Nairobi and greater small-scale irrigation availability, as well as the long tradition of horticultural crop intensification in Nyeri from the time when the dehydration factory was located in Karatina in 1947.

There has been a steady increase in the hectareage used in seed multiplication and in tons of seed certified in both major and minor crops (Tables 32 and 33 and 34). Maize, wheat, barley and grass seeds have been produced in significant quantities since the late sixties. Production of seeds in Kenya for dry beans, potatoes, and sunflower only began in the mid-seventies. Seeds for sorghum, green beans and other vegetables only began on a significant basis in 1980/81, with vegetable seed production based almost entirely in Busia. Local production now has the major share of the market for many of the major vegetables (Table 35).

The shortage of maize seed in October/November 1984 has been caused by the failure of the long rains in March - June 1984 which resulted in an unusually high demand for Katumani and 511 series seeds for the short rains. Kenya Seed Company stocks were sufficient for a 30 percent increase in demand in 1984/85 (Table 36). Sales of Katumani were 2,000 tons August - October 1984 in contrast with normal annual sales of 200 tons. Similarly, prior to the drought, sales of dry bean seed had been low relative to 1984/85 levels as farmers do not generally purchase seed each year. Lack of price incentives from National Cereals and Produce Board (NCPB) for a high quality product has resulted in low coverage by new improved bean seed varieties developed by the grain-legume research project in Thika.

To be prepared for such drought-centred demand which occurs every three to four years, as well as to meet the rising demand of neighbouring countries, will require that special financing facilities are made available to the Kenya Seed Company. There is no other source of maize seed for Kenya, as neighbouring countries do not have functioning seed companies, and Kenyan hybrids cannot be produced outside Kenya in areas such as Europe or the United States. If hybrid seed is not available, so that farmers use their own seeds, a drop of 30 percent in yields can be expected from seed genetic quality, and more if the seed is not of such good physical quality National Agricultural Research Station (NARS) (Maize Research Section trials, Kitale, 1972).

There was also an acute shortage of other seeds in late 1984. Potato seed was in short supply owing to a long rains crop failure on ADC farms in Molo. If the short rains crop was not good in late 1984, seed would be imported under Dutch aid from the Netherlands. The shortage of seed for new drought-resistant varieties of green grams and cowpeas for from the Katumani research station is due to the unwillingness of the Kenya Seed Company or other companies to undertake commercial multiplication. This is owing to uncertain demand, as for Katumani maize and dry beans noted above.

3.8 Margins in Seed and Fertilizer Distribution

Margins in seed ^{distribution} are considerably greater than for fertilizers, which is doubtless a major factor in the greater seed availability noted in the rural trading centres. Margins for seed stockists have narrowed over the last five years from 9 - 10 percent, down to 7 - 8 percent (Table 37). The margin in 1983/84 was 7.5 percent. Margins for the Kenya Seed Company agents (see Figure 1 attached to Table 37) and subagents have also been small, with 3 percent for the KFA and 2.7 percent for the subagent in 1983/84 (Table 37).

For fertilizers, although the importers' margins are 30 percent over fob prices plus Kshs.100 per ton, the stockist's margin varies between Kshs.5 per bag (MEA) to Kshs.1 or Kshs.2 per bag (KFA). In percentage terms, these are between 1 percent and 3 percent of value, and do not cover costs of financing, storage, handling and return on capital unless the bags are broken down and sold on a per kilo basis as in Nyeri.

Although the need for rebagging in smaller quantities has been stressed since the early 1970's (see Chege and Ascroft, 1972), there has been no packaging in properly marked and labelled bags for fertilizer below the 50 kilo bag, except by one small company based near Nyeri which has rebagged in 10 kilo bags. On field visits, packaging by Asian traders in 5 kilo bags was found, but bags carried no indication of type of fertilizer or weight. On 10 kilcs of DAP in 1981/82, the Nyeri based company had costs of Kshs. 3 per 10 kilo baf for rebagging (including bag cost) and Kshs.2 for transport up to 50 km to rural stockists. The wholesale profit margin was 4 percent and the stockist was given a 6.4 percent margin. The price to the farmer was considerably lower than the per kilo price of other rural stockists.

Estimates of a farmer's costs in going to look for fertilizer in the nearest town, if it is not available locally, are shown in Table 29. The average cost per 50 kilo bag is approximately Kshs.20 per bag in Nyeri and Kshs.28 per bag in Kisii just ofr transport, which is nearly 10 percent of the price for most types of fertilizer. To this must be added the opportunity cost of the farmer's time. Since most farmers wait until the time they want to use fertilizer before buying it owing to tight cash constraints, the opportunity cost of half a day or a whole day close to planting time may be Kshs. 20 - Kshs.30. In addition, there is the disincentive of the heavy labour of transferring 50 kgs. of weight by foot or by bicycle from the matatu stop to the farm itself. It is thus hardly surprising that farmers are willing to pay nearly double the price for the convenience of buying fertilizer locally and in small quantities which are easy to carry (see Table 28). This argues strongly for increasing the margin for retail stockists of fertilizers so they are in line with those for maize to ensure greater availability at the local level.

Prices announced by the Price Controller do not indicate twhat shopkeepers may charge outside the major towns. Often the name of the district and the name of the town are the same (e.g. Nyeri, Machakos, Kisii, Kericho), so the DCs interpret prices given for the towns as applicable to the whole district. Transport costs to rural areas and retail margina are not included. Given the importance of shops in ensuring a ready access for smallholders to fertilizers in convenient packaging and clost to their homes, this issue needs to be addressed urgently.

4. POLICY IMPLICATIONS

To achieve an annual growth rate of fertilizer consumption of even 10 percent per annum during the rest of the eighties will require a 20 - 30 percent per annum growth rate in use on maize. As fertilizer use is starting at such a low level in so many districts, this target may be achievable if there is determined pursuit of this objective.

The repeated shortages of fertilizers in the economy over the last seven years has been a major constraint on growth of consumption. Given inevitable administrative delays for a variety of reasons, donors should be asked to assist in building up an inter-season carry-forward stock of not less than 50,000 tons, or 25 percent of annual consumption. Given rates of marginal physical product for major crops like coffee, tea and maize, the social rate of return on this 'excess capacity' would be extremely high, provided the types stocked corresponded closely with those most in demand.

The major problems in the fertilizer retail distribution system discovered in the surveys of Nyeri and Kisii need to be addressed. In particular, fertilizer margins must encourage or require importers to rebag a proportion of imports into 10 kilo bags for the smallholder sector. Of even greater importance, present retail margins should be raised from the present 1 - 3 percent to be in line with retail margins for seeds at 7 - 8 percent. In fact, fertilizer margins need to be slightly above margins for seed if transport costs are included within the margin as it costs more to transport Kshs.100 of fertilizer than Kshs.100 of seed.

There is almost no active promotion for fertilizers in Kenya - no radio or newspaper advertising, and only eight sales agents (five KFA and three MEA) in a country of eighteen million people with fertilizer consumption approaching 200,000 tons per annum. There is a lack of printed information in regional languages, Swahili or even English available to wananchi on how to apply fertilizers for any of the major crops. Printed material at present is only available to trained extension staff. Availability of information is especially important as the major future thrust has to be on smallholder crops such as maize, coffee, tea and potatoes, where the gap between present and recommended levels is greatest.

To increase fertilizer use on three major crops - smallholder coffee, tea and beans - changes in the marketing systems will be vital. For coffee, with payment for cherry at only Kshs. 2 per kilo by some cooperative societies (relative to Kshs.6 in others), and often paid to the farmer over a year in arrears, the rate of return is severely eroded. For tea, by increasing the first payment from the present 21 percent to, say 50 - 70 percent, so that the farmer is not waiting up to twelve months for the major cash payment for his crop, the farmer would have greater incentive to increase application rates. Bean prices have not been increased since 1981, and parallel market prices are at present (November 1984) approximately two or three times the level of official prices. Also, greater quality incentives in bean purchasing, and higher prices through liberalising exports after the effects of the present drought have subsided, would raise returns to fertilizer on beans, which has a larger hectareage in Kenya than any crop other than maize. Efforts to control diseases in beans through clean seed and chemical sprays will also be important to raise returns on fertilizer use.

Research will be important in two areas: agronomic research to establish clearer recommendations for may 'minor crops' like beans, bananas, groundnuts, potatoes and cotton, including site specific recommendations, and economic research to investigate reasons for the large inter-district variation in application rates on maize, coffee and tea.

Two strategic seed reserves need to be considered. The first is for use in Kenya, and the second for use among Kenya's neighbours which continue to have supply difficulties. Without these reserves, the country's major staple will be constantly at risk to weather factors, or even to mismanagement within the Kenya Seed Company itself as the only supplier. The financing of these reserves is not commercially viable so will have to be met from public funds. There is a strong case for donor support for the regional strategic seed reserve, especially as donors are often the major purchasers in drought situations.

5. BIBLIOGRAPHY AND DATA SOURCES

A. Fertilizer Recommendations

Coffee: Coffee Research Foundation, Technical Circular No.56, "Standard Recommendations for Fertilizer 1984", published in Kenya Coffee, March 1984, pp.31-37.

Maize: Scientific Research Division, Ministry of Agriculture, "Maize Growing Recommendations", (revised 1980), National Agricultural Research Station, Kitale, 1980.

Tea: Caleb O. Othieno and David K. A. Siele of Tea Research Foundation and Moses A. Mbaya and James P. Muriithi of Kenya Tea Development Authority, "Economics of Fertilizer Application to Smallholder Tea Farms in Kenya - Part III, 1982/83 Results", Tea, 5 (1), 1984, pp.14-22.

Sugar: See calculation for Table 1. Personal communication, National Sugar Research Station, Kibos.

Wheat: Recommendations from Plant Breeding Research Station, Njoro.

Barley: Personal communication, Kenya Breweries Ltd., Barley Department, September 1984.

Tobacco: Personal communication, British American Tobacco Co. Ltd., September - October 1984.

Sunflower
& Rape Personal communication, East African Industries Ltd.,

Irrigated
Cotton &
Rice: Personal communication, National Irrigation Board.

Unirrigated
Cotton &
Groundnuts: World Bank Agronomist, East Africa Projects Division.

B. Studies on Fertilizer and Seed

Chege, Fred E. and Ascroft, Joseph, "Marketing Farm Supplies in Rural Areas, A Study of Farm Inputs Availability in Tetu Division", Institute of Development Studies, Working Paper No.48, July 1972.

Chemical Engineering Consultants, Fertilizer Infrastructure Improvement Support Exercise, "Phase 1 - Part I: The Gathering of Data on Fertilizer Use in Selected Districts of Western Kenya", Draft Final Report, Nairobi, July 1983. (a)

Chemical Engineering Consultants, Fertilizer Infrastructure Improvement Support Exercise, "Phase 1 - Part II: An Appraisal of the Fertilizer Situation at Farmers' Level in Relation to the Major Fertilizer Consuming Food Crops in Western Kenya", Draft Final Report, Nairobi, July 1983.(b).

Chemical Engineering Consultants, Fertilizer Infrastructure Improvement Support Exercise, "Phase 1 - Part III: Computer Storage and Analysis of Fertilizer Data Gathered in Selected Districts of Western Kenya", Draft Final Report, Nairobi, July 1983.

Hagenouw, R., "Position Paper of the Seed Unit Project", Nakuru, November 1982.

Kenya National Seed Quality Control Service, Evaluation Report on Netherlands Assistance, Nakuru/Wageningen, March 1983.

Kenya, Republic of, Ministry of Cooperative Development, "The Supply and Distribution of Farm Inputs to the Cooperative Sector: Final Report", Mwenge International Associates Ltd., Government Printer, Nairobi, November 1983.

Muriuki, E. M. "A Review of Past Fertilizer Trials on Potatoes (First Draft)", National Agricultural Laboratories, March 1982.

Mwangi, W. M., "Farm Level Derived Demand Responses for Fertilizer in Kenya", Ph.D. dissertation, Department of Agricultural Economics, Michigan State University, East Lansing, 1978.

Rowe, J. D. M., and Whittaker, M. J., "Management Practices and Coffee Productivity Within the Estate Sector", Coffee Research Foundation, Unpublished Draft. Note: Should not be quoted prior to official release by CRF but contains vital data for estimating allocation of fertilizer imports between major crop subsectors in Kenya.

Ruigu, G. Alila, P. O. and Chitere, P. Bura Irrigation Settlement Project. A Social economic survey. IDS Consultancy Report No.14, 1984.

Schluter, Michael, "The Role of Shops in the Distribution of Agricultural Inputs to Smallholder Farmers in Nyeri and Kisii Districts of Kenya in 1983", World Bank Working Paper, Washington DC., 1985.

Tidrick, G., "Kenya: Issues in Agricultural Development", (IBRD-mimeo), 1978.

UNDP/FAO, "Fertilizer Marketing in Kenya", Technical Report; Nairobi, September 1978.

USAID, "The Fertilizer Situation in Kenya", Annex F., Document no.2120G, Washington, DC. 1984.

Whittaker, M. J., "Supply of Inputs to Smallholder Coffee Farmers Through the Cooperative Distribution System in 1981/82 and 1982/83". Coffee Research Foundation, Unpublished Draft, October 1984.

C. Other Data Sources

Coffee Board of Kenya, Annual Report and Statement of Accounts, (various years), Nairobi.

Desai, Guntant M., "Sustaining Rapid Growth in India's Fertilizer Consumption: A Perspective Based on Composition of Use", IFPRI Research Report No.31, August 1982, pp.12-13).

Kenya Farmers Association, Growing Together, Diamond Jubilee publication, Nakuru, 1983.

Kenya, Republic of, Central Bureau of Statistics, Ministry of Economic Planning and Development, The Integrated Rural Surveys 1976 - 79, Basic Report, Government Printer, Nairobi, February 1982.

Kenya, Republic of, Sessional Paper No.4 of 1981 in National Food Policy, Government Printer, Nairobi, 1981.

Kenya Tea Development Authority, Annual Report and Statement of Account (various years), Nairobi, and Newspaper Advertisement, "Second Payment to Growers for the Year Ended 30 June 1984", Daily Nation, 27 September 1984, p.8.

Schluter, Michael, "Constraints on Kenya's Food and Beverage Exports", Occasional Paper No.43, Institute of Development Studies (Nairobi), and IFPRI (Washington DC), July 1984.

TABLE 1: ESTIMATES OF FERTILIZER USE BY CROP AND FARM SIZE FOR FINANCIAL
YEAR 1st JULY 1982 - 30th JUNE 1983
 (Metric tonnes)

<u>Crop</u>	<u>Estates</u>	<u>Large Farms</u>	<u>Smallholder</u>	<u>TOTAL</u>
Coffee	21,300	-	19,400	40,700
Maize	1,000	15,700	14,300	30,000
Tea	17,900	-	10,000	27,900
Sugar	12,700	-	13,800	26,500
Wheat	1,000	11,000	-	12,000
Barley	-	4,700	-	4,700
Other Horticultural Crops	2,000	-	1,200	3,200
Tobacco	-	-	2,540	2,540
Potatoes	-	-	2,500	2,500
Rice	-	-	2,500	2,500
Sunflower & Rape	-	1,790	-	1,790
Pineapples	2,000	-	-	2,000
Irrigated Cotton	-	-	1,600	1,600
TOTAL	57,900	33,190	67,840	158,930
Percentage	36%	21%	43%	100%

Sources: See notes and calculations attached.

- 11 -
TABLES 1 AND 2

Sources:

Coffee:	Whittaker, pp.7, 9, 11, 13. Also personal communication with Mr. Rowe at Coffee Research Station.
Maize:	Chemical Engineering Consultants, Fertilizer Infrastructure Improvement Support Exercise(NLFII).
Katumani Maize:	No fertilizer is assumed to go to Katumani maize in Eastern Province. Mavua (see bibliography) has demonstrated the high risks and doubtful returns. Levels of use in areas such as Machakos at present are extremely small.
Tea:	KTDA and estimates for estate sector based on personal communication with Brooke Bond Kenya Ltd. and African Highlands Produce Company Ltd.
Sugar:	Kenya Sugar Authority, Mumias Sugar Co. Ltd. and Chemilil Sugar Co. Ltd.
Barley:	Kenya Breweries Ltd.
Wheat:	Plant Breeding Research Station, Njoro, and large farmers contacted in Nakuru confirmed average levels of use are closer to 2 bags/ha than the recommended levels of 1 bag/acre.
Horticultural Crops:	Whittaker, p.9, Integrated Rural Survey, 1976-79, Simlaws Ltd.
Tobacco	British American Tobacco Co. Ltd.
Rice:	National Irrigation Board.
Sunflower & Rape:	East African Industries Ltd.
Pineapples:	Kenya Cannery Ltd.
Irrigated Cotton:	National Irrigation Board and Ruigu et al. p.5.
Total Imports:	The Ministry of Trade reports imports of 466,000 tons in 1980, 1981 and 1982. However, there are no reliable data to show stocks at the beginning and end of the period. Our estimate of 160,000 tons is not inconsistent with this level of imports over this three year period.

CALCULATIONS FOR TABLE 1

Maize

Estimates of fertilizer use on maize by main producing area in Western for 1982/83 from data collected by CEC were as follows (after adjusting for Jan 1 - Feb.14 sales, July/August sales, KFA market share, ets.):

<u>District</u>	<u>Bags</u>	<u>Tons</u>
Trans Nzoia	160,000	8,000
Uasin Gishu	134,000	6,700
Kericho	12,500	625
Nandi	31,600	1,580
Kakamega	34,000	1,700
Bungoma	23,000	1,150
	<hr/>	<hr/>
	395,100	19,755
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Estimates for Kisii are based on data collected from Kisii during the Fertilizer Distribution Survey in Kisii for the calendar year 1983, and the proportion of Kisumu sales going to Kisii in CEC survey. Estimates for Central Province (inc.Embu) and the remaining area of Rift Valley Province are based on an average of 1 bag/ha, which is not inconsistent with Whittaker and Rowe's estimates for levels of application among coffee farmers in Central and Eastern Provinces. This is considerably above levels in Nandi/Kericho but below levels in Trans Nzoia/Uasin Gishu. For estimates of maize area by district and province in 1982/83, see Table 3. There is an additional 1,000t on irrigated maize on the Tana River and Burra irrigation schemes (see George Ruigu et al. ibid).

Wheat

Assumed 2 bags/ha.

Other Horticultural Crops

Irrigated: Assumed 8 bags/ha for 5,000 ha of irrigated horticultural crops (see Table 3).

Unirrigated: Assumed 2 bags/ha for 12,000 ha of unirrigated horticultural crops (see Table 3).

Potatoes

Assumed 1 bag/ha.

CALCULATIONS FOR TABLE 1: SUGAR (1)

<u>Factory</u>	<u>N/Estates</u>	<u>Estates</u>	<u>Small-Scale Outgrowers</u>	<u>TOTAL</u>
Mumias ¹	770	-	8,720	9,490
Chemelil ¹	840	1,990	620	3,450
Muhuroni ¹	2,000	-	1,400	3,400
Sony ²	590	720	1,180	2,490
Nzoia ²	880	690	970	2,540
Miwani ³	660	490	590	1,740
Ramisi ¹	2,930	110	340	3,380
	<u>8,670</u>	<u>4,000</u>	<u>13,820</u>	<u>26,490</u>

1. Actual
2. Pro rata with Mumias
3. Assumed 75 percent application rate as Chemelil

Note: Area for each factory shown on sheet attached. Assume annual planting 20 percent of total area, and ratoon 40 percent.

CALCULATIONS FOR TABLE 1: SUGAR (2)

<u>Factory</u>	<u>TCH</u>	<u>N.E.</u> Ha	<u>Small-Scale</u> Ha	<u>Large-scale</u> Ha	<u>Total</u> Ha
Miwani		3,165	2,857	2,371	8,393
E.A.S.I. (Muhuroni)	85	1,800	6,933	1,279	10,012
Chemelil	95	3,000	5,750	3,750	12,500
Mumias	300	3,400	19,600	9,800	32,800
Nzoia	85	3,200	3,500	2,500	9,200
Sony	85	2,135	4,160	2,700	8,995
Ramisi	45	5,200	200	600	6,000
TOTAL		21,900	43,000	23,000	87,900

N.E. Area under sugarcane 25%

O.G. Large scale farmers 26%

Small scale farmers 49%

Source: KSA, September 1984.

CALCULATIONS FOR TABLE 1: SUGAR (3)

Fertilization Practices for
Sugarcane

<u>Fertilizer</u> <u>Nutrient</u>	<u>Zone of</u> <u>Application</u>	<u>Sources of</u> <u>Nutrients</u>	<u>Rate of Applica-</u> <u>tion at planting</u> Kg/Ha
A. Phosphorous P_2O_5	1. Nyanza Sugar Belt	DSP	100
	2. ASC Ramisi		250
	3. Mumias	SSP	250
B. Nitrogen	1. Nyanza Sugar Belt	CAN/ASN	350
		SA	430
	2. ASC Ramisi	SA	380
		CAN	310
	3. Mumias	CAN	300

Note: 1. Nyanza Sugar Belt factories: Miwani, Chemelil, Muhoroni.

2. Fertilizer application increases for rate on application may be by 10% - 15% depending on the ingredient of land under use.

3. SA - Sulphate of Ammonia
CAN - Calcium Ammonia Nitrate
DSP - Double Super Phosphate
SSP - Single Super Phosphate

Source: National Sugar Research Station, Kibos (1983).

TABLE 2: ESTIMATES OF NUTRIENT USE BY CROP FOR 1982/83 (in Tons)

Crop	N	P	K	Major Fertilizer Types Used
Coffee				
Estate	4,760	1,760	1,050	CAN, ASN, 20:10:10
Smallholder	4,660	1,460	240	20:20:0, DAP.
Subtotal	9,420	3,220	1,290	
Maize	5,800	8,600	-	DAP, 20:20:0
Tea				
Estate	4,225	1,145	1,145	25-5-5 and 20:10:10
Smallholder	2,500	500	500	25-5-5
Subtotal	6,725	1,645	1,645	
Sugar				
Mumias & Nzoia	2,860	1,050	45	SSP, Urea, CAN
Sugar Belt Factories	1,480	190	-	DSP, CAN, ASN, SA
Sony	570	210	10	As Mumias (pro rata)
Ramisi	580	410	-	DSP, CAN, SA.
Subtotal	5,490	1,860	55	
Wheat	2,520	6,720	-	DAP
Barley	260	2,300	-	TSP & MAP
Other Horticultural Crops				
Estates	360	920	-	DAP
Smallholder	100	270	-	DAP
Subtotal	460	1,190		
Tobacco	250	410	380	6-18-20, 15-15-6, CAN
Potatoes	490	1,240	-	DAP
Irrigated Rice	260	280	-	TSP & SA
Sunflower & Rape	350	680	-	DAP & CAN
Pineapples	920	-	-	Urea
Irrigated Cotton	225	-	-	SA & ASN
TOTAL	33,170	28,145	3,370	TOTAL 64,685 tons
Percentage	51%	44%	5%	100%

Sources: As for Table 1.

NOTES FOR TABLE 2

Coffee	See Whittaker, p.13 (adjusted by a factor of 1.4 times for msmallholders following 1983/84 smallholder survey.
Maize	Assume 10,000t DAP and 20,000t 20:20:0.
Tea: Estates	5,000t 20:10:10 and 12,900t 25:5:5
Smallholders	10,000t of 25-5-5.
Sugar	See Table 1 working papers
Wheat	Assume 2 bags DAP per ha
Barley	1 bag TSP and 1 bag MAP per ha (KBL).
Other Horticultural Crops	Assume 1 bag/ha smallholders and 8 bags/ha for irrigated estates - DAP
Tobacco	1,700t 6-18-20, 680t 15-15-6, 170t CAN supplied to smallholders by BAT
Potatoes	Assume 2,500t DAP
Irrigated Rice	600 bags TSP and 1,865 bags S/A (NIB)
Sunflower & Rape	1,482t DAP and 310t CAN supplied by EAI to farmers for 1982/83 crop
Pineapples	2,000t Urea (Kenya Cannery Ltd.)
Irrigated Cotton	78.3t (HOLA) of nitrogen and 147.4t (Burra).

TABLE 3: ESTIMATES OF HYBRID MAIZE AREA AND FERTILIZER APPLIED IN 1982/1983

	Hectares ¹ ('000)	% Total Maize Area	Estimate of Quantity of Fertilizer Applied (tons)	% of Total Fertilizer Applied
RVP TN	61	10.3	8,000 ²	26.7
UG	56	9.4	6,700 ²	23.1
Kericho	58	9.8	625 ²	2.1
Nandi	44	7.4	1,580 ²	5.5
Other (inc. Meru)	72	12.1	3,600 ³	12.4
Subtotal	291	49.0	20,505	69.8
Western Kakamega	67	11.3	1,700 ²	5.9
Bungoma	45	7.6	1,150 ²	4.0
Busia	10	1.7	500 ³	1.7
Subtotal	122	20.6	3,350	11.6
Nyanza Kisii	86	14.5	380 ⁴	1.3
Other	12	2.0	500 ³	2.1
Subtotal	98	16.5	980	3.4
Central (inc. Embu) ⁵	81	13.6	4,150 ³	14.3
Coast	2	0.3	-	-
TOTAL	594	100.0	28,985	100.0

Sources & Notes:

1. Estimated on the basis of sales of hybrid seeds from KFA branches, adjusted to districts by CEC and Kenya Seed Company estimates as shown in the attached papers.

2. Chemical Engineering Consultants estimate.

3. Estimates at 1 bag/acre.

4. For fertilizer use on maize in Kisii in 1983, the following data were used:

Sales Outlet	Quantity (bags)	Information Source
KFA Kisii	1,388	Survey
KFA Sotik (destination Kisii)	400	CEC estimates
KFA Kisumu	5,760	KFA (excludes S/A and CAW)
TOTAL	7,548	and assumes 50 percent of Kisumu KFA sales go to Kisii district.

5. Based on hybrid seed sales from the following KFA branches: Karatina, Sagana, Maragua, Thika, Nairobi, and 67 percent of sales from Nyahururu (source: Kenya Seed Company).

HYBRID MAIZE SEED SALES

The centres used in Kenya Seed Company area sales estimates are based on KFA branches and we list areas that we believe may be covered from those branches. (Underlines are other KFA branches serviced from main branch).

KITALE	Cherangani, Settlement, Trans Nzoia, Kapenguria
MOI'S BRIDGE	Cherangani, Settlement, Trans Nzoia, Uasin Gishu
ELDORET	Elgeyo, Uasin Gishu, Nandi, Settlement
KAPSABET	Nandi Settlement
TURBO	Settlement, North Nandi
WEBUYE	Bungoma, Busia
KAKAMEGA	Kakamega
KISUMU	Kisumu, Siaya, Maragoli, Chemilil
KISII	<u>Oyugis</u> , Homabay, <u>Migori</u> , Kisii
SOTIK	Sotik, Kisii, Settlement
KERICHO	Kericho, Mara
KIPKELLION	Kipkellion, Londiani
MOLO	Molo, Elburgon
NAKURU	Nakuru, <u>Rongai</u> , <u>Narok</u> , Baringo, Nyahururu
NAIVASHA	Naivasha, Kinangop
NYAHURURU	<u>Ol Kalou</u> , Nyahururu, Laikipia
NANYUKI	Nanyuki, <u>Meru</u> , <u>Naromoru</u> , Mandera
KARATINA	<u>Nyeri</u> , Karatina, <u>Othaya</u> .
SAGANA	<u>Embu</u> , Muranga, Kirinyaga.
MARAGUA	Muranga
THIKA	Murange, Thika, Kiambu, Kitui
NAIROBI	<u>Githunguri</u> , Kiambu, Ngong, Loitokitok, <u>Machakos</u> , Kitui, Taita.
MACHAKOS	Machakos, Kitui
MOMBASA	Coast, Taita, <u>Wundanyi</u>

Source: Kenya Seed Company, October 1984.

TABLE 4: AREA PROJECTIONS FOR SELECTED MAJOR CROPS

1982 TO 1990 (ha)

Crop	1982 (actual)	1984	1986	1988	1990
Mature Coffee (E)	33,600	33,600	33,600	33,600	33,600
(S)	103,000	105,000	107,000	109,000	110,000
Maize Hybrid	596,000	719,000	763,000	810,000	859,000
Other	350,000	350,000	350,000	350,000	350,000
Tea (E) (planted)	26,400	26,800	27,200	27,600	28,000
(S) (mature)	50,700	53,300	54,700	55,000	55,000
Sugar	88,000	88,000	88,000	88,000	88,000
Wheat	117,000	113,000	109,000	105,000	100,000
Barley	46,700	40,000	55,000	60,000	65,000
Irrig. Horticultural crops (E)	5,000	5,000	7,700	8,000	8,000
Unirrig. Horticultural crops (S)	11,600	12,300	13,000	13,800	14,700
Tobacco	4,400	5,200	5,200	5,200	5,200
Potatoes	54,000	57,300	60,800	64,500	68,400
Irrigated Rice	8,400	8,400	8,400	8,400	8,400
Sunflower & Rape	4,000	11,600	30,000	40,000	50,000
Irrigated Cotton	3,200	3,500	3,900	4,300	4,700
Unirrigated Cotton	22,000	22,000	22,000	22,000	22,000
Groundnuts	15,700	15,700	15,700	15,700	15,700
Pyrethrum	21,000	21,000	21,000	21,000	21,000
TOTAL	1,605,500	1,735,500	1,820,000	1,885,900	1,951,500

Notes for Table 4

- Coffee: Data from Coffee Research Foundation at Ruiru
- Maize: For 1982/83, see Table 3. For 1984/85, figures are derived from 1983/84 hybrid maize sales, assuming a seed rate of 9 kgs/acre or 22-23 kgs/ha. For later years, the 1984 figure is estimated to increase at 3 percent a year, with some new land coming under maize in Kericho and Narok, and some substitution of grass leys for maize in traditional maize areas such as Trans Nzoia and Uasin Gishu. This assumes relatively low growth in productivity per hectare, and consumption rising above the 4 percent p.a. population growth rate owing to positive per capita income growth and a positive income elasticity of demand.
- Tea: Data from KTDA Technical Department. No fertilizer is provided by KTDA for immature tea, whereas estates fertilize tea from date of planting.
- Sugar: KSA estimates. No hectarage expansion expected.
- Wheat: 101,000 ha in 1980/81 (planting March 1981) and 117,000 in 1982/83 (Njoro Plant Breeding Station). Assumed decline to 100,000 ha by 1990 owing to farm subdivision and some competition from sunflower and rape.
- Barley: Figures for 1982 and 1984 are actual (Kenya Breweries Ltd.) Even with rising yields, areas is assumed to rise slowly to increase in beer consumption. Also, levels of barley hectarage fluctuated between 67,400 and 90,250 between 1975/76 and 1981/82 so 65,000 does not seem excessive for 1990.

Notes for Table 4 (contd)

Irrigated Horticultural Simlaw Ltd. (a subsidiary of Kenya Seed Co.)
estimated roughly the following:

	<u>1984/85</u>	<u>1986/87</u>
	(acres)	(acres)
Naivasha	7,500	10,000
Kibwezi	1,500	4,000
Mombasa/Voi/Taveta	1,500	3,000
Thika	1,500	1,500
Athi River	600	600
	<hr/>	<hr/>
	12,600	19,100
	<hr/>	<hr/>
	(5,000 ha)	(7,700 ha)

(In addition, there are 700 acres of smallholder irrigated horticulture at Bungoma and 200 acres at the Kibirigwi scheme near Sagana in Kirinyaga district).

Tobacco:

BAT are not planning to expand acreage beyond 5,200 ha in 1984 which is sufficient for domestic consumption. Exports do not appear promising.

Potatoes:

Based on estimates for 1978 as average of 1976 - 1979 contained in Integrated Rural Survey 1976-79, Table 11.8, p.118. Then assumed 3 percent p.a rate of growth owing to subdivision of high altitude holdings, intrusion into forest areas, and growing man: land ratios.

Rice:

Includes area under rice in the following irrigation schemes: Mwea, Ahero, Bunyala, West Kano. (Statistical Abstracts 1983, p.115).

Notes for Table 4 (contd)

Sunflower & Rape

4,000 ha in 1982, 7,500 ha in 1983, 11,600 ha in 1984 are actual. Projections from EAI exceeded the levels shown for 1988 and 1990 but were restricted in our estimates owing to anticipated competition from other crops, such as wheat and barley.

Irrigated Cotton:

The current plan is for 3,900 ha at Bura by 1990, of which 2,340 was under irrigated cotton by 1982 (Dr. George M. Ruigu, et al, "Bura Irrigation Settlement Project", IDS, August 1984, p.5). In addition, there are 870 ha at Hola Irrigation Scheme (Statistical Abstract 1983, p.115).

Unirrigated Cotton,
Unirrigated Horticultural
Crops, Groundnuts, Bananas &
Pyrethrum

Integrated Rural Survey 1976-79, Table 11:8, p.118. Assume no change from average 1976-79 to 1990.

Table 6: ESTIMATED AREA (Ha) OF HYBRID MAIZE PLANTED IN SEVEN DISTRICTS OF WEST KENYA, 1983

KFA Depot	Estimate Area (ha) from seed sales	Subjective Estimate of Area Planted in each District with Seed from these KFA Depots ('000 ha)								
		1983	Kericho	Nandi	Uasin Gishu	Trans Nzoia	Kakamega	Bungoma	Kisii	Neighbours
Kitale	63,578					57				5
Moi's Bridge	13,471			7		3	3			
Eldoret	62,401		17	45						
Kapsabet	24,486		24							
Turbo	15,611		3	4			8			
Webuye	36,642					1	15	20		
Bungoma	27,880						25			2
Kakamega	31,332						30			
Kisumu	33,083						11		11	11
Kisii	57,836								50	8
Sotik	45,570	25							25	
Kericho	27,822	26								
Kipkelion	8,614	7								
TOTAL	448,326	58	44	56	61	67	45	86	26	

Notes:

1. Seed Sales for 1983 are for period 1st August 1982 to 31st July 1983.
2. Seed rate is taken as 22.23 Kg/ha (formerly equivalent to C.20 lbs/acres).
3. The division of seed amongst the districts was done subjectively, using proportions based partly on the results of the fertilizer analyses, which showed how fertilizers were divided up amongst these districts from the same KFA depots.

Source:

Chemical Engineering Consultants, Fertilizer Infrastructure Improvement Support Exercise, 1983/84.

TABLE 5: HYBRID MAIZE AREA PROJECTIONS 1982/83 to 1990/91

District/Province	1982/83 ¹	1983/84 ¹	1984/85 ²	1986/87 ²	1988/89 ²	1990/91 ²
RVP Trans Nzoia	16	67	6 ¹	73	78	82
Uasin Gishu	56	61	6 ³	67	71	75
Kericho	58	60	6 ²	66	70	74
Nandi	44	46	4 ¹	50	53	57
Other (inc Meru)	74	106	10 ¹	116	123	130
Western Kakamega	67	70	7 ²	76	81	86
Bungoma	45	57	5 ¹	62	66	70
Busia	10	11	1 ¹	12	13	14
Nyanza Kisii	86	95	9 ¹	104	110	117
Other	12	13	1 ¹	14	15	16
Central (inc Embu) ³	81	109	11 ²	119	126	134
Coast & Other Eastern Provinces	4	4	1	4	4	4
TOTAL	598	699	71¹	763	810	859

Sources & Notes:

1. Data for 1982/83 and 1983/84 are derived from hybrid seed sales data from the Kenya Seed Co.
2. For 1984/85 to 1990/91, a compound growth of 5 percent is assumed over the 1983/84 levels for all areas.
3. Based on hybrid seed sales from the following KFA branches: Karatina, Sagana, Maragua, Thika, Nairobi, and 67 percent of sales from Nyahururu (source: Kenya Seed Company).
4. The area for the six largest districts is estimated in Table 4E.

TABLE 7: ESTIMATED AREA (Ha) OF HYBRID MAIZE PLANTED IN SEVEN DISTRICTS OF WEST KENYA, 1984

KFA Depot	Estimated Area (ha) from seed sales	Subjective Estimate of Area Planted in each District with Seed from these KFA Depot ('000 ha)							
		Kericho	Nandi	Uasin Gishu	Trans Nzoia	Kakamega	Bungoma	Kisii	Neighbours
Kitale	69,167				63				6
Moi's Bridge	15,326			9	3				
Eldoret	64,087		17	47					
Kapsabet	25,512		26						
Turbo	16,950		3	5					
Webuye	39,354				1				
Bungoma	36,633						22		2
Kakamega	30,135					30			
Kisumu	34,028					12		11	11
Kisii	63,538							55	9
Sotik	56,712	28						29	
Kericho	25,113	25							
Kipkelion	6,903	7							
TOTAL	483,491	60	46	61	67	70	57	95	28

Notes:

1. Seed sales for 1984 are for period 1st August 1983 to 31st May 1984. Sales in June and July are very small.
2. Seed rate is taken as 22.25 kg/ha (formerly equivalent to C.20 lbs/acre).
3. The division of seed amongst the districts was done subjectively, using proportions based partly on the results of the fertilizer analyses, which showed how fertilizers were divided up amongst these districts from the same KFA depots.

Source:

Adapted from Chemical Engineering Consultants, Fertilizer Infrastructure Improvement Support Exercise, 1983/84.

TABLE 8: ESTIMATED AREAS OF TOTAL MAIZE, HYBRID MAIZE & FERTILISED MAIZE.

	QUANTITY IN EACH DISTRICT, '000 Ha						Overall Totals
	Kericho	Nandi	Uasin Gishu	Trans Nzoia	Kakamega	Bungoma	
Estimated total maize areas and sources							
A. Govt., Cereal prodn policy, 1969	37.2	24.3	18.2	36.4	80.9	54.2	251.2
B. District Development plans & D.A.O.s 1982	72.0	63.0	47.0	50.0	110.0	70.0	412.0
C. Lake Basin Dev. Auth. Survey, 1983	42.2	36.9	56.3	50.4	54.9	48.2	289.4
D. C.B.S. Crop Forecast Survey, 1984	55.7	55.7	37.7	33.0	131.2	82.3	397.6
Estimated areas planted with hybrid seed - K. Seed Co. 1983/84 Ha	58.0	44.0	56.0	61.0	67.0	45.0	331.0
Estimated areas on which farmers use fertilisers.							
1983 - planting types	10.1	12.3	29.2	35.3	15.1	14.8	117.3
- top-dressing types	0.2	2.9	19.6	37.5	7.8	5.7	73.9
1984 - Preliminary figures							
- planting types	14.9	10.2	29.8	29.1	19.5	15.6	119.1
- top-dressing types	0.3	2.2	20.5	35.8	9.8	7.7	76.3

Notes:

- 1.A These figures are 15 years old, and the areas have increased greatly. The area in U. Gishu and T. Nzoia were mostly on large-scale farms, and were therefore reasonably accurate.
 - B. Based on subjective estimates by Agricultural Department field staff every year.
 - C. The Lake Basin Development Authority commissioned a database survey, and the area was sample-surveyed in November, 1983, using aerial photos. This survey captured the main Long Rains mz. crops in the upper areas, but in lower areas the main crop is harvested in August - September, hence only the Second Rains crops would be on the ground then, i.e. much of Kakamega and Bungoma. The survey measured all maize intercrops was estimated, and the derived maize areas were then added to the pure maize to give the total maize areas, shown above. Also, the LBDA area covers only about 2/3 of Kericho District.
 - D. The CBS crop Forecast Survey covers the Long Rains crops.
 - E. In the densely populated, lower warmer areas there is a lot of double-cropping of maize, and most estimates apparently do not take that into account; certainly it is not usually even mentioned.
2. Hybrid maize areas - from Table 7.7.
 3. Areas planted with fertilizers - from Tables 7.1 to 7.6

Source: Chemical Engineering Consultants, Fertilizer Infrastructure Improvement Support Exercise, 1983/84.

TABLE 10: ESTIMATES OF THE GAP BETWEEN PRESENT AND OPTIMAL LEVELS OF PHOSPHATE APPLICATION FOR MAJOR CROPS PER HECTARE

PHOSPHATE

Crop	Estate/Smallholder District/Province	Estimated Present Level (1982/83)	Estimated Usage in 1990	Estimated Usage in 2000	Estimated Economic Optimum at present I/O
Coffee	Estates	53	60	74	74
	Smallholders	10	25	48	48
Maize	Trans Nzoia	42	50	60*	90
	Uasin Gishu	38	45	60*	90
	Kericho/Nandi	7	20	60*	90
	Other RVP (inc. Meru)	15	25	40*	60
	Bungoma/Kakamega	8	20	50	75
	Kisii	2	20	40*	60
	Other Nyanza Central Province (in Embu)	15	25	40*	60
Tea	Estates	30	30*	30*	30
	Smallholders	12	14	18*	30
Potatoes	-	23	50	190*	255
Irrigated Cotton	-	-	-	-	-
Unirrigated Cotton (non Black Cotton)	-	-	20	46*	50
Groundnuts	-	-	20	36	40

Sources & Notes:

* Research Station recommendations (see bibliography)

1. See footnotes for Table 9.

2. For coffee, no recommendations are available for phosphate application so the current N:P ratios of 2:7 to 1 and 3:2 to 1 respectively for estates and smallholders was applied to derive recommended phosphate application rates from recommended nitrogen application rates.

TABLE 9: ESTIMATES OF THE GAP BETWEEN PRESENT AND OPTIMAL LEVELS OF NITROGEN APPLICATION FOR MAJOR CROPS PER HECTARE

NITROGEN

Crop	Estate/Smallholder District/Province	Estimated Present Level (1982/83)	Estimated Usage in 1990	Estimated Usage in 2000	Estimated Economic Optimum at present I/O prices
Coffee	Estate	142	160	200*	200
	Smallholders	45	80	30	150
Hybrid Maize	Trans Nzoia	25	40	60*	90
	Uasin Gishu	23	40	60*	90
	Kericho/Nandi	2	20	60*	90
	Other RVP (inc Meru)	10	20	40*	60
	Bungoma/Kakamega	5	20	40*	60
	Kisii	1	20	40*	60
	Central Province (inc Embu)	10	30	40	60
Tea	Estate	150	150	50*	150
	Smallholder	46	70	90*	150
Wheat	-	23*	23*	23*	23*
Potatoes	-	10	25	75*	100
Irrigated Cotton	-	64*	64*	64*	64*
Unirrigated Cotton (Black Cotton Soils)	-	-	10	26	30

Sources & Notes:

* Research Station recommendations (see bibliography)

1. For estimates of present levels of use, see Tables 1-4.

2. For all crops except smallholder coffee, recommended levels are reached by the year 2000. For most crops these are still well below the economic optimum. For smallholder coffee, the level in the year 2000 is taken as the level in the leading smallholder district in 1934 as there is no clear research station recommendation.

3. Estimated usage in 1990 is an intermediate rate between present application rates and recommended rates.

4. For most crops, the levels recommended by research stations are well below the economic optimum at present input and output prices.

TABLE 11: LEVELS OF N, P, K APPLICATION PER HECTARE ON SMALLHOLDER
COFFEE BY DISTRICT 1982/83

<u>District</u>	<u>Ha('000)²</u>	<u>Kilos per Hectare Application Rates¹</u>		
		<u>N</u>	<u>P</u>	<u>K</u>
Muranga	12.6	263.5	267.4	7.4
Kiambu	10.3	70.9	44.1	8.2
Embu	6.1	29.3	26.2	-
Kirinyaga	7.5	28.7	-	-
Machakos	9.1	15.5	4.1	1.1
Nyeri	8.6	14.5	1.8	-
Meru	34.6	10.6	1.4	-
Kisii	7.2	-	-	-

Sources & Notes:

1. Whittaker (1984). See bibliography and data sources.
2. CBK, Annual Report, Balance Sheet and Accounts
30th September 1983, Nairobi, 1984.

TABLE 12: LEVELS OF NITROGEN APPLICATION PER HECTARE ON SMALLHOLDER TEA
BY DISTRICT IN 1982/83

<u>District</u>	<u>No. Growers</u>	<u>No. Hectares</u>	<u>No. tons Supplied by KTDA of 25-5-5</u>	<u>Kilos per Hectare Application Rates</u>
Kirinyaga	5,593	2,900	1153.5	99
Embu	3,549	1,800	610.2	85
Meru	8,214	5,800	1818.1	78
Muranga	13,221	8,200	2425.0	74
Nyeri	7,943	4,800	1279.1	67
Kiambu	5,160	4,600	1079.7	59
Nandi	1,330	1,300	175.7	34
Kakamega	2,160	1,800	236.3	33
Kericho	5,953	6,700	825.3	31
Kisii	7,330	10,300	750.8	18
Kitale	153	n.a.	n.a.	n.a.
TOTAL	60,606	48,200	10353.7	53(weighte average)

Source: The Kenya Tea Development Authority (KTDA).

TABLE 14: THE GAP BETWEEN PRESENT AND OPTIMAL LEVELS OF PHOSPHATE USE FOR MAIZE, COFFEE AND TEA IN 1982/83

Crop	Estate/Smallholder District/Province	Estimated Levels of Use in 1982/83	Nutrient Requirement at Recommended Levels (tons of phosphate)	Additional Nutrient Requirement	Present as % of Recommended %
Coffee	Estate	1,760	2,486	726	71
	Smallholder	1,460	4,944	3,484	30
	Subtotal	3,220	7,430	4,210	43
Maize	Trans Nzoia	2,560	3,660	1,100	70
	Uasin Gishu	2,144	3,360	1,216	64
	Kericho	200	3,480	3,280	6
	Nandi	506	2,640	2,134	19
	Other RVP (inc. Meru)	1,152	2,880	1,728	40
	Bungoma	368	2,250	1,882	16
	Kakamega	544	3,350	2,806	16
	Kisii	30	3,440	3,410	1
	Other Nyanza	8	480	472	2
	Central Province (inc. Embu)	1,328	3,320	1,992	40
	Subtotal	8,840	28,860	20,020	31
Tea	Estate	1,145	1,145	1,020	100
	Smallholder	500	1,520	1,020	33
	Subtotal	1,645	2,665	1,020	57
TOTAL	13,705	38,955	25,250	35	

Sources: Tables 1 - 10.

TABLE 13: THE GAP BETWEEN PRESENT AND OPTIMAL LEVELS OF NITROGEN CONSUMPTION FOR MAIZE, COFFEE AND TEA IN 1982/83

Crop	Estate/Smallholder District/Province	Estimated Levels of Use in 1982/83	Nutrient Requirement at Recommended Levels (tons of nitrogen)	Additional Nutrient Requirement	Present as % of Recommended %
Coffee	Estate	4,760	6,720	1,960	72
	Smallholder	4,660	13,390	8,730	35
	Subtotal	9,420	20,110	10,690	47
Maize	Trans Nzoia	1,520	3,660	2,140	42
	Uasin Gishu	1,270	3,360	2,090	38
	Kericho	120	3,480	3,360	3
	Nandi	300	2,640	2,340	11
	Other RVP (inc. Meru)	620	2,490	1,540	25
	Bungoma	220	1,800	1,580	12
	Kakamega	320	2,680	2,360	12
	Kisii	20	3,440	3,420	1
	Other Nyanza	5	480	475	1
	Central Province (inc. Embu)	850	3,340	2,200	26
	Subtotal	5,245	27,370	21,505	19
Tea	Estate	4,225	4,225	-	100
	Smallholder	2,500	7,600	5,100	33
	Subtotal	6,725	11,825	5,100	57
TOTAL	21,390	59,305	37,295	36	

Sources: Tables 1 - 10.

TABLE 16: PROJECTIONS OF PHOSPHATE NUTRIENT USE PER HECTARE FOR SELECTED MAJOR CROPS TO 1990/91

Crop	Estate/Smallholder District/Province	1982/83	1984/85	1986/87	1988/89	1990/91	Annual Rate of Growth
		(Kilos per Hectare)					
Coffee	Estate	53.0	54.7	56.4	58.2	60.0	1.56
	Smallholders	14.0	16.2	18.7	21.6	25.0	7.52
Hybrid Maize	Trans Nzoia	40.0	42.3	44.7	47.3	50.0	2.83
	Uasin Gishu	36.0	38.1	40.3	42.6	45.0	2.83
	Kericho/Nandi	6.0	8.1	11.0	14.8	20.0	16.24
	Other RVP (inc. Meru)	15.0	17.0	19.4	22.0	25.0	6.59
	Bungoma/Kakamega	8.0	10.1	12.6	15.9	20.0	12.14
	Kisii & Other Nyanza Prov. Central Province (inc. Embu)	2.0	3.6	6.3	11.2	20.0	33.35
Tea	Estates	30.0	30.0	30.0	30.0	30.0	-
	Smallholders	12.0	13.3	14.7	16.3	18.0	5.20
Potatoes & Other Horticultural Crops (S)	Smallholders	23.0	27.9	33.9	41.2	50.0	10.19
Cotton (Non Black Cotton Soils)		0.0	2.0	4.0	7.0	10.0	*
Groundnuts		0.0	2.0	4.0	7.0	10.0	*

Sources: Table 9 (for 1982/83 and 1990/91)

Notes: As for Table 9.

* Straight line projection.

TABLE 15: PROJECTIONS OF NITROGEN NUTRIENT USE PER HECTARE FOR SELECTED MAJOR CROPS TO 1990/91

Crop	Estate/Smallholder District/Province	1982/83	1984/85	1986/87	1988/89	1990/91	Annual Rate of Growth
		(kilos per Hectare)					
Coffee	Estates	142.0	146.3	150.7	155.3	160.0	1.50
	Smallholders	45.0	52.0	60.0	69.3	80.0	7.46
Hybrid Maize	Trans Nzoia	26.0	29.0	32.2	35.9	40.0	5.53
	Uasin Gishu	24.0	27.3	31.0	35.2	40.0	5.9
	Kericho/Nandi	5.0	7.1	10.0	14.1	20.0	18.92
	Other RVP (inc. Meru)	4.0	6.0	8.9	13.4	20.0	22.84
	Bungoma/Kakamega	10.0	11.9	14.1	16.8	20.0	9.05
	Kisii & Other Nyanza Prov. Central Province (in Embu)	1.0	2.1	4.5	9.5	20.0	45.42
Tea	Estate	150.0	150.0	150.0	150.0	150.0	-
	Smallholders	49.0	57.0	66.4	77.3	90.0	7.89
Potatoes & Other Horticultural Crops (Smallholders)		9.0	11.6	15.0	19.4	25.0	13.62
Cotton (Black Cotton Soils)		-	2.0	4.0	7.0	10.0	-

Sources: Table 9 (for 1982/83 and 1990/91)

Notes: 1. For crops in this table, a constant growth rate is assumed for the period 1982/83 to 1990/91 to reach the projected use in 1990/91 (Table 9). The implied growth rates are shown in the final column.

2. For all other major crops, it is assumed there will be no change in rates of application between 1982/83 and 1990/91. For levels of use in 1982/83 see Tables 1 - 3.

* Straight line projection.

TABLE 17 PROJECTIONS OF TOTAL NITROGEN NUTRIENT REQUIREMENT BY CROP TO 1900

Crop	Estate/Smallholder District/Province	1982/83	1984/85	1986/87	1988/89	1990/91
		(tons)				
Coffee	Estates	4,760	4,910	5,040	5,210	5,380
	Smallholders	4,660	5,570	6,630	7,740	8,800
	Subtotal	9,420	10,480	11,670	12,950	14,180
Hybrid Maize	Trans Nzoia	1,590	2,070	2,410	2,890	3,280
	Uasin Gishu	1,340	1,760	2,140	2,560	3,000
	Kericho	290	560	860	1,190	1,480
	Nandi	220	420	650	900	1,140
	Other RVP(in Meru)	300	870	1,390	1,970	2,600
	Western Province	1,220	1,700	2,250	2,720	3,400
	Nyanza Province	100	670	1,300	2,000	2,660
	Central Prov. (inc. Embu)	810	1,680	2,380	3,150	4,020
	Subtotal	5,870	9,730	13,380	17,380	21,580
Tea	Estates ¹	4,225	4,290	4,350	4,420	4,480
	Smallholders	2,500	3,090	3,770	4,400	4,950
	Subtotal	6,725	7,380	8,120	8,820	9,430
Sugar	Mumias & Nzoia	2,860	2,860	2,860	2,860	2,860
	Sugar Belt Factories	1,480	1,480	1,480	1,480	1,480
	Sony	570	570	570	570	570
	Ramisi	580	580	580	580	580
	Subtotal	5,490	5,490	5,490	5,490	5,490
Wheat		2,520	2,430	2,350	2,260	2,150
Barley		260	220	310	330	360
Other Horti- cultural Crops	Estates	360	360	550	580	580
	Smallholders	100	170	230	300	370
	Subtotal	460	530	780	880	950
Tobacco		210	290	290	290	290
Potatoes		490	800	1,090	1,420	1,710
Irrigated Rice		260	260	260	260	260
Sunflower & Rape		350	1,020	2,630	3,500	4,380
Pineapples		920	920	920	920	920
Irrigated Cotton		230	230	230	230	230
Unirrig. Cotton ² (BC soils)		-	20	40	80	110
Groundnuts		-	-	-	-	-
TOTAL		33,200	39,800	47,560	54,810	62,040
Increase over previous two years		-	19.9%	19.5%	15.2%	13.2%

Sources: Tables 2, 4, 5 and 15.

- Notes: 1. This is above the optimum rate in research station recommendation of 150kgs. nitrogen/hectare and 30kgs. each of phosphate and potash because many estates already use substantially above this level.
2. Assumes half cotton grown on black cotton soils.

TABLE 18: PROJECTIONS OF ^{TOTAL} PHOSPHATE NUTRIENT REQUIREMENT BY CROP TO 1990

Crop	Estate/Smallholder District/Province	1982/83	1984/85	1986/87	1988/89	1990/91
Coffee	Estates	1,760	1,850	1,920	1,980	2,020
	Smallholders	1,460	1,680	2,030	2,400	2,750
	Subtotal	3,220	3,530	3,950	4,380	4,770
Hybrid Maize	Trans Nzoia	2,440	2,900	3,210	3,670	4,100
	Uasin Gishu	2,020	2,390	2,680	2,980	3,360
	Kericho	350	560	860	1,190	1,480
	Nandi	260	420	650	900	1,140
	Other RVP (inc Meru)	1,110	1,850	2,320	2,710	3,250
	Western Province	980	1,560	2,100	2,720	3,400
	Nyanza Province	200	670	1,180	1,880	2,660
	Central Province (inc Embu)	1,220	1,900	2,270	2,770	3,350
Subtotal	8,580	12,250	15,270	18,820	22,760	
Tea	Estates ¹	1,150	1,160	1,180	1,200	1,210
	Smallholders	500	640	770	880	990
	Subtotal	1,650	1,800	1,950	2,080	2,200
Sugar	Mumias & Nzoia	1,050	1,050	1,050	1,050	1,050
	Sugar Belt Factories	190	190	190	190	190
	Sony	210	210	210	210	210
	Ramisi	410	410	410	410	410
	Subtotal	1,860	1,860	1,860	1,860	1,860
Wheat		6,720	6,490	6,260	6,030	5,740
Barley		2,300	1,970	2,710	2,960	3,200
Other Horticultural Crops	Estates	920	920	1,420	1,470	1,470
	Smallholders	270	370	480	610	740
	Subtotal	1,190	1,290	1,900	2,080	2,210
Tobacco		480	480	480	480	480
Potatoes		1,240	1,720	2,250	2,840	3,420
Irrigated Rice		280	200	280	280	280
Sunflower & Rape		680	1,970	5,100	6,800	8,500
Pineapples		-	-	-	-	-
Irrigated Cotton		-	-	-	-	-
Unirrig. Cotton ² (Non BC soils)		-	20	40	80	110
Groundnuts		-	20	40	80	110
TOTAL		28,200	33,680	42,090	48,690	55,640
Increase over previous two years		-	19.4%	25.0%	15.7%	14.3%

Sources: Tables 2, 4, 5 and 16.

Notes: 1. This is above the optimum rate in research station recommendations of 150kg nitrogen/hectare and 30kgs each of phosphate and potash because many estates already use substantially above this level.

2. Assumes half cotton grown on non black cotton soils.

TABLE 20: ESTIMATE OF TOTAL NUTRIENT REQUIREMENTS OF NITROGEN, PHOSPHATE AND POTASH 1982/83 - 1990/91 (tons)

		1982/83	1984/85	1986/87	1988/89	1990/91
IDS/DP 280	Nitrogen	33,175	38,300	44,960	52,340	62,040
	Phosphate	28,310	33,180	40,870	47,630	55,640
	Potash	3,450	3,650	3,860	4,100	4,350
	TOTAL	64,935	75,130	89,690	104,070	122,030
	Percentage increase over previous two years	-	15.7%	19.4%	16.0%	17.3%
	Fertilizer requirement based on nutrient concentration factor in 1982/83 type imports	160,190 ¹	185,350	221,270	256,740	301,050

Sources: Tables 17, 18 and 19.

Note: 1. This assumes the ratio of tons of nutrients to tons of fertilizer in 1982/83 will remain the same to 1990/91 (i.e. 1:2.467). However, if policies increase the nutrient: fertilizer ratio, for example by increasing use of Urea in place of ASN, the quantities would be slightly less.

TABLE 19: PROJECTIONS FOR TOTAL POTASH REQUIREMENT BY CROP TO 1990

Crop	Estate/Smallholder District/Province	1982/83	1984/85	1986/87	1988/89	1990/91
		(tons)				
IDS/DP 280	Coffee	1,050	1,100	1,150	1,180	1,210
	Smallholders	200	280	330	390	450
	Subtotal	1,250	1,380	1,480	1,570	1,660
Tea	Estates	1,150	1,160	1,180	1,200	1,210
	Smallholders	500	640	770	880	990
	Subtotal	1,650	1,800	1,960	2,080	2,200
Sugar	Mumias & Nzoia	50	50	50	50	50
	Sugar Belt Factories	-	-	-	-	-
	Sony	10	10	10	10	10
	Ramisi	-	-	-	-	-
	Subtotal	60	60	60	60	60
Tobacco	Tobacco	450	450	450	450	450
	Tobacco	450	450	450	450	450
	TOTAL	3,450	3,690	3,940	4,160	4,370
	% growth over previous two years	-	7.0%	6.8%	5.6%	5.0%

Sources: Tables 2, 4 and 5.

Note: For each crop it assumed that application of potash relative to nitrogen and phosphate (as shown in Table 2) will continue to 1990/91 in the same proportion as in 1982/83.

TABLE 21: ESTIMATES OF MARGINAL RETURNS TO FERTILIZER USE PER SHILLING USED FOR FERTILIZER APPLICATION ON MAJOR CROPS
1978/79 - 1983/84

	Coffee	Tea	Maize	Wheat	Sugarcane	Sunflower	Barley
1978/79	11.0	n.a.	3.3	5.0	1.1	3.1	3.9
1979/80	10.4	n.a.	2.7	5.6	1.0	2.2	3.8
1980/81	7.2	7.0	2.5	4.0	0.8	1.6	2.8
1981/82	7.0	4.9	3.0	3.7	0.7	1.7	2.6
1982/83	9.4	7.5	3.6	4.5	0.9	3.4	2.3
1983/84	n.a.	13.7	3.0	4.3	1.2	3.0	2.5

Sources: See Tables 22 and 23 attached.

n.a. = not available.

TABLE 21 FOOTNOTES

- Coffee: Based on marginal response of 20kgs of cherry to 1 kilo of nutrient (which is derived from data in CRF Recommendations in Technical Circular No.56), a ratio of 7kgs of cherry to 1 kilo of clean coffee and no nutrients derived from ASN and TSP applied in the ratio of 3:1.
- Tea: Based on marginal response of just 20kgs of fresh leaf per kilo of nutrient applied. The 1980/81 figure is based on nutrient costs in 20:10:10 and 1983/84 in 25:5:5. In 1982/83, 48 out of 79 experimental plots with yields results had responses of over 20kgs of green leaf per kilo of nitrogen (see Othierio and Siele).
- Maize/Wheat: Based on marginal response of 15kgs of maize or wheat grain per kilo of nutrient applied (for maize from fertilizer trials in Kitale). Nutrient cost estimated from nutrient costs in DAP.
- Sugarcane: Based on an estimated 5kgs of sugar per kilo of nutrient, which is 50 tons of sugarcane with a 10:1 ratio of cane to sugar. This ratio holds only up to 75kgs/hectare of nitrogen, and falls approximately 3.375 kgs of sugar for applications between 75 and 150kgs/hectare. (Source: World Bank estimates). Marginal returns are based on the cost of nutrients derived from SA and TSP applied in the ratio of 3:1.
- Sunflower: Based on marginal response of 10kgs of sunflower per kilo of nutrient applied. Nutrient cost estimated from nutrient costs in DAP. (Source: EAI estimates).
- Barley: Based on marginal response of 12kgs of barley grown per kilogram of nutrient applied. Nutrient cost estimated from nutrient costs in TSP and MAP applied in ratio of 1:1. (Source: KBL estimates).

TABLE 22: OFFICIAL PRICES FOR SELECTED CROPS IN KENYA, 1970/71 - 1983/84

Year	Coffee per kg clean coffee	KTPA tea per kg	Maize per 90 kg. bag	Average (Grade 3) wheat per 50kg bag	Sunflower & Rape per kilo	Sugar per ton cane	Barley per 80kgs Grade 1	Cotton AR per kg.	Basmati Rice per kg.	Flue-cured Tobacco per kg.
1970/71	n.a	n.a	n.a	43.14	n.a.	25	n.a	n.a	n.a	n.a
1971/72	n.a	1.43	n.a	48.14	n.a	25	n.a	1.20	n.a	n.a
1972/73	890	1.87	n.a	48.65	n.a	25	n.a	1.25	n.a	n.a
1973/74	1,010	1.21	35	58.00	n.a	52	n.a	1.30	n.a	n.a
1974/75	940	1.40	65	80.00	n.a	62	n.a	1.40	n.a	n.a
1975/76	2,231	1.60	80	100.00	n.a	92	n.a	2.00	1.20	7.56
1976/77	3,934	3.42	80	120.00	n.a	105	n.a	2.50	1.45	7.74
1977/78	2,607	2.38	80	120.00	1.25(NCPB)	133	n.a	3.20	1.45	9.25
1978/79	2,660	2.33	80	120.00	1.25(NCPB)	133	116	3.45	1.60	10.84
1979/80	2,483	2.75	65	135.00	0.89(NCPB)	133	116	3.55	1.60	10.35
1980/81	2,133	2.50	95	150.00	1.00(NCPB)	133	130	3.60	1.70	10.57
1981/82	2,780	2.62	130	161.00	1.25(NCPB)	150	145	3.80	2.70	12.03
1982/83	3,489	4.03	158	195.00	2.50(GAI)	170	145	4.30	2.80	13.25
1983/84	n.a	7.27	158	225.00	2.65(GAI)	227	145	4.80	3.25	15.02

Sources: See list attached.

TABLE 22: SOURCES

Coffee: Coffee Board of Kenya, Annual Report and Statement of Accounts, various years.

Tea: KTDA, Annual Report and Statement of Accounts, various years.

Maize: Maize and Produce Board, Annual Reports; Kenya Gazette, various issues.

Wheat: KFA, "Growing Together" - Diamond Jubilee Magazine, 1983.

Sunflower
& Rape: Maize and Produce Board, Annual Reports; East African Industries.

Sugarcane: Kenya Sugar Authority.

Barley: Kenya Breweries Ltd.

Cotton: Cotton and lint Marketing Board.

Basmati
Rice: National Irrigation Board.

Tobacco: British American Tobacco Ltd.

TABLE 24: FIRST ESTIMATES OF SMALLHOLDER FERTILIZER USE IN FOUR DISTRICTS OF KENYA IN 1983 (in 50kg. bags)

	Cooperative Unions	KTDA	KFA through retailers	KFA direct sales to farmers	TOTAL	High Potential Land Equivalent '000 ha	Estimate of Application per Hectare
Muranga	216,900	48,500	8,550	9,900	283,850	217	65.4
Nyeri	162,400	25,580	14,745	18,900	221,625	160	69.3
Kirinyaga	34,420	23,070	6,150	1,725	65,365	100	32.7
TOTAL	413,720	97,150	29,445	30,525	570,840	477	59.8
Est. Market Share	72.5	17.0	5.2	5.3	100	-	-

Sources: 1. Cooperative unions of Muranga, Nyeri and Kirinyaga

2. KTDA

3. For KFA, chemical Engineering Consultants, Fertilizer Infrastructure Improvement Support, Research Report No.7, Nairobi, November 1984.

4. For estimates of hectare of high potential land equivalent, see ILO, Employment, Incomes and Equality, Geneva, 1972, p.35. As this includes some land in estates, it over-estimates smallholder area and thus slightly underestimates fertilizer use per hectare.

Notes: 1. As the KFA data given by CEC are for the period January - July, they were increased by a factor of 50 percent to estimate the annual sales total. CEC data is for 1984, which is taken as a proxy for sales in 1983.

2. Data for the Muranga cooperative unions and KTDA data relates to 12 months of 1982/83 rather than to the 1983 calendar year.

TABLE 23: FERTILIZER PRICES PER 50kg. 3AG F.O.R. NAKURU (Kshs.)

	SSP	TSP	DAP	MAP	ASN	AN	SOA	UREA	6-18-20	2-20-0	20-10-10	25-5-5
1970/71	14.20	26.40	36.05	37.70	23.35	23.35	19.20	36.25	-	-	-	-
1971/72	14.70	30.75	40.90	42.80	29.30	29.30	21.35	31.75	-	-	-	-
1972/73	19.00	42.95	56.15	56.50	33.85	33.85	26.50	42.30	-	-	-	-
1973/74	20.90	58.60	77.10	77.5	41.75	41.75	34.85	53.95	-	-	-	-
1974/75	20.00	155.85	77.10	195.40	108.85	41.75	34.85	53.95	-	-	-	-
1975/76	20.90	125.00	150.00	162.50	90.00	90.00	60.00	110.00	-	-	-	-
1976/77	20.90	110.15	150.00	161.25	89.25	83.75	60.00	109.25	-	-	-	-
1977/78	62.15	96.75	118.55	119.60	91.70	86.60	73.75	113.50	-	-	-	-
1978/79	72.50	115.00	128.50	129.50	105.00	100.00	79.50	120.00	-	-	-	-
1979/80	72.50	122.45	128.50	129.50	99.50	93.80	77.95	112.45	-	-	-	-
1980/81	81.85	166.60	199.80	207.75	120.30	116.30	95.00	143.75	n.a	143.65	139.35	n.a
1981/82	143.30	224.20	230.80	237.95	159.80	140.40	108.80	22.20	n.a	187.40	139.35	176.00
1982/83	143.30	179.10	233.85	237.95	159.80	143.45	121.80	222.20	n.a.	187.40	n.a	185.00
1983/84	134.10	171.50	281.30	289.90	171.65	128.60	120.75	166.75	246.65	175.45	165.35	175.00

Sources: 1. KFA

2. For selected compounds, data is taken from "Costs, Yields and Prices", Ministry of Agriculture, Nairobi (issues for various years).

TABLE 25: ESTIMATES OF ANNUAL SALES TO SMALLHOLDER FARMERS THROUGH MAJOR DISTRIBUTION CHANNELS IN NYERI AND KISII DISTRICTS, 1983(in 50 kilo bags)

	Nyeri %		Kisii %	
Cooperative Union				
Through Societies (cash & Loan)	140,570		2,350	
Through Shops (cash)	21,830		-	
TOTAL	162,400	73	2,350	11
KTDA (loans)	25,580	12	15,020	70
KFA (cash)	18,900	9	2,770	13
Small Farm Shops (cash)	11,600	5	1,250	6
Dehydration Factory Sales	2,500	1	-	-
TOTAL	220,980	100	21,390	100
Hectares of High Potential Land	160,000		220,000	
Fertilizer Applied Per Ha (kgs)	69.1		4.9	

Sources: 1. Cooperative Unions in Nyeri and Kisii. For Nyeri, the data refers to 1983 and for Kisii to the period October 1983 - September 1984.

2. KTDA.

3. For KFA, Chemical Engineering Consultants, Fertilizer Infrastructure Improvement Support, Research Report No.7, Nairobi, November 1984.

4. For farm shops, see survey.

5. For area of high potential land, ILO, Employment, Incomes and Equality, Geneva, 1972, p.35.

Notes: 1. As the KFA data given by CEC are for the period January - July, they were increased by a factor of 50 percent to estimate the annual sales total. CEC data is for 1984, which is taken as a proxy for sales in 1983.

2. KFA sales to retailers in Nyeri District in the period January - July 1984 were 9,829 bags, so the survey estimate of 11,600 bags for the whole of 1983 is consistent with all family-owned shops buying their supplies direct from the KFA.

3. KTDA sales are for 1982/83, but are taken as a proxy for sales in the calendar year of 1983.

4. These figures exclude sales to estate sector, although a small part of cash sales through shops owned by the Nyeri Cooperative Union may have gone to estates.

TABLE 26: LEVELS OF FERTILIZER SALES IN SHOPS IN NYERI AND KISII DISTRICTS
IN 1983

Levels of Sales (50kg.bbags)	No. of shops Nyeri	No. of Shops Kisii
0 - 100	25	17
101 - 200	8	1
201 - 300	3	1
301 - 500	5	1
501 - 1000	2	-
1001 - 2000	3	-
Over 2000	3	-
TOTAL	49	20

Source: Survey

Schluter, M. "The Role of Shops in the Distribution of
Agricultural Inputs to Smallholder Farmers in Nyeri and Kisii
Districts of Kenya in 1983."

TABLE 27: RANGE OF PRICES PER 50kg. BAG FOR MAJOR FERTILIZER TYPES IN NYERI AND KISII IN SEPTEMBER 1984

<u>Price</u> (Kshs)	<u>No. of Shops</u>		<u>Price</u> (Kshs)	<u>DAP</u> <u>Nyeri</u>
	<u>20-20-0</u> <u>Nyeri</u>	<u>TSP¹</u> <u>Kisii</u>		
176 - 180	2	1	275 - 280	1
181 - 182	4	1	281 - 290	10
186 - 190	4	4	291 - 300	21
191 - 195	3	2	301 - 325	6
196 - 200	18	-	326 - 350	5
201 - 220	4	-	351 - 375	-
Over 200	8	-	376 - 400	2
TOTAL	43	8	TOTAL	45

Source: Survey, Data, op.cit.

Notes: 1. The price for one case was below Kshs. 176, so the total number of shops selling TSP was 9.

TABLE 28: RANGE OF PRICES PER KILO FOR MAJOR FERTILIZER TYPES SOLD BY SHOPS IN NYERI DISTRICT SEPTEMBER 1984

<u>Kshs. per Kilo</u>	<u>Number of Shops</u>		
	<u>DAP</u>	<u>20-20-0</u>	<u>CAN</u>
3.00	-	-	-
4.00	-	4	8
4.50	-	5	3
5.00	-	17	1
5.50	-	3	2
6.00	7	6	-
6.50	8	5	-
7.00	9	2	-
7.50	11	1	-
8.00	10	-	-
8.50	1	-	-
TOTAL	46	43	14

Source: Survey, op.cit.

Note: No shops in Kisii reported that they sold fertilizer on a kilo by kilo basis.

TABLE 29: TRANSPORTATION COST PER PERSON AND PER FERTILIZER BAG FROM MARKET CENTRE TO NEAREST MAIN TOWN IN NYERI AND KISII DISTRICTS IN SEPTEMBER 1984

Distance to Town (kms)	No. of Cases	Average Time Needed (hrs)	Transportation Cost (Shs)		Total Cost
			Per Person One way(1)	Per bag	Two ways & Bag One way
<u>NYERI DISTRICT</u>					
0-5	10	0.64	5.10	5.79	15.90
6-10	16	0.47	5.28	6.33	16.90
11-15	15	1.35	7.20	6.46	20.90
Over 15	5	1.00 ²	13.40	8.00	34.80
WEIGHTED AVERAGE	8.7	0.84	6.71	6.40	19.80
<u>KISII DISTRICT</u>					
0-5	2	0.25	4.50	4.00	13.00
6-10	3	0.52	4.66	4.00	13.30
11-15	9	0.65	7.50	5.75	22.80
16-20	14	0.69	8.61	6.46	23.70
21-25	9	0.85	9.66	6.88	26.20
Over 25	20	1.42	15.40	7.80	38.60
WEIGHTED AVERAGE	22.8	0.94	10.63	6.66	27.90

Source: Survey Data, op.cit.

Notes:1. All the costs for transport are for matatus (local taxis), although buses are available at a slightly lower cost on some routes.

2. All the shops over 15km from a major town were in two trading centres on a major trunk route to Nyeri so the transport time required was relatively low.

TABLE 30: ESTIMATED TOTAL VALUE OF AGRICULTURAL INPUTS SOLD BY SHOPS IN NYERI AND KISII DISTRICTS IN 1983)(Kshs. millions)

	<u>Nyeri</u>	<u>Kisii</u>	<u>Total</u>
Fertilizers	8.5	0.2	8.5
Maize Seeds	1.8	2.1	3.9
Vegetable Seeds	0.6	0.1	0.7
Agricultural Chemicals	0.5	-	0.7
Agricultural Equipment	0.2	0.1	0.3
Total	11.6	2.5	14.1

Source: Survey Data, op.cit.

Note: 1. Total value of sales of agricultural chemicals in Kisii District in 1983 is estimated at just Kshs. 17,700.

TABLE 31: KENYA SEED COMPANY HYBRID SEED MAIZE SALES - 2kg. UNITS

	<u>Total</u> 1980/81	<u>Total</u> 1981/82	<u>Total</u> 1982/83	<u>Total</u> 1983/84
Kitale	631	304	1,792	4,407
Kapsabet	-	-	2,760	9,336
Webuye/Bungoma	1,400	2,791	1,440	650
Kakamega	5,211	12,992	19,550	21,013
Kisumu	10,415	11,200	10,211	13,246
Kisii	9,470	12,439	9,318	224,082
Sotik	-	3,000	2,394	4,886
Kericho/Kipkellion	-	-	-	2,791
Molo	-	-	555	360
Nakuru	3,691	9,181	4,220	1,873
Naivasha/Narok	1,780	1,058	1,583	1,933
Nyahururu	221	487	276	1,756
Nanyuki	240	137	2,334	3,966
Karatina	18,485	10,048	22,138	23,105
Sagana	9,244	9,965	8,129	3,301
Maragua	-	8,139	7,349	3,687
Thika	5,404	9,947	11,075	21,697
Nairobi	23,452	14,488	24,149	39,197
Machakos	2,832	1,472	1,635	4,800
Mombasa	-	-	297	735
TOTAL	92,476	110,421	139,206	186,801

Source: Kenya Seed Company.

	Maize		Wheat		Barley		Grasses	
	Ha	Tons	Ha	Tons	Ha	Tons	Ha	Tons
1971/72	2,910	8,272	1,104	1,164	181	139	1,886	45
1972/73	3,556	8,744	1,364	1,368	172	101	1,631	88
1973/74	3,574	10,701	1,726	2,617	166	389	544	89
1974/75	3,890	11,407	2,685	3,862	365	1,397	1,171	31
1975/76	4,690	13,867	3,425	4,438	1,598	2,595	1,087	48
1976/77	5,446	13,918	5,093	7,521	2,033	2,325	1,070	61
1977/78	7,370	18,712	5,866	7,759	2,353	3,267	2,129	77
1978/79	4,856	9,712	4,976	5,424	2,585	3,180	1,637	42
1979/80	2,886	15,796	2,962	5,017	2,888	3,172	1,367	113
1980/81	5,114	17,000	3,146	6,521	1,402	2,886	2,560	123
1981/82	7,407	20,398	7,151	8,618	1,159	1,587	3,233	134
1982/83	5,259	11,934	3,629	4,772	1,312	1,524	1,050	110
1983/84	4,309	17,448	3,588	5,862	794	1,103	1,141	140

Source: National Seed Quality Control Station (NSQCS), Nakuru.

Table 33: ACREAGES APPLIED FOR INSPECTION FOR SELECTED NON-CEREAL CROPS 1976/77 -- 1983/84

	Dry Beans	Potatoes	Sunflower	Rape	Sorghum	Green Beans	Misc. Veg.
1976/77	Ha -	Ha 44	Ha 190	Ha 14	Ha -	Ha -	Ha -
1977/78	2	68	123	-	2	23	1
1978/79	9	119	-	-	1	16	-
1979/80	104	100	192	-	8	3	7
1980/81	731	194	26	-	23	165	48
1981/82	1,312	235	31	6	84	1,068	64
1982/83	206	160	41	16	75	4,392	149
1983/84	-	120	132	35	89	3,099	292

Source: National Seed Quality Control Station (NSQCS)

TABLE 34: WHEAT SEED SALES IN KENYA BY KENYA SEED COMPANY (50kg units)

	1979/80	1980/81	1981/82	1982/83
Nakuru	29,946	35,758	24,450	25,245
Molo	5,531	6,183	4,162	4,561
Naivasha	4,119	3,942	5,153	3,481
Nyahururu	10,436	9,832	6,788	6,111
Narok	6,419	11,871	21,600	13,073
Nanyuki	2,349	8,021	2,271	1,697
Eldoret	31,445	32,829	24,808	35,816
Kitale	9,849	7,368	7,898	9,969
Subtotal	100,094	115,804	97,130	99,953
Given to Growers for multiplication all over Kenya	6,537	11,134	13,215	12,069
TOTAL	106,631	126,938	110,345	112,022

Source: Kenya Seed Company

	611/MISC	612	613	614	625	622	632	511	512	X105 ^A	TOTAL
1967/68	2,289	6,142	6,689	-	-	1,158	3,167	283	-	-	19,728
1968/69	2,631	1,722	11,271	-	-	3,246	3,966	479	-	-	23,314
1969/70	2,046	3,269	16,824	-	-	3,689	4,494	1,683	74	-	32,078
1970/71	3,926	3,074	22,723	-	-	8,989	5,599	2,046	1,554	-	47,908
1971/72	6,709	5,384	30,110	-	-	7,066	8,381	2,447	2,114	-	62,211
1972/73	5,524	7,898	42,086	-	-	5,068	5,258	3,072	2,544	-	71,450
1973/74	5,265	8,923	42,022	314	-	6,006	4,656	388	6,508	102	74,474*
1974/75	6,200	16,666	44,513	5,989	-	5,403	3,900	1,479	6,226	97	90,472
1975/76	6,072	7,005	36,764	33,690	-	7,710	4,276	4,929	6,423	131	106,999
1976/77	4,136	11,546	16,531	63,931	-	8,240	3,722	6,191	7,729	152	122,240
1977/78	582	14,816	23,467	50,536	-	7,088	2,212	8,673	1,723	62	109,219
1978/79	809	18,403	7,970	48,633	-	4,750	2,208	8,826	95	131	91,925
1979/80	933	19,447	44,803	44,433	346	6,591	3,086	10,000	1,086	9	130,732*
1980/81	748	14,462	36,881	42,616	2,962	6,566	3,277	10,934	3,527	-	121,972*
1981/82	788	14,271	41,791	42,361	13,495	5,898	2,255	4,696	9,161	107	134,823
1982/83	109	10,271	21,273	43,261	38,245	4,694	1,853	5,292	4,968	135	130,100*
1983/84 ^A	59	9,761	22,907	45,267	54,203	5,627	1,867	6,257	9,345	127	155,419*
1984/85 ^{AA}	0	9,644	20,691	41,783	89,337	16,596	8,485	5,564	10,800	0	202,900

Source: Kenya Seed Company

Notes: A. Includes 2kg.

AA. Available for distribution.

* Total disagrees due to rounding

TABLE 35: IMPORTS AND LOCAL PRODUCTION OF THE MOST IMPORTANT VEGETABLE SEEDS IN 1982

Species	Imports kg	Local kg	Total kg	Local as % of total
Dry beans	-	225,459	225,459	100
Okra	-	2,348	2,348	100
Cucumber	30	731*	761	96
Green podded bean	14,000	41,580	55,580	75
Eggplant	650	1,156*	1,806	64
Capsicum	691	334*	1,025	33
Kale	3,000	750	3,750	20
Tomatoes	2,200	52**	2,252	2
Cabbage	17,234	-	17,234	0
Onion	4,467	-	4,467	0
Carrot	2,250	-	2,250	0

Notes: * Seasonal carry over figures not included

** A considerable amount was rejected because of mechanical damage to the seed.

Source: NSQCS.

TABLE 37: KENYA SEED COMPANY HYBRID MAIZE SEED PRICING STRUCTURE COUNTRYWIDE
1979 - 1983/84

	15/4/79	20/4/80	4/11/80	Current at Oct 1984	Proposed 1984/85
	(Price per 10kg bag Kshs.)				
KSC to Agent	34.30	37.70	47.80	63.25	78.50
Agent to Subagent	35.00	38.50	49.50	65.25	81.00
Subagent to Stockist ¹	36.30	40.00	51.00	67.00	83.00
Price to Farmer	40.00	44.00	55.00	72.00	89.00
Price to Seed Growers	1.95	1.90	3.00	4.00	5.00
Agents' Margin	2.0%	2.1%	3.6%	3.2%	3.2%
Subagents' Margin	3.7%	3.9%	3.0%	2.7%	2.5%
Stockists' Margin	9.25%	10.0%	7.8%	7.5%	7.2%

Source: Kenya Seed Company

Note: ¹Ex Subagent store

FIGURE 1: STRUCTURE OF SEED SELLING INSTITUTIONS

