

37)

MAKERERE  
INSTITUTE OF  
SOCIAL RESEARCH  
RURAL DEVELOP  
MENT RESEARCH  
PROJECT

RDR No. 72  
E.R. Watts  
26.11.68

FOURTY YEARS OF CROP INTRODUCTION

A STUDY OF AGRICULTURAL DEVELOPMENT IN EMBU  
DISTRICT, KENYA.

Note: Rural Development Research papers are written as a basis for discussion in the Makerere Rural Development Research Seminar. They are not publications and are subject to revision.

INTRODUCTION:

The paper examines briefly the introduction of over 70 crops into Embu District. It looks in closer detail at Coffee, Cotton and Macademia Nuts and discusses the reasons for the success or failure of crop introductions. The paper attempts to draw some wider implications for agricultural development.

FOURTY YEARS OF CROP INTRODUCTION  
A STUDY OF AGRICULTURAL DEVELOP-  
MENT IN EMBU DISTRICT, KENYA.

by

E.R. Watts,  
Lecturer in Agricultural Extension.

I. INTRODUCTION

Agricultural development invariably leads to the cultivation of new crops. Africa abounds with examples of the spread of introduced food crops like maize or cassava. In some cases the production of export cash crops has developed with little or no official encouragement. One of the main functions of government agricultural departments has been to develop and promote innovations in the forms of new crops. With the increasing need to accelerate agricultural change we need to know more about the adoption and development of past innovations.

II. MAJOR CROP INTRODUCTIONS

From 1924, when an Agricultural Superintendent was first appointed in Embu District, efforts have been made to introduce new crops into the District. Initially these have been on a trial basis and in some cases no serious attempt has been made to get farmers to grow them. A number of crops are now widely grown in the District and Fig. 1 shows the 1967 values of crops grown for export from the District.

Fig. 1 Crops adopted and now major exports from the District in order of value (1967 figures)

Crop	Value of Exports £
Coffee	613,316
Rosecoco Beans	22,028
Green Gram	22,028
White Haricot Beans	19,247
Mexican 142 Pea Beans	17,487
Yellow Gram	14,856
Tea	11,083
Tobacco	5,164
Castor Seed	2,596
Cotton	1,453
Pyrethrum	1,300
Canadian Wonder Beans	921
Black Gram	903
Cowpeas	838
White Beans	770
English Potatoes	500 (Estimate only)
Cabbages	600 "
Maize	143
Mixed Beans	31
Wattle	Nil (but listed in 1966)
Sisal	Not mentioned in 1967 Report.

There are of course great fluctuations in the export of annual crops from year to year depending on demand and climate. In some years maize has to be imported whereas in other years exports of maize may be considerable. Bean crops have had considerable variations as is shown by the following table:-

Fig. 2 District Income from various Bean Crops 1966 & 67.

	1966	1967
	£	£
Rose Coco	31,953	22,416
Green Grams	12,878	22,028
White Haricot	40,496	19,247
Mexican 142	9,526	17,487
Yellow Gram	6,448	14,856
Canadian Wonder	3,190	921
Black Gram	976	903
Cowpeas	65	838
White Beans	-	770
Mixed	139	31
Pigeon Peas	40	

### III. SUCCESSFUL CROP INTRODUCTION - COFFEE

Coffee was first tried on the Embu Seed Farm in 1933. Coffee growing by Africans was slow to develop because of opposition from European planters. Despite this "the Department of Agriculture decided in 1934 to make a start in Meru and Embu District".<sup>(1)</sup> Much time was lost by an unsuccessful attempt to grow coffee in blocks.

According to Melville<sup>(1)</sup> the sites for development were well chosen and he states that "it became accepted later that Meru and Embu Districts contained the most favourable environment for the crop in the whole country". The block system was justified because of the necessity to supervise the cultural operations very closely and to process the crop at central points.

The reasons for the initial partial failure of coffee introduction were:-

- a) A general failure to assess the human factor,
- b) In particular a failure to see the effect of growing coffee a considerable distance from the farmers homestead.

---

(1) A.R. Melville "The Development of Coffee Production by African Farmers in Kenya". Case study if at the Reading Seminar 1968.

- c) Contrary to expectation the blocks were difficult to supervise because the farmers were not there when the extension staff visited them.
- d) A technical miscalculation in that growing in blocks meant that neglected coffee quickly infected other areas of the block.
- c) Low prices for coffee at the time also obviously had some effect.

The second phase of introducing <sup>to</sup> as defined by Melville (1) ran from 1947-53. During this time "Research and field officers were seeking and perfecting knowledge". The planters were still exercising a restricting influence and coffee was only introduced to new areas after consultation with the Coffee Board (2). During 1947-55 the acreage in Embu increased from 49 to 1278.

In the third phase (see Fig. 3) Coffee planting was so popular that it became out of hand. Previously careful planning had insured ample facilities for processing. Now much of the planting was unplanned and following the International Coffee Agreement (1962) planting continued despite official discouragement. The DAO reports (3) that 521 acres over the allotment of 8553 acres were discovered after a District census. By 1957 approximately 82% of holdings in Embu Division were growing coffee.

Not only was coffee successfully introduced as regards acreage. In the early days quality was maintained at a very high level. Contrary to the forecast <sup>at</sup> the European planters quality was maintained at a much higher level than in the Colony as a whole. Between 1953 and 1962 the percentage of the Colony Crop in the first three classes never rose above 25%. Over the same period Central Province Coffee Co-operatives had a consistently better record with often over 50% (4) of their coffee in the first three classes.

(2) S. Gillett. Speech quoted in the Monthly Bulletin of the Coffee Board of Kenya. April 1949 Vol XIV No. 164 p. 146.

(3) Embu DAO's Annual Report 1967 p. 6.

(4) Annual Report of Central Province. Ministry of Agric. and Animal Husbandry 1962.

'000  
ACRES

- 5 -

Fig 3 COFFEE ACREAGE  
IN  
EMBU DISTRICT  
(Since 1963 Embu and  
Kiambu Districts)

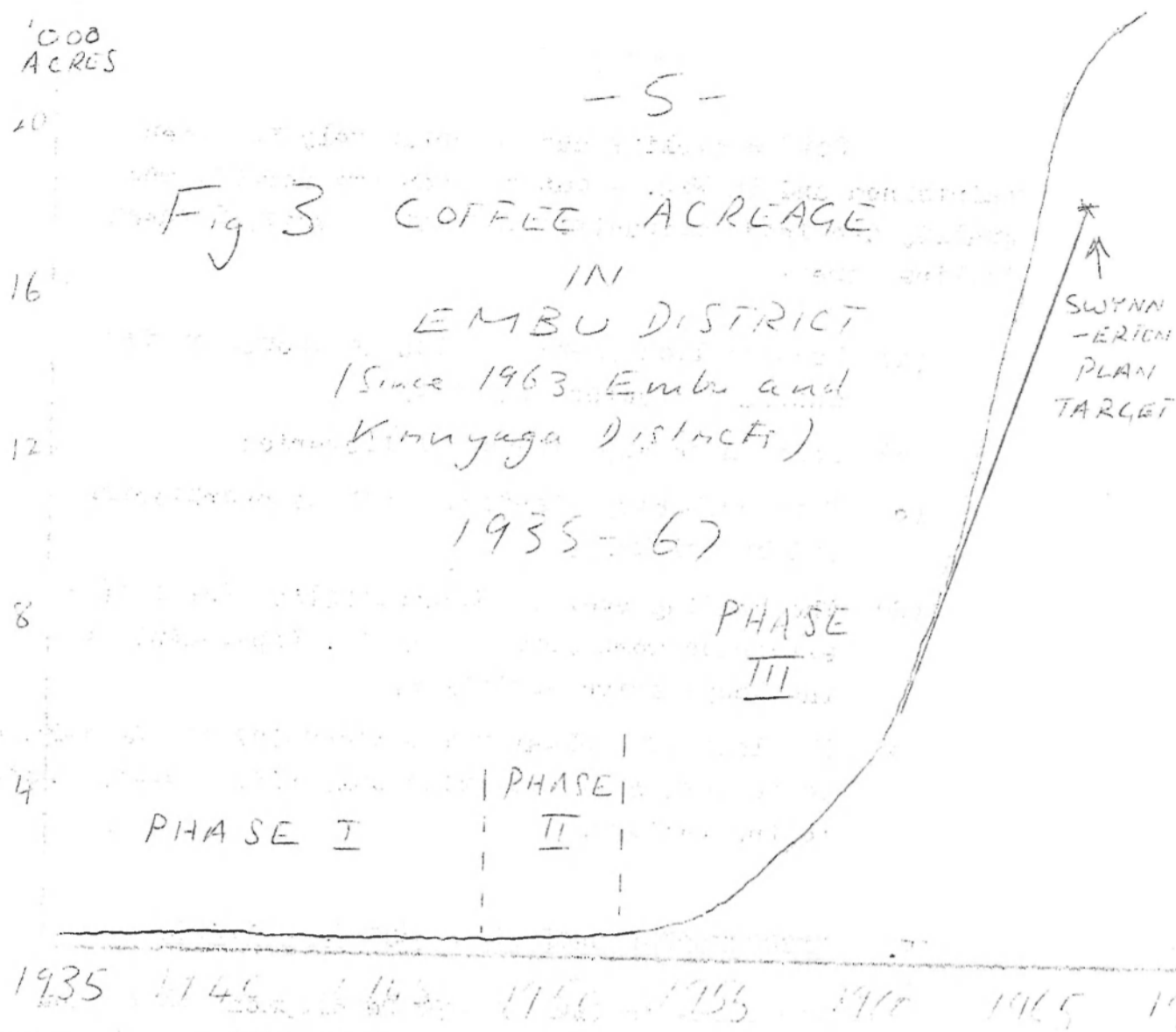
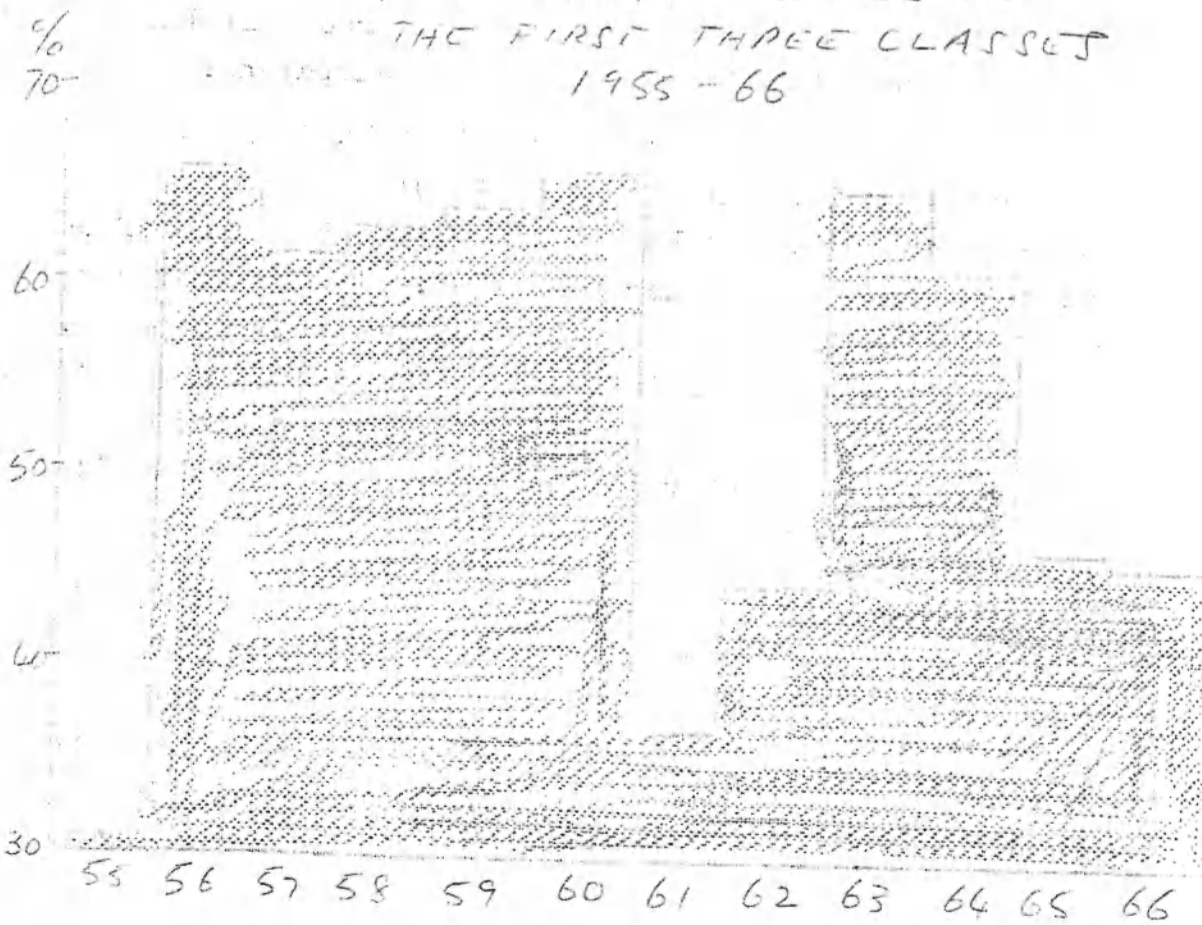


Fig 4. EMBU DISTRICT COFFEE  
QUALITY

PERCENTAGE COFFEE IN  
THE FIRST THREE CLASSES  
1955 - 66



Coffee quality has unfortunately not been maintained and in Fig. 4 can be seen two periods when quality declined seriously. The main causes of these declines are:-

- (a) Uncontrolled planting with no provision for increased factory capacity,
- (b) Inadequate supervision of factories,
- (c) Poor husbandry standards such as overbearing and bad picking,
- (d) The handing over of responsibility for coffee extension work from the Agric. Department to the Cooperative Societies.
- (e) The lack of a clear price incentive to the farmer to encourage him to bring only high quality cherry to the factory.

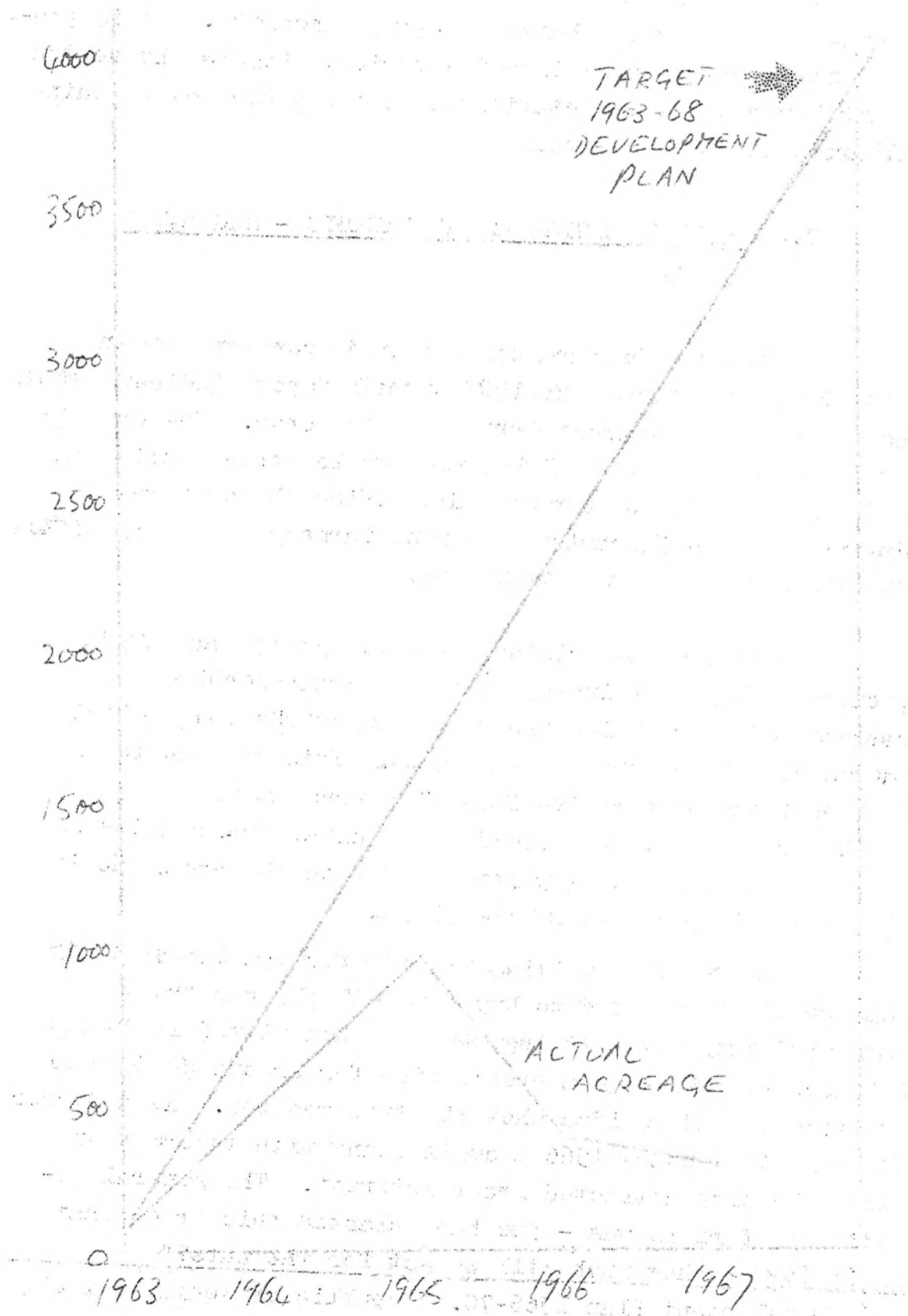
#### IV. UNSUCCESSFUL CROP INTRODUCTION - COTTON

According to the 1966-70 Development Plan Embu District target for cotton production in 1970 is 8990 acres at an average of 450 lbs cotton seed per acre. Over the past few years production has tended to decline despite intense propaganda and effort. Although in some Districts production has increased the situation in Nyanza Province is so serious that a special enquiry has recently been set up to investigate the failure of cotton campaigns.

Cotton was first grown in Embu in 1924 on an experimental basis. Farmers were first encouraged to grow the crop in 1933. By 1935 there were 1059 acres of cotton and this rose to 4750 acres in 1936. In 1940 the short rains planting of cotton failed and production ceased. The ginnery at Kitui which had opened in 1934 was closed. A second ginnery at Sagana which had also opened in 1935, despite the fact that cotton had never established itself, also had to be closed.

After twenty years of dis-use, the Kitui Ginnery, which had been maintained in good order by its owners, was re-opened. Embu production re-started in 1963 and rose from 76 acres in that year to 938 acres in 1965. Since then there has been a general decline in acreage despite governme

Fig. 5 COTTON ACREAGES  
INI EMBU DISTRICT  
1963 - 68





campaigns and the introduction of mechanised block plantings.

The 1966-70 Development Plan lays considerable emphasis on the expansion of cotton. The plan (5) provides for a 200 per cent increase in acreage by 1970. The plan claims that cotton "is thought to have the greatest potential of all Kenya's major export crops for relative expansion by 1970". The Embu and Meru target for 1970 is 15,000 acres.

*-posed* As is shown in Fig. 54 attempts to increase the cotton acreage in recent years have not been successful. It is proposed in a later section to go into the various factors why cotton has not lived up to expectations as a crop for the low rainfall areas of the District.

V. FARMERS DESIRE FOR NEW CROPS - MACADAMIA NUTS.

Macadamia Nuts are not yet an important crop in Embu District although the 1967 Annual Report indicates that there are some 178 acres planted to the crop. The crop is mentioned here because of its remarkable spread during the period 1964 to 1966. During this period the crop was planted by a considerable number of farmers with very little extension backing from government.

Although the original idea of growing Macadamia appears to have originated from the Senior Horticultural Research Officer, Thika the promotion of the crop quickly got out of the control of the D.A.O. This was due to the fact that the Cooperative Societies were "sold the idea" of the crop by Mr. Eobs Harries of Thika. Mr. Harries is a farmer who has for many years promoted the crop. He is also the main producer of seedlings.

The remarkable thing is that farmers bought or in some cases were forced to buy (at 7-75 Shs per tree) a tree that they knew nothing about. When visited in August 1966 Mr. Isaiah Mbogo a progressive farmer and Headmaster admitted he had no idea what the tree was for. At a Farmers Day held in January 1966 a small stand with information about the crop attracted great interest. The general reaction of farmers was - "we have planted this tree- what is it for" - "how much will we get for the nuts?"

(5) Development Plan 1966-70. Republic of Kenya. Nairobi 1966 p. 182.

- 9 -

In August 1966 a small survey was carried out to test farmers knowledge of the crop. 129 farmers who had planted the crop were questioned. Fig. 6 gives their answers:-

Fig. 6 Knowledge about Macadamia Nut Trees - 1966.

Price per lb.:-	%
1 - 5 Shs	28
5 - 8 Shs	30
8 - 12 Shs	9
Dont Know	21
No Answer	12
	<u>100</u>
	===

(The Agric. Dept. pamphlet dated March 1967 indicates that the price is not known but that it will be more than 1 Shs per lb. Mr. Harries pamphlet of the same date suggests 1-50 per lb unshelled)

Average Number of years to bear:-

	%
1-5 years	14
5-8 years	74
8-12 years	12

(The Agric. Dept. pamphlet states 5-6 years)

The idea that farmers are too conservative to try new crops without intensive extension work is surely unfounded as far as Embu farmers go. It is estimated that nearly 1000 farmers in the District have planted this crop. (178 acres x 24 trees/acre x 5 - the average number of live plants owned by farmers in the sample). However these farmers are heavily concentrated in the areas covered by 1 or 2 co-operative Societies.

Farmers are obviously keen to try out new crops where a small outlay is involved. The average outlay in this case was about 35-00 Shs. The fact that the cash could be deducted from coffee payments was obviously an added incentive. It is also clear that, independently of Government extension efforts, farmers are willing and in fact interested to try new crops.

This conclusion may not apply equally to all areas of the District.

VI. FACTORS INVOLVED IN INTRODUCING NEW CROPS:

Often extension Workers blame farmers if they fail to get acceptance of a new crop or practice. The farmers are too lazy/uninterested/careless, etc. to adopt what is being taught. An extension workers who makes such a statement is in fact admitting his own failure. Closer examination in most cases leads to one of the following conclusions:-

- a) The crop or practice was not sufficiently profitable,
- b) Serious labour bottlenecks which greatly affect yield have been over-looked,
- c) The organisation of government support services including marketing was inadequate,
- or d) Some technical factor which had been previously over-looked is involved.

An examination of the failures to grow cotton and other crops in Ambu and other areas indicates that the following are important causes of failure:-

Organizational Factors:

- a) Too many intermediaries in the provision of inputs,
- b) Partly through the above frequent failures to supply seed or fertilizer or insecticide in time,
- c) Failure to establish a fair and equitable marketing system which operates efficiently in remote areas,
- d) Failures due to use of the Block System which necessitates much greater finesse in organisation,
- e) Constant changes of staff.

Farmers Preferences:

- a) Farmers give priority to food crops,
- b) As a result of a) cotton may be planted late,
- c) Some farmers prefer other crops (e.g. Tobacco or Beans),
- d) "Much cotton rots unpicked at the end of each season" (6).

Planning:

- a) Unrealistic acreage targets are provided by the planners.
- b) Unrealistic yield targets may have been provided (Uganda cotton yields according to official records, if anything tended to fall over the period 1945-61) (7).
- c) National needs have been put before local needs (e.g. Cotton may have been emphasised at the expense of beans).
- d) Failures to predict world market trends (e.g. Sisal in Kenya).
- e) Planning governed by political rather than economic considerations (e.g. Ginnery at Sagana).
- f) Insufficient staff provided to meet the targets given (In 1965 in Embu 1 instructor was expected to supervise nearly 1000 acres of widely scattered plots).

Extension Method Factors:-

- a) Failures to contact the right farmers (At Embu FTC courses for the dry areas often had a majority of farmers from the high rainfall zones),
- b) The use of posters of doubtful value particularly in areas with a high proportion of illiteracy,
- c) Inadequate numbers of staff to depend on individual visits - yet standard of literacy, etc. precludes other methods,
- d) In-sufficient use of method demonstrations.

(6) L.H. Brown A National Cash Crops Policy for Kenya  
Govt. Printer Nairobi 1963.

(7) J.J. Oloya "Coffee, Cotton, Sisal and Tea" EAPH 1968  
(In Press).

Extension Content Factors:

- a) Insufficient allowance for competition with food crops,
- b) Insufficient attention to costs of recommended inputs relative to increased yield. (An Imbu FTC course for instructors dated June 1965 recommends an application of 84 lbs insecticide per acre. No mention is made of cost or possible effect or yields.)

Agronomic Factors:

- a) Frequently failure of either the long or short rains is blamed for cotton failures (See Reports for 1935, 1936, 1938, 1939, 1942, etc.)
- b) One of the main factors causing the failure of cotton in the 1940's was insect damage by Stainers and Spiny Bollworms. It is not possible to control these insects.
- c) Low Fertility (See Cotton Officers Report for 1965 - reference to Maragna<sup>u</sup> Ridge in Muranga District).

Marketing Factors:

- a) Problems of cheating by farmers in putting stones or dirt in with cotton,
- b) Sorting problems - farmers are "discouraged" by having to re-sort their crop,
- c) The fixed price has not always been paid by traders who sometimes take advantage of illiterate farmers.
- d) Problems of distance that the farmer has to carry his crop. Though this should apply less with cotton than with most other crops.

VII. DISCUSSION:

Brown in his National Cash Crops (6) Policy examined a large range of crops with a view to selecting those whose production could be emphasised. Cotton came out as a crop which was capable of much greater production. Other crops in the same group were Soy-beans, Castor, Linseed, Sunflower, Pineapple, Tomatoes, Cashew, Barley, Sisal, Tea and Sugar.

Cotton has been emphasised in plans and extension campaigns for the following reasons:-

- a) Expansion of the crop would benefit producers outside the best cash crop zones,
- b) The wide gap between experimental yields and farmers yields indicates a high return to extension efforts,
- c) A marketing structure was already established,
- d) Brown (6) stated that increased yields "should be feasible within the Cotton Board and Ministry resources and should require no additional expenditure other than that which is self-generated by the crop",
- e) A large internal market means less dependence on world markets than with many other crops.

The question inevitably arises at this stage of why have plans to expand cotton failed in so many places. As is shown in Section VI many factors are involved in introducing a new crop or in promoting production of an existing crop. Many failures are due primarily to non-extension factors. The importance of organizational and planning factors might be stressed here.

The fact that Agricultural Officers and Assistant Agricultural Officers receive virtually no training in planning and administration is to be deplored. A DAO with a staff of 114 (8) as in Embu District, stands or falls on his organisation and administration rather than on his technical knowledge.

Further enquiry is needed to establish whether sufficient detailed planning was done prior to the emphasis on Cotton expansion. Appendix III would however indicate a striking contrast between cotton and other crops as regards potential profitability. The crops listed are all crops which can be grown in the low rainfall areas of Embu. Cotton at the low yield of 375 lbs compares unfavourably with most other crops.

---

(8) E.R. Watts "A Study of Agricultural Extension in Embu District of Kenya". USSC Conference Paper PL4/2 1966 Nairobi.

In particular cotton compares unfavourably with bean crops and grams. It is to be noted that at both times when cotton has been pushed as a cash crop (1930's and 1960's) beans and grams have remained a major crop for the low lying parts of the District. Fig. 1 shows the value of Bean and Gram exports accounted for nearly £100,000 worth of exports compared with only £1453 for exports of cotton.

It should be remembered that bean exports are produced with very little extension expenditure. Only in the case of Mexican 142 Pea Beans has any substantial extension effort been directed at beans. The cost of one years cotton extension in Eastern and Central Provinces\* came to approximately 110,000 Shs in 1964/65 (See Appendix IV). This was approximately 25 Shs per acre which is equal to about one quarter the cost of production. Presumably this was justified on the grounds that the crop was being initiated and production would later expand and more adequately cover the extension costs. The problem with cotton is that extension pressure must be maintained from year to year if production is not going to fall off.

In the event production has levelled out at well below the targets in all 3 cotton producing areas. Although some of the rates of acreage increase used in the targets do bear a relation to actual acreage growth rates they appear overall to have been unrealistic. The plain fact is that cotton at present prices and with present costs of production is not a particularly attractive crop to farmers. This fact may have been overlooked in calculating the potential for increased yields.

If the extension costs for cotton had been spread in the form of a subsidy to producers the price could have been raised by approximately one third. It is interesting to speculate what would have been the effect of such an increased price on the acreage of cotton.

The main lesson of this paper would seem to be that farmers will adopt what we want them to adopt if:-

- a) It is clearly profitable,
- b) We concentrate on insuring that the necessary inputs and marketing facilities are available at the right time,
- c) We concentrate on teaching how to grow the crop after the farmer has become interested

\* Excluding Machakos & Kitui

in the crop,

- d) We avoid trying to combine instruction in how to grow the crop with exhortation to grow the crop in the first place.

Further enquiry is needed on the following points:-

- a) What has prevented the anticipated break through in increasing yields of cotton ?
- b) Further study of comparative rates of acreage increase for different areas in East Africa.
- c) Further study of comparative staff: acreage ratios for different cotton growing areas.
- d) Further comparative studies of crop introductions (e.g. Cocoa in Buganda and Lake Malawi area).



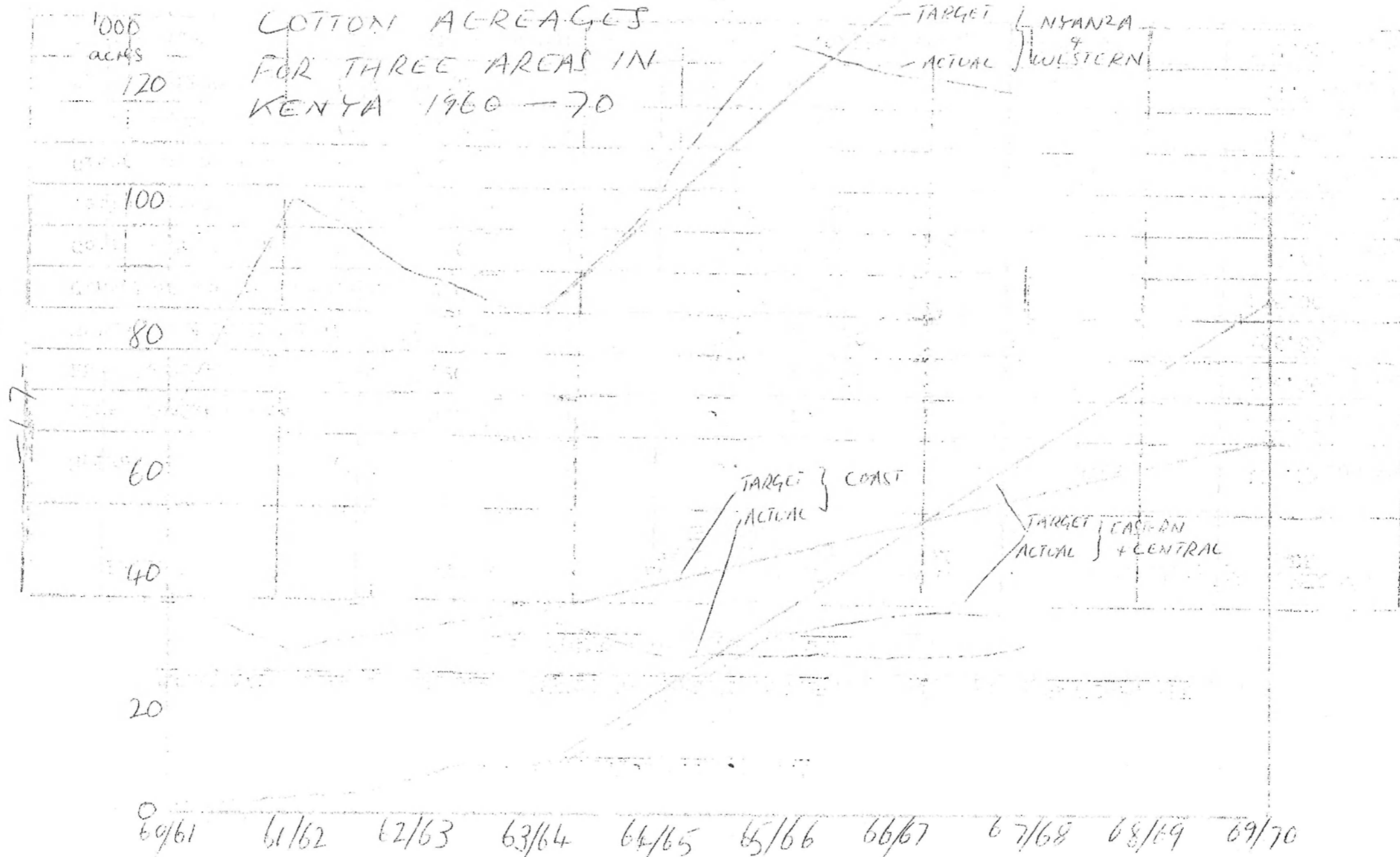
APPENDIX I

CROP INTRODUCTIONS IN EMBU

DISTRICT

	ADOPTED AND NOW LISTED EXPORTS	ADOPTED PRIMARILY FOR LOCAL CONSUMPTION	ADOPTED BUT NO LONGER IMPORTANT	NOT ADOPTED TO ANY EXTENT	NOT ADOPTED & NOT FOUND
<u>Export Cash Crops</u>	Coffee Tobacco Cotton Pyrethrum Tea		Ruaha <del>Renda</del> Wattle Sisal Geranium Gum Arabic	Cashew Cononut	Flax <sup>x</sup> Ramie Fibre
<u>Legume/Oil Crops</u>	Rose Coco B. White Haricot B. Canadian Wonder B. Green Grams Yellow Grams Black Grams Mexican 142  Castor Cow Peas Pigeon Peas		Sunflower Madagascar  Butter Bean Groundnuts  Sim-Sim  Soya Beans  Boston Beans	Painted Lady Bean  Tepary Beans	Carob Bean  Linseed Niger Oil  Victoria  White Peas  Velvet Beans
<u>Root Crops</u>	English Potatoes	<del>Yams--</del> Cassava Carrots			
<u>Vegetables /Frukt</u>	Cabbages	Green Beans Onions Bananas Pineapples Citrus Avocado Peas Custard Apple PawPaw Guava	Garlic Sweet Pepper		
<u>Cereal Crops</u>	Maize	Sorghum Wheat Bulrugh Millet Proso. Millet	Oats Finger Millet Rice Paddy Sorghum		Barley Buckwheat
<u>Fodder/Grass Crops</u>		Fodder Sweet- Potato		Lucerne Spineless Cactus Ley Pastures Edible Lanna	Kale Kudzu Vine

APPENDIX II  
 COTTON ALREAGES  
 FOR THREE AREAS IN  
 KENYA 1960-70



APPENDIX III

COMPARATIVE TABLE OF AVERAGE CROP PROFITABILITY FOR 1967 PLANTED CROPS BASED ON THE  
CURRENT PRICES AT GROWERS MARKETS

PRODUCE	UNIT/WT	AVERAGE PRICE/BAG SHS AT GROWERS MARKET	APPROX. YIELD/ ACRE	AVERAGE VALUE/ ACRE SHS
Maize	(200 lbs Bag)	21.65	5 Bags	108.25
Mixed Beans	(200 " " )	35.40	4 "	141.60
Rose Coco	(200 " " )	55.20	5 "	276.00
White Harricot	(200 " " )	49.20	4 "	196.80
Canadian wonder	(200 " " )	47.00	5 "	235.00
Cows Peas	(200 " " )	31.80	3 "	95.40
Yellow Grams	(200 " " )	54.40	3 "	163.20
Green Grams	(200 " " )	62.35	4 "	249.40
Black Grams	(200 " " )	49.30	6 "	295.80
MEXICO 142	(200 " " )	60.30	6 "	361.80
Cotton	(lbs Seed Cotton)	35 c/lb (average)	375 lbs	131.25

(Adapted from the Embu DAO's Report 1967)

-18-

-19-  
APPENDIX IV

EXTENSION COSTS AND RESULTS

A Cotton Extension Team in Eastern and  
Central Province, Kenya.

1964-65

Area involved:

In Eastern Province, Embu and Meru Districts and in Central Province, Kirinyaga, Muranga, Nyeri and Kiambu Districts. 1964/65 acreages were as follows:-

Embu	382
Meru	502
Kirinyaga	3000
Muranga	207
Nyeri	15
Kiambu/Thika	70
	<hr/>
	4176 acres

Cost of one year's extension work:

a) <u>Salaries:</u>	Shs.
1 Cotton Development Officer	12000
1 Driver @ 280 Shs	3360
1 Gardener @ 100 shs	1200
4 Cotton Instructors @ 200 Shs	9600
1 Clerk @ 200 Shs	2400
1 Assistant Cotton Officer @ 580 Shs	6960
1 Divisional Cotton Officer @ 500 Shs	6000
29 Locational Tech. Assts. (2½ months each @ 500 Shs)	36250
Total	<hr/> 77770
b) <u>Transport:</u>	
Mileage of 1 asst. Cotton Officer (500 @ 35c per month)	2100
5 Bicycle allowances @ 10 Shs per month	600
Land Rover: running costs @ 1200 Shs per month	14400
Land Rover: servicing @ 500 Shs per month	6000
Total	<hr/> 23100
c) <u>Seed:</u> supplied free. 2129 acres @ 5 Shs.	<hr/> 10645
TOTAL COST	<hr/> <hr/> 111315

Net Return to Investment in Extension:

Total value of production	229075
Total costs of extension	111315

N.B. See Appendix II for changes in acreage over the years 64/65 - 67/68.

---

This work is licensed under a  
Creative Commons  
Attribution – NonCommercial - NoDerivs 3.0 Licence.

To view a copy of the licence please see:  
<http://creativecommons.org/licenses/by-nc-nd/3.0/>