

CROP PRODUCTION IN ZIMBABWE'S COMMERCIAL AGRICULTURAL

SECTOR : 1940-1979

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For Comment.

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Preface

This paper traces crop production patterns in the commercial agricultural sector of Zimbabwe from 1940 to 1979. It is based on time series analysis of the data presented in "Crop Production Statistics 1940-1979" (Muir, 1981b). The more important series have been presented graphically in this paper. Some historical information has been included in the analysis but the paper does not attempt a full historical record. Documentation on this period is scarce and this paper attempts to highlight the factors responsible for the growth in crop production.

Particular emphasis is given to the crops grown in the family owned commercial farm sector although all the data on the commercial sector include output from national and multi-national corporate estates. A study of the peasant sector has not been attempted because data are both scarce and unreliable and marketed output from this sector is limited. An analysis of the factors influencing production trends would require a detailed study of the constraints faced by this sector.

To obtain real producer prices, money prices have been inflated or deflated against the Central Statistical Office "Consumer Price Index for Higher Income Urban Families", base year 1964 to which the earlier CSO indices have been linked. It should be noted that the index understates the inflationary trend faced by farmers. The urban index emphasises housing and foodstuffs which are less important to farmers and which have been kept low by the uncertain political situation and government policy on consumer subsidies. Farm input prices on the other hand have been mainly uncontrolled and have escalated rapidly, particularly since 1973.

In Zimbabwe, most crops are planted in one calendar year and harvested in the next. In order that the area planted may be easily compared to that harvested and sold, statistics on area planted are given using the harvest year. Throughout the paper any reference to tobacco is to flue-cured tobacco unless stated otherwise. All data in the paper, except where another source is quoted come from Muir, 1981b.

This is a working paper and comments, additional information and corrections would be most welcome.

Introduction

In the period reviewed the gross value of crop production increased by 834% in real terms from 1940 to 1979. There was an overall increase in area planted of 183%. The increase in the first two decades of the period was primarily the result of high prices whereas the increase in the 1960's and '70's was due to increased yields. Furthermore, after 1965, the country's crop production base was expanded and broadened as a result of the trade embargo and government

policy to encourage import substitution. Maize and tobacco have continued to be important contributors to agricultural output but their relative importance has declined.

Percentage of Total Value of Crop Production

<u>1960</u>		<u>1973</u>			
Tobacco	76%	Tobacco	30%	Coffee	3%
Maize	14%	Cotton	15%	Tea	2.5%
Sugar	4%	Maize	14%	Vegetables	2%
Tea	1%	Sugar	13%	Seed Maize	2%
All other crops	5%	Wheat	6%	Fruit	1%
		Spices	4%	Other crops	7.5%

Economic Review

The period after the Depression and before World War II saw a gradual improvement in the export prices of tobacco and to a lesser extent maize (Muir, 1981a). This was reflected in the area planted and by 1940 tobacco had surpassed its previous peak of 1928. Tobacco was becoming increasingly important as an export accounting for 15% of total exports in 1940. Maize was still an important crop in the commercial farm sector although the area planted had fallen. Farmers were encouraged to continue production during the war and by 1943 the total area planted to crops was 228 000 ha., an increase of 36 000 ha. over 1900. In 1944 the total area planted (218 000 ha.) and the gross value of crop production (\$11 million) were broken down as follows:-

	<u>% of total area</u>	<u>% of gross value</u>
Maize	45%	22%
Tobacco	11%	54%
Fodder & Green Manure	28%	N/A

The Land Settlement Board was created in 1944 with the introduction of the Land Settlement Act. Its task in the post-war years was to settle ex-servicemen in nominally priced crown lands with generous loans and grants and after 1947 to supervise civilian settlement. The total number of commercial farms rose from 3 689 in 1945 to 6 255 in 1955 (Dunlop), where it remained with minor fluctuations. In 1979 there were 6 113 registered commercial farmers (CSO 1980). The increase in the number of farms settled in the 1940's and early 1950's has led some writers to attribute the growth in agricultural output in this period to an increase in area under cultivation (Dunlop). There was a 50% increase in area planted from 1944 to 1955 but there was also an almost 200% increase in the real value of crop production over the same period. The first

decade after the war, in fact, saw no greater increase in the area planted than the increases in the following decades:-

1945/55	117 000 ha.
1955/65	100 000 ha.
1965/75	144 000 ha.

The increase in the value of commercial agricultural output and its contribution to gross national product and export earnings from 1945-55, was largely due to increasing prices. The real price of tobacco was 25% higher in 1955 than in 1945 and in some years was 55% higher. The real price of maize was 90% higher in 1955 than it had been in 1945. The nominal price of tobacco had doubled and that of maize trebled. After 1954, however, the terms of trade moved against agriculture, nominal prices for maize, tobacco and cotton were lower in the 1960's than the 1950's. This, with increasing inflation, meant a serious decline in per unit terms (See Figs 1-6). The decline was, however, partially offset by considerable increases in yields achieved in the period 1955-1979, as a result of local research and extension efforts.

In the Appendix details of crop yields for the different sectors have been given from 1950. From these figures it can be seen that there have been substantial increases in the yields of the large-scale commercial farmers. Tattersfield (1981a) shows that in the late 1970's cotton yields had increased, over the 1951-55 period, more than sixfold, maize threefold, soyabeans fivefold and groundnuts fourfold. There has also been a fourfold increase in sorghum and barley and wheat yields are three and a half times greater.

The Federation of the Rhodesias and Nyasaland (Zambia, Zimbabwe and Malawi 1954-63) appears to have had little direct effect on commercial crop production in Zimbabwe. There was a marked increase in that period, in the area grown of potatoes, edible beans and vegetables, (Muir 1981b, table 1) which would seem to indicate an increase in demand for those products related specifically to Federation. Tobacco continued to dominate contribution to the value of crop production accounting for 76% in 1955 and 63% in 1963. Sugar production became significant from 1959; it accounted for 4% in 1960 and 13% in 1963. The value of crop production increased from 54 million dollars in 1955 to 95 million in 1963 which in real terms was a 49% increase; area planted increased 22%. Since the real price of most of the major commodities had declined it was the increase in yields which accounted for the rise in the value of crop production.

The implementation of trade sanctions against Zimbabwe in 1966¹ had a significant effect on crop production. Tobacco, the mainstay of the agricultural industry and the country's principal export, relied on foreign markets. The Government was forced to take up a major proportion of the embargoed tobacco crop in 1966 in order to avoid the total collapse of the agricultural industry, but even so the price paid to producers dropped by 30%. Farmers were actively encouraged by government to diversify out of tobacco

Footnote 1. The Unilateral Declaration of Independence (UDI) on 11th November 1965, resulted in internationally applied economic sanctions.

growing, and tobacco production quotas were introduced. Tobacco area reaped was 26% lower in 1967 and, in fact, the total planted area of all crops fell in 1967. Thereafter, the total crop area increased steadily as the diversification programme gathered momentum.

Diversification was encouraged by the Agricultural Diversification Scheme which was implemented in June 1967. This provided low-interest loans to farmers who were issued with tobacco quotas but who agreed to severely limit or go out of tobacco production. To maintain profitability larger areas had to be planted since the alternative crops generally exhibited lower gross margin per hectare. As a consequence plans presented by farmers applying for loans under the scheme, indicated a proposed reduction in tobacco area of 10 500 ha. but a planned increase of 25 000 ha. planted to other crops and an increase of approximately 84 000 head of livestock (Rep. of Secretary of Agriculture 1966/67). There was some concern in the Department of Conservation and Extension that the larger areas planted to alternative crops was at the expense of crop rotations, leading to possible land deterioration (McKenzie). The 1968 harvest year saw a marked increase in the acreages of a large number of crops - in particular, cotton, groundnuts, sunflowers and soya beans. The increase in groundnut and sunflower production was short-lived but cotton and soya beans continued to increase. This increase was rather erratic, reflecting the unfamiliarity of farmers with these crops. In the second half of the 1960's there was 22% more land under crops than the first half and although the volume of output increased by 11%, the real value of output declined by 10%.

Drought in 1968 caused farm incomes to fall 50% from the previous year. Farmers had to carry the first 20% of the loss while government provided 25 million dollars in drought relief (McKenzie). In the late 1960's irrigation began to play an increasingly important part in crop production patterns. The Sabi-Limpopo Authority was established in January 1965 to exploit the water resources of the Sabi-Limpopo catchment and to promote economic development in the South-Eastern Lowveld. The high wheat prices introduced by Government to reduce reliance on imports also helped to finance the construction of many small dams and irrigations systems in the middle and highveld.

The gross value of crop production between 1963 and 1970 remained relatively static in nominal terms (declining 14% in real terms) except for the sharp drop in 1968. The value of production started to increase in 1971 and by 1973 it was \$153 million against \$103 million in 1970 (an increase of 34% in real terms). In 1972 tobacco prices started to improve but gross margins for tobacco were not sufficient to cause significant disinvestment in wheat, cotton, seed maize and soya beans which continued to be widely grown. The area planted to maize steadily declined after reaching its peak in 1972.

Inflation, initiated by the oil crisis in 1973, hit farmers severely. As stated in the preface the real prices used in this paper seriously understates the extent to which farmers' incomes have been affected. The costs of many major farm inputs, diesel and other fuels, fertilizers and chemicals, are directly related

to oil prices. Plant and machinery are also important cost items which have risen at a far greater rate than the consumer price index since 1975. As a result, the financial position of agriculture has deteriorated in the late 1970's. Gross value of crop production was \$305 million in 1979 - an increase of \$152 million over 1973 or a 22% increase in real terms. Despite this, gross margins have declined by 27% in real terms. Capital formation has also been falling with that in 1979 only 30% of the 1973 level.

In 1979 there were 542 000ha, planted in the commercial cropping area and unprocessed crop exports accounted for 18% of total exports. In 1978 food imports accounted for only 1% of the total import bill although this increased to 2% in 1979 when, as a result of declining acreages and drought, some maize had to be imported.

Agricultural Marketing and Price Policies

The Marketing system for tobacco and maize remained essentially unchanged in the period reviewed. Government extended its influence in the marketing of other agricultural products through the Grain Marketing Board. The GMB has controlled the purchase and disposal of the following crops since the date given:

1931	Maize	1969	soya beans
1950	sorghum	1970	wheat
1952	groundnuts	1972	coffee

The Agricultural Marketing Authority was constituted in 1967 and assumed responsibility for the commodity boards. Its role is predominantly administrative although Government controls both the producer and consumer prices of designated products through the AMA. The Cotton Marketing Board was established in 1969. Cotton marketing had, however, been controlled since 1936, first by the Cotton Research and Industry Board and then by a committee of the Grain Marketing Board.

Government intervention in agricultural commodity prices was initiated during the Depression in order to maintain farmers on the land in the face of very low export prices for maize (Muir, 1981a). Surpluses for export declined in the late 1930's as farmers switched to tobacco production. Local demand for maize expanded rapidly after the war and maize imports and consumer rationing became necessary. In order to regain self-sufficiency and promote maize production a system of guaranteed prices based on sample surveys of production costs was introduced in 1946 (Phillips P.266). Local selling prices were not allowed to rise in line with producer prices and Government was forced into a consumer subsidy policy for maize. Whilst this was acceptable when maize was in deficit, the emergence of surplus production in 1955 raised the problem of an open-ended subsidy commitment which could no longer be justified since export returns were low. Producer price guarantees were thereafter limited to local requirements with surpluses to the account of producers at net realisation values. (Dunlop)

In the period immediately after UDI, foreign currency earnings and food security were particularly important, and government pricing policy was once again aimed at increasing agricultural self-sufficiency and promoting exports. Government, however, preferred to support the farming industry through indirect measures rather than to increase the price of agricultural products sufficient to affect profitability. It was believed that the adverse effect on the cost of living from major agricultural price increases would be unacceptable (L.B. Smith, Deputy Minister of Agriculture, quoted in McKenzie). Thus, together with incentive prices for certain commodities, there were subsidies on inputs and capital equipment, easy access to credit and drought relief in bad years. In July 1970 minimum producer prices for specific quantities of maize and cotton were guaranteed for three years in advance. Excess production was bought at net export realisations to give an overall blend price (Lacey).

In the 1970's government became increasingly concerned with maintaining low food prices. Since 1976 the trading accounts of all controlled food products have been run at a loss which is met from government revenues (Callar). In 1975 government agreed to announce pre-planting (i.e. minimum guaranteed) prices well before planting so that farmers' could plan their cropping programmes. This reduced some of the price uncertainty faced by farmers and encouraged them to meet government's production objectives. Interim prices were then fixed at the beginning of the intake year so that payments could be effected. The final producer price was gazetted in July for summer crops and October for wheat. The prices were negotiated between producer representatives and government agencies and took into account production costs, forecast internal demand and potential export earnings.

The commodity studies in the next section review some of the factors influencing yields and prices and the effects these have had on commercial farmers' cropping decisions.

Commodity Studies

Maize

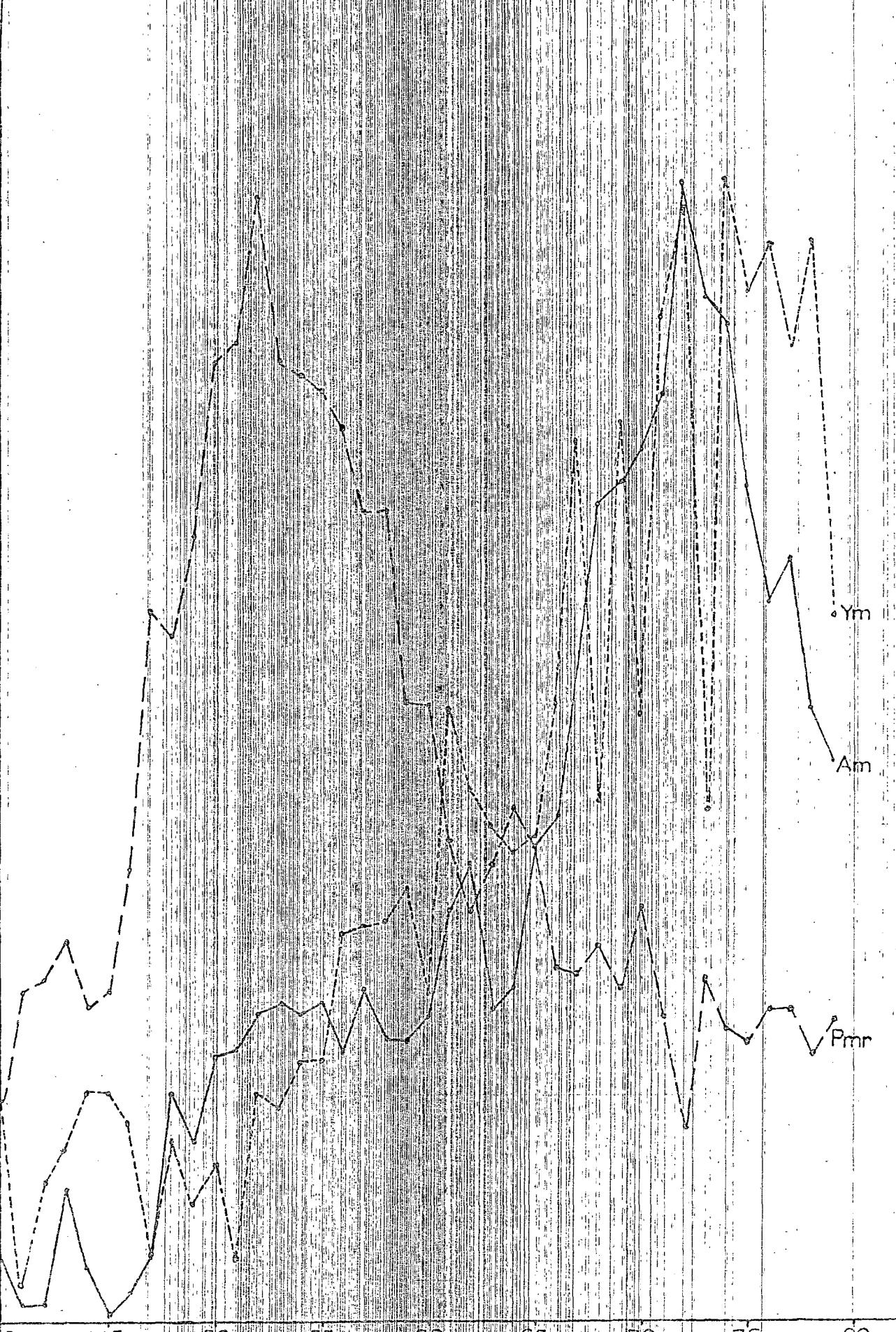
The area planted to maize by commercial farmers has consistently been between two and four times higher than that planted to any other crop. It forms the basis for the country's staple food, maize meal, and is the principal crop grown by peasant farmers. Historically it has been relatively unsuccessful as an export. After the depression in the 1930's the local market was used to subsidise producers on exports which brought a much lower return than the controlled, internal price.

As outlined previously, maize surpluses declined and after a poor season in 1947, 129 000 tonnes of inferior quality maize had to be imported in 1948. The flinty, yellow grain which made up the bulk of the imported consignments met with stiff consumer resistance (Smith). To regain self-sufficiency, the producer price was raised by 36% in real terms in 1947 and continued to increase until 1952 (see Fig. 1).

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Ym

Am

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YEARS

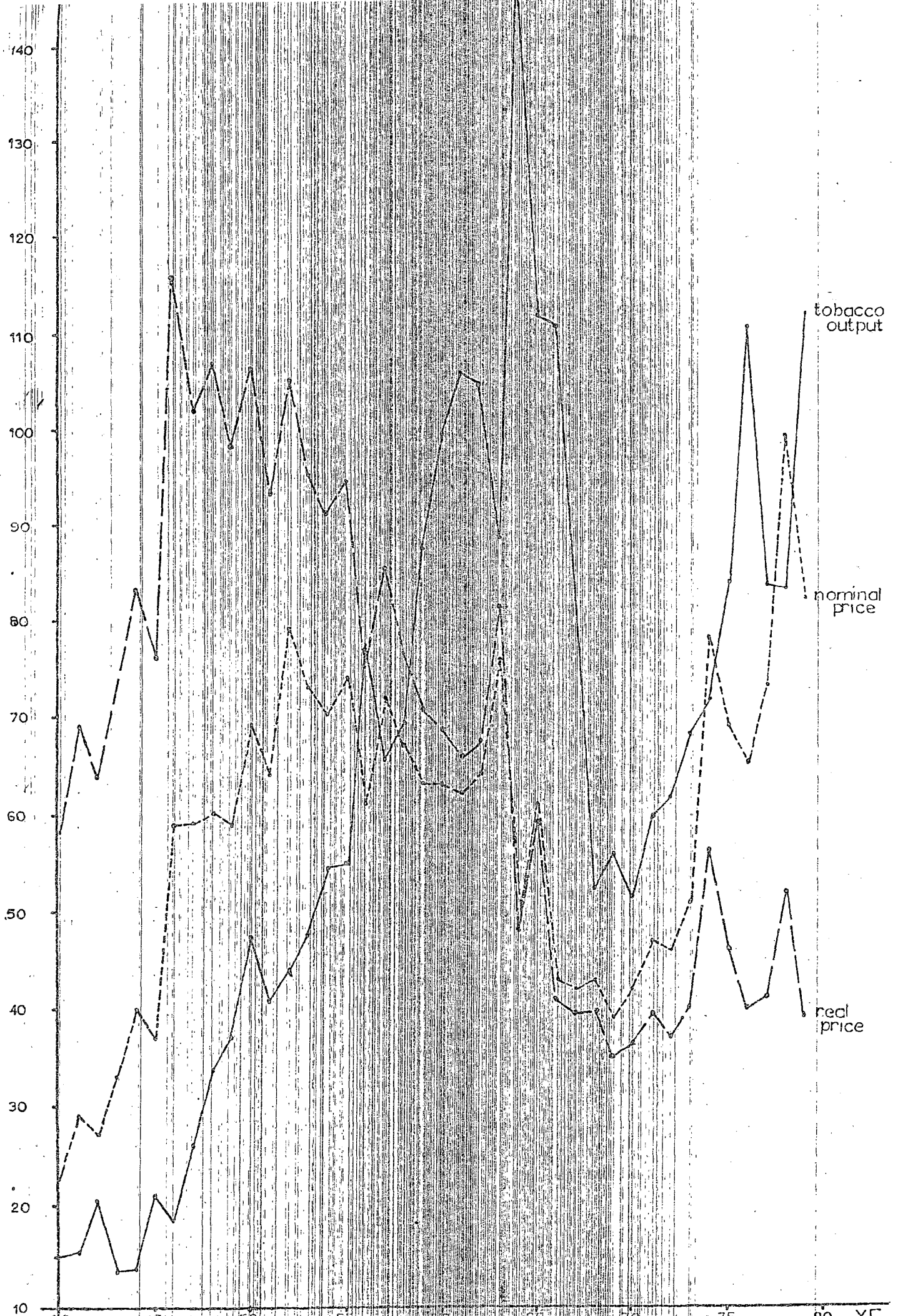
From 1953-62 the country exported maize. The exported maize price was consistently below the producer prices guaranteed for local requirements. The gross returns on exports were only between \$2 and \$6 per tonne higher than the average price paid to producers. Imported maize in 1963 and 1964 was actually cheaper than locally produced maize. In 1965 and 1966, although not cheaper than local maize, the cost of imported maize was still very competitive. Maize yields and area planted increased markedly after 1966. The increase in maize area was mainly due to a fall in tobacco prices. From 1968 onwards, despite declining real prices for maize, (Fig. 1), there was surplus of maize produced for export.

It has been argued that the declining producer prices for maize were a result of government's attempt to cut down subsidy costs in support of a cheap food policy. Maize, however, is a low value, high bulk commodity (Muir 1981b Table 13) and with the increasing demands on the nation's transport facilities, the opportunity costs of exporting maize were high in terms of foreign currency earnings foregone. Furthermore in the period reviewed, maize was usually exported at a net loss. It is suggested, therefore, that whilst the country remained self-sufficient and whilst lucrative export markets were unavailable, there was no justification for a premium on maize.

Despite declining terms of trade to the producer, from 1947 to 1972, the area planted to maize continued to increase. In Fig 1 the area planted to maize has been plotted together with yield and real prices. This continued increase in area planted can be attributed mainly to the significant increase in yields consequent upon local research efforts (see Appendix). In 1950 Zimbabwe became the second country (after the United States) to grow hybrids of its own breeding; 22% of the commercial acreage at that time was planted to locally bred double hybrid seed. Locally developed and imported open-pollinated varieties were slowly phased out. In 1962 a limited quantity of SR52, a locally bred single hybrid, was put on the market. Although it cost more than double hybrids, it had a greater yield potential. By 1968, 65% of the commercial crop was planted to SR52 (Rattray). This is a long season variety more suited to the higher rainfall areas. Other varieties have been released recently with more reliable yield potential for the marginal rainfall areas which need quicker maturing hybrids.

Nitrogenous fertilizers, which by 1950 were half as expensive in relation to maize prices as they had been in 1930 (Weinmann p.37) were particularly significant in increasing maize yields (Tattersfield, 1981a). With improved farming techniques and increasing applications of fertilizers, yields continued to improve steadily until 1965 (see Fig 1).

In the commercial farming areas, maize acts as both a complement to and substitute for virginia tobacco. Tobacco and maize are normally grown in rotation, with, in times of good tobacco prices, tobacco being the primary crop. Where tobacco prices fall, maize is also a substitute for tobacco in the short term. It can be seen in Fig. 3 that as the area planted to tobacco declines, that planted to maize increases. To maintain gross turnover, however, a much larger area of maize must be planted. When UDI forced



farmers to cut back tobacco production there was a substantial increase in the area planted to maize. In order to try to achieve higher yields farmers greatly increased the fertilizer applications previously used and the management input was also greater. At the same time many tobacco farms are not situated in ideal maize growing areas and high yields can only be obtained in good years. These factors combine to account for some of the variability in maize yields seen in the period 1966 to 1979 (Fig. 1).

The area planted to maize reached a peak of 299 000 ha. in 1972, which with good rains and high yields produced a record crop of 1.7 million tonnes from the commercial farming area. Thereafter the area planted to maize declined (Fig. 1) and that of tobacco and cotton increased until 1976 when the independence war distorted normal farming patterns.

Tobacco

Flue-cured tobacco in Zimbabwe relies almost entirely on export markets and the trends in tobacco production (Fig. 2) are closely linked to external demand. For many years Britain was Zimbabwe's most important buyer but there were several times in the late 1940's and 1950's that growers and buyers were to clash.

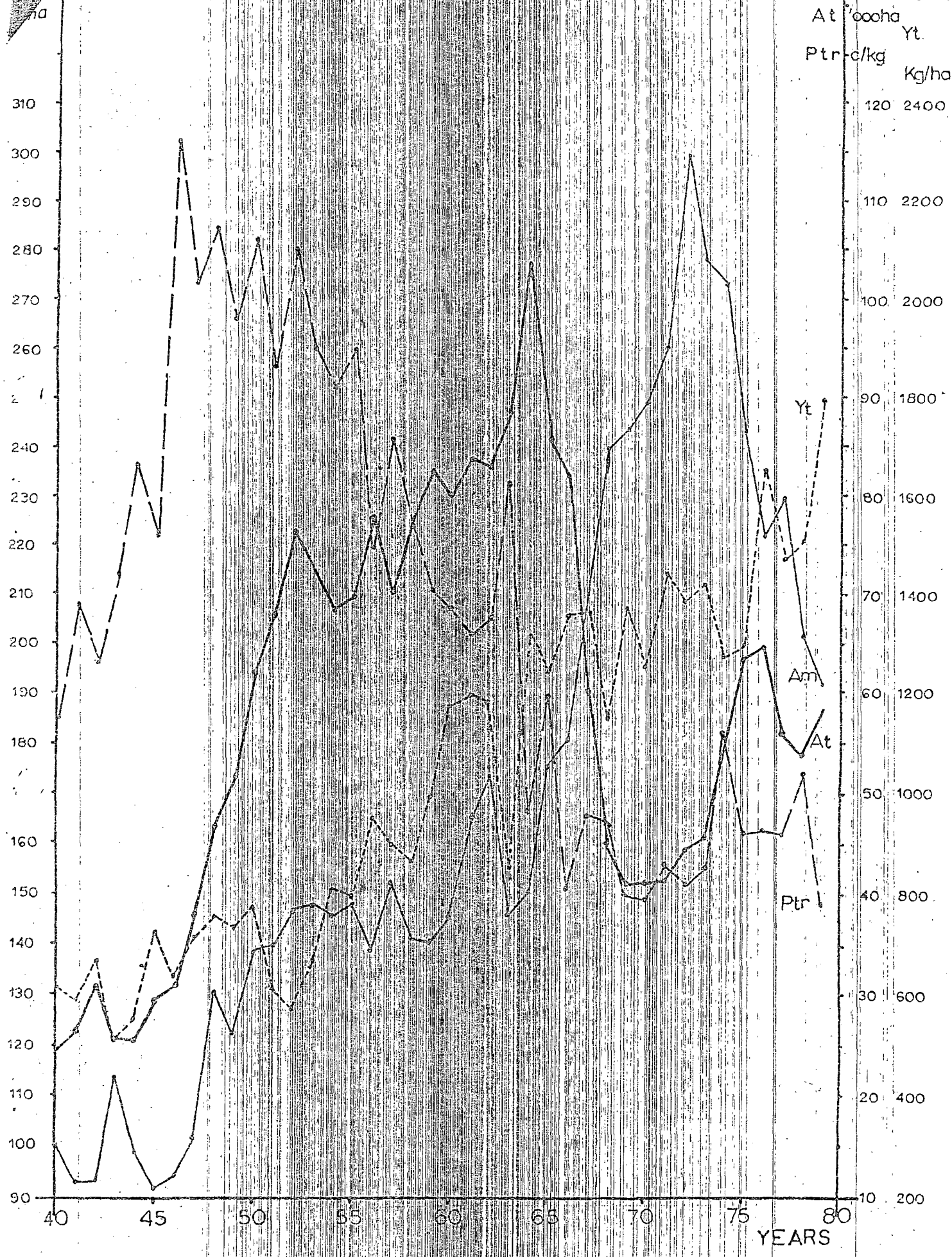
In 1940 growers had produced a record crop in response to requests from Britain to increase production but when auctions opened, buying was listless and prices low. However, when buyers were threatened by the Minister of Agriculture with closure of the auction floors, prices improved. During World War II, production costs did not materially increase whilst prices almost doubled. The expansion of output, on the other hand was restricted (Fig. 2) by a shortage of fertilizers and manpower and by pests and disease. In 1944, climatic factors caused a short crop in both Zimbabwe and South Africa. The South Africans bought a large percentage of the crop leaving British buyers complaining of the quality and quantity available to them.

After the war, despite an increase in the British duty on tobacco, there was a significant increase in the demand for Zimbabwean tobacco in both Europe and Britain. Zimbabwe growers were worried that the dollar shortage was temporary and that the Europeans would thereafter return to American tobacco. The growers agreed to ask the Southern Rhodesia Government to impose export controls on merchants buying for continental countries. In return the British merchants agreed to buy a specified quantity at above an agreed minimum price to be negotiated annually. The export controls were abolished in 1953 but British manufacturers continued to forecast their requirements for three years forward.

There was a large crop in 1956 and the British manufacturers, committed to purchase 38 million tonnes, were sluggish in their bidding. The auction floors were closed, reopened after guarantees of higher prices and closed again when these were not met. In the end the merchants purchased slightly more than the agreed figure but the average price

Footnote 2: After the war the shortage of US dollars in Europe caused demand for American tobacco to decline.

COMMERCIAL MAIZE AREA PLANTED (Am)



YEARS

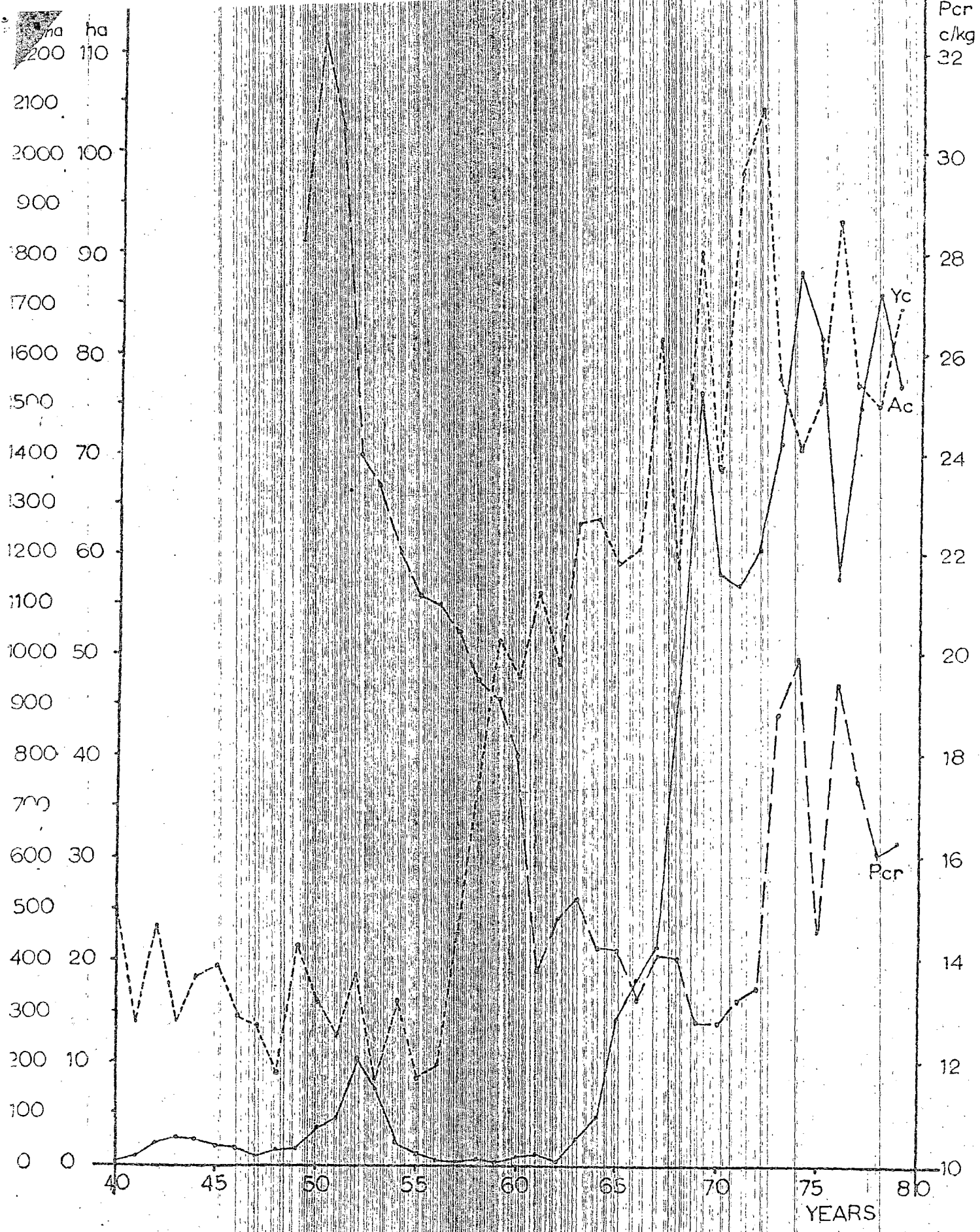
fell by 30%. There were problems again in 1958 but growers and buyers were more aware of their relative strengths and weaknesses; the auction floors were not closed and the price fell by only 7%. The British market had lost some of its relative importance and by 1960 was purchasing only 47% of the market against 87% in 1940.

Throughout its history Zimbabwe's tobacco export market has been volatile with price tending to move inversely with crop size up to 1965 despite a steadily increasing market (see Fig. 2). As late as 1962 Clements and Harben predicted that the continued expansion of Zimbabwe tobacco production was essential for the prosperity of the industry remarking that "an almost insatiable market exists" (p. 211). The Chairman of the Tobacco Export Corporation, Evan Campbell declared in 1961 that the industry's immediate target was 178 000 tonnes but the record production in 1964 of 147 000 tonnes caused a 40% decline in price (Fig. 2). Price was also affected by the relatively poorer quality commonly associated with weather conditions favourable to high yields. A smaller crop in 1965 resulted in an improved price.

It has been suggested (Dunlop p.48) that demand for Zimbabwean tobacco had reached its peak in the early 1960's and that even if sanctions had not forced the commercial farming sector to diversify, tobacco production would have been constrained by world demand. The data do not justify this conclusion: Zimbabwe's tobacco industry has always been volatile and despite the adverse trading position caused by sanctions, the industry was back up to 1965 output levels by 1976. It is possible, in the absence of sanctions, that Zimbabwe's relative position in the world market would have continued to increase. Zimbabwe's flue-cured tobacco exports accounted for 15% of total world exports in 1950/54 and 22% in 1960/64 but fell during UDI and represented only approximately 11% of total world exports by 1979. Brazil, Korea, Thailand and India appear to have replaced Zimbabwe in filling the shortfall created by the continued drop in the USA share of world flue-cured tobacco exports.

Sanctions, however, caused a major drop in demand intensified by the total British withdrawal from the market. The Rhodesian Government was forced to buy a substantial proportion of the crop. From 1967 to 1977 Government announced a preplanting reserve price in return for production restraints by growers. Farmers also received active support from Government to move out of tobacco and produce other crops. Prices paid on the auction floors began to increase again in 1970 (Fig 2) and in 1972 the area planted to tobacco also began to steadily increase (Fig. 3). Tobacco, as an important foreign-exchange earner, continued to be imported by government. During the period 1967-77, it was only in 1974 and 1975 that the auction floor price (Fig. 2) was above the government reserve price. 1977 was the last year of government support pricing. There was increase in the price paid in 1978 which was reflected in the area planted for the 1979 harvest (Fig 3.) but price fell again in 1979 when there was a 35% increase in output.

The high prices paid for tobacco after World War II created the conditions necessary for increasing output. After 1955, however, the major factor influencing increasing output was increased yields (Fig 3). They not only increased output per hectare but encouraged farmers to continue increasing the area planted by offsetting the price decline.



In the early 1940's with the increasing number of new growers, research was considered less important than extension. However, "branching tobacco over an expanding acreage would never produce a harvest of the size and quality which would permit economic competition with the traditional growing countries" (Clements and Harben p. 168) and research on a vast scale was required. In 1946 because of dissatisfaction with research conducted by the Research Board the Tobacco Growers' Association subsidised and initiated private research. In 1950, with the industry prepared to double again the government's contribution to research it was agreed that the Tobacco Research Board should operate completely independently. The industry's contribution to research continued to increase both absolutely and relatively and between 1960 and 1965 they guaranteed a minimum contribution of over two million dollars against government grants of \$650 000. Although contributions fell off due to the slump in the tobacco industry after UDI, growers' contributions to the annual recurring costs budget of approximately one million dollars is still double that of Government. The investment was an important one. With costs of production increasing and the average price declining, increases in both yield and quality were necessary to maintain profit levels. To a large extent these were achieved. The increases in tobacco yields were in themselves considerable although they have not been as spectacular as those of cotton and maize (see Appendix). The average yield in the late 1970's was more than double that of the early 1950's:

1940-44	590	kg/ha.	1960-64	1 250	kg/ha.
1950-54	680	kg/ha.	1975-79	1 600	kg/ha.

average tobacco yields

The yield increases in the late 1950's and early 1960's came mainly from the increased use of nitrogenous fertilizer and water-planting together with the introduction of EI and other disease-resistant varieties. Thereafter, to offset declining gross margins, a far greater management input was required and improved growing techniques were particularly important together with the increasing use of herbicides and suckercides, the development of higher yielding varieties such as Mammoth and latterly the introduction of supplementary irrigation into some farm systems. Another reason for the increasing yields has also been the declining price differential between high and medium quality tobacco. To grow high quality tobacco it is usually necessary to sacrifice a certain measure of weight.

Farmers' tobacco price response and crop mix decisions have been complicated by the various factors outlined. From 1967 they appear to have been based on the price and yield (gross returns) received the year before, yield potential or expected returns based on government's announced reserve price and the viability of alternative crops. Figure 3 does, however, show that generally the area planted tends to respond positively with price (lagged one year) but the magnitude of the response has not been measured.

Cotton

Cotton production was insignificant in Zimbabwe before UDI. In the 1920's there were several years in which large cotton acreages were grown but with disastrous results due primarily to jassid attack (Muir 1981c). The Cotton Research and Industry Board, established in 1936, operated the three ginneries at Bindura, Sinoida and Gatooma. It was responsible for research and for marketing the cotton crop and in 1942 it was authorised to establish cotton, textile and allied industries. The first cotton spinning mill was established in 1943 and a second in 1951 (Weinmann). Despite all these efforts to encourage local cotton production, there was little interest in cotton production until the late 1960's.

In 1946 the first major trials using insecticides were initiated and shortly thereafter the variety Albar was introduced from Uganda. This variety demonstrated jassid and blackarm resistance together with good lint quality and yield potential (Pattway). It took some ten years before commercially viable results were obtained but the outcome was a significant increase in commercial cotton yields from 1957 (see Fig. 4). In 1967, Deltapine was released to farmers in the Lowveld to overcome the problem of rank growth experienced with Albar. It was also better suited to the mechanical harvesting methods favoured in that area. Subsequent research improved pest control and developed the Delmao variety, a higher quality, longer staple cotton. The introduction of irrigation in the Lowveld and supplementary irrigation in Northern Mashonaland also increased yields.

The increases in cotton yields during the period reviewed were considerable. Average yield in the late 1970's was 68% higher than it was in the early 1950's (Pattersfield 1981a). Despite an almost threefold increase in cotton yield in the late 1950's acreage remained static. This was related directly to the relative profitability of tobacco production. It took UDI to change the situation.

In 1968 there was a marked increase in the cotton area harvested (Fig 4) which was mainly attributable to the effects of UDI. Cotton and tobacco are not ideal substitutes since cotton is best grown on the heavier red loams and tobacco on lighter sandy soils. In the pre-UDI tobacco boom period, tobacco was grown in many areas not really suited to either tobacco or cotton production. At altitudes above 1 300 m, the low night temperatures in autumn affect lint fibre development and the only way to produce economic yields in high altitudes is to establish the crop early with irrigation (McKinstry). Tobacco farmers worst affected by falling prices were those in highveld areas. The increase in the area planted to cotton between 1966 and 1969 can, nonetheless, be mainly attributed to the diversification out of tobacco and into cotton. An important factor in the continued increase in cotton acreage was the development of irrigation schemes in the Lowveld, which not only increased the area planted but also contributed to increases in national yield.

Cotton prices had reached a peak in 1950 and then declined (Fig. 4) There was a slight increase in price in 1967 which reinforced the diversification from tobacco to cotton. Cotton acreage dropped slightly in 1970 (despite fair returns in 1969) as farmers continued to experiment with alternatives for tobacco. The drop in area appears to have been replaced mainly by increased soya bean and maize production. From 1972 cotton area increased again until 1974.

whereafter it appeared to fluctuate in response to the previous year's returns. Thus, despite an increase in price in 1974 because yields were low, there was a small drop in the 1975 area harvested. Preplanting prices were introduced for cotton from 1976 but since these have generally been considerably lower than the final price paid (this price relying heavily on export realisations) farmers still respond mainly to the previous year's returns. The exception was 1978 when, despite low yields and falling prices in 1977, there was a rise in acreage.

Wheat

Wheat had been grown since the early 1900's but the summer varieties suffered from rust and the winter crop had to be grown under irrigation. Irrigated wheat yields did not repay the capital investment necessary to expand production and the wheat produced was of a poor baking quality and was low in protein (Muir 1981a). Nonetheless government encouraged wheat production in the thirties and about 7000 ha. per annum was grown until 1946 when the high tobacco prices made wheat unattractive and thereafter less than 1000 ha. per annum were planted.

Wheat yields had to be increased before irrigated winter wheat warranted the necessary capital investment. The plant breeder appointed by government in 1954, initially looked at the possibilities of summer wheat but it was found that even in the highveld the temperatures were too high and it was not possible to obtain economic yields. By 1969 high-yielding short-stemmed varieties had been developed which did not lodge when fertilized heavily and which were relatively resistant to a large number of the fungus races responsible for stem rust (Rattray). Another important research achievement was the development of strong wheats of good baking quality so that the importation of a proportion of hard wheats would not be necessary. To encourage the production of these wheats, which were lower yielding, a premium was offered to farmers. By the late 1970's wheat yields were three and a half times greater than they had been in the 1950's.

Local wheat production provided only about 2% of consumption prior to 1965. Import substitution was encouraged in the early 1960's with the price paid for wheat about \$5 per tonne above import parity in 1965 (Ministry of Agriculture). The need for increased self-sufficiency after UDI was important as foreign currency reserves dwindled and as it became increasingly important to secure national food supplies. In order to stimulate the investment necessary for wheat production the government, in 1967, guaranteed a price which was \$15 a tonne higher than import parity (Roberts). Initially most of the wheat was grown in the Lowveld, encouraged by the Sabi-Limpopo authority and by 1971, despite a marked increase in demand, the country was producing 75% of local requirements (Handford). After the initial increase in producer prices the real producer price began to decline in 1969 (although it was still above import parity) and did not start recovering until 1974. This combined with the increased profitability of cotton and sugar resulted in a drop in the area planted to wheat in the Lowveld. The high prices paid for wheat in 1974 and 1975, however, encouraged the expansion of irrigation in the highveld and by 1979 Mashonaland was producing 63% of Zimbabwe's wheat (CSO 1980). Having encouraged wheat pro-

COMMERCIAL WHEAT AREA PLANNED (AW),

AVERAGE YIELD (YW) AND AVERAGE

REAL PRICE PAID (PWT)

PWT

Y/M/T

50

40

30

20

10

0

0

0

0

0

0

0

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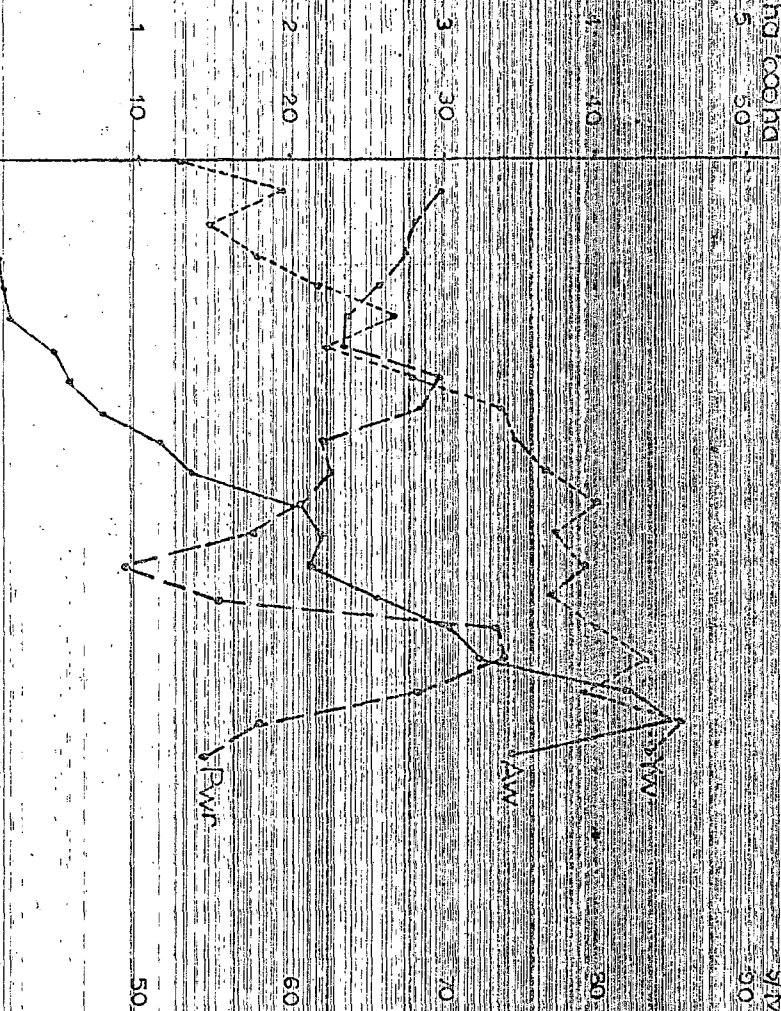
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COMMERCIAL SOY BEAN AREA PLANNED (AS),

AVERAGE YIELD (YS) AND AVERAGE

REAL PRICE PAID (PSR)

PSR

Y/S

50

40

30

20

10

0

0

0

0

0

0

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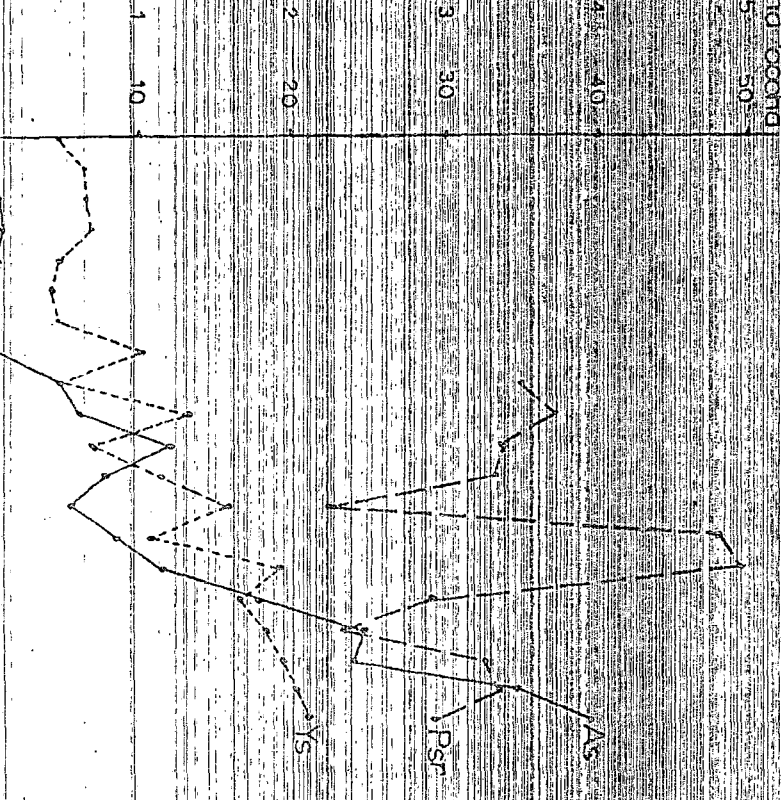
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0 0 60 65 70 75 80 YEARS 40



duction from 1974 to 1976 in response to the increasing cost and difficulty of importing the balance of the country's requirements, government were faced with a surplus over local storage capacity with only limited and uneconomic export markets. The real price of wheat declined in 1977 and in 1978 the nominal price fell by \$13 per tonne. There was a \$7 per tonne increase in the nominal price in 1979, in response to increasing local demand.

Wheat was the first major annual crop produced in Zimbabwe requiring a high fixed investment and its response to price was lagged differently from other annual crops. The price response has not been quantified but the graph showing the area planted and the real prices paid seems to indicate a lag of approximately two years even after the introduction of preplanting prices. It takes time to plan, raise finance and construct the irrigation facilities necessary for wheat production and so there is a delay in the response to increased prices where the expected increase in production has to come from expanded national capacity. The lagged response to a fall in price can be attributed to the lack of suitable alternatives in the short term, the high turnover needed to make capital and interest repayments and the relatively low variable costs in proportion to capital costs. Thus although the wheat price began to decline in 1977, the area planted to wheat only fell off in 1979.

Wheat has been an important crop for the intensified use of Zimbabwe's agricultural resources. It is planted in May and reaped in September/October when demand for land and labour is relatively low (summer crops are planted in November/December and reaped between January and April.) In most of Zimbabwe, however, the soils cannot stand up to continuous cropping even with heavy fertilizer applications and careful crop rotations, and fallow years must be included in these rotations. The implementation of irrigation schemes in the highveld were made possible with the emergence of a high-return winter crop and this was important for the supplementary irrigation for tobacco, maize, cotton and soya beans. In the longer term it is expected to have an even greater effect on groundnut and coffee production.

Soya Beans

Soya beans have been grown as a forage crop on a small scale for many years. The first Heron strains were released to farmers in the mid thirties and although prone to lodging when grown under high fertility conditions, they were satisfactory for fodder purposes (Rattray). Apart from lodging another disadvantage was that the strain was slow maturing. A new breeding programme was started in 1963 to obtain faster maturing varieties capable of high seed yield, which did not lodge, were disease resistant and acceptable on world markets. With the introduction of suitable hybrids and legume inoculants, soya bean yields started to increase markedly in 1966 and continued relatively erratically until 1975 after which there has been a steady of slower progress (see Fig. 6). On a three year average (1975-1977) Zimbabwe's soya bean yield equalled that of the U.S.A.

Soyabean marketing was not controlled until 1969 but Government announced a minimum price for Grade A soya beans in 1967 for the 1968 season. The impetus for the incentive price policy was the shortage on world markets (Cox) and the need to encourage export crops other than tobacco. 1968 saw the first real increase in soya bean production and soya beans have been exported since 1969 in their raw state. Prices declined after 1969 but Figure 6 shows a sharp price rise in 1973 and 1974 with a decline in 1975. Although production did fall in 1971 and 1972 in response to falling prices, thereafter there does not appear to be a marked relationship between price and area planted. Instead, area planted continued to rise steadily despite fluctuating prices, as farmers became more familiar with the crop and its potential as a complement to many production systems. It is important in wheat rotations and, because of its short growing season, can be grown together with maize or cotton. By 1979, soya beans had become Zimbabwe's sixth most important crop in value terms.

The oil content of soya beans is only 17% compared with 48% for groundnuts and 20% for cotton seed and in 1967, Heath saw no prospect of developing the solvent extraction plants necessary to obtain soya bean oil. In 1975, however, the first plant was installed and in 1977 some soya bean oil was exported. Approximately 20% of the locally consumed edible oil is derived from soya beans and, where cheap enough, soya oil is also used in industry for certain plastics. The soya bean cake has a very high percentage of protein and is used for livestock feeds. It could, correctly processed and marketed, become an important source of protein for Zimbabwe's increasing population.

Groundnuts

Since the early 1920's the area planted to groundnuts has been relatively constant (2-4000 ha per annum). For many years research concentrated on the improvement of agronomic practices and local and imported varieties were screened to find the best yielders under different systems. It was not until the 1970's that significant increases in yield were recorded. For many varieties a long growing season is necessary and it is essential that there is sufficient water at the pegging-down stage. Supplementary irrigation is, therefore, important to achieve consistently high yields. Groundnut yields are four times higher than they were in the early 1950's.

In the period reviewed there were only two years when groundnut acreages increased sharply. The first was in 1946 when the harvested area doubled to 5 400 ha. Price data for these years are unavailable but it is possible that the new settlers, who were not yet familiar with tobacco, boosted production. The second was in 1968 when the area harvested increased by 163% to 11 200 ha. There was a 14% increase in the real price paid in 1968. The drought in that year resulted in very low yields and the area planted fell sharply and by 1971 only 2 600 ha. were harvested. The real price of groundnuts increased again from 1972. The planted area fluctuated slightly in response to price movements (with a one year lag) but these were not as obvious as may be expected from a crop where prices have increased in real terms against most crops which have shown a marked decline. From 1965-1979 the real price of maize

fell 25% and tobacco 35%, whereas that of groundnuts increased 65%. It is possible that the lack of response by farmers to groundnut prices may be that the increased yields are a relatively new phenomenon and also that, without irrigation, it is a high risk crop.

Sunflowers

Sunflowers were initially mainly grown as green manure although there was some seed and fodder production. After the introduction of cheap nitrogenous fertilizers in the 1950's most of the crop was grown for seed. Relatively little research has been carried out on sunflowers in this country. The slight increase in average yields is probably the result of the increased use of fertilizer both direct and indirect. Sunflowers are comparatively free from disease and insect pests and are relatively drought resistant. They are, however, very susceptible to eelworm attack and unsuitable for tobacco and potato rotations.

The area planted to sunflowers remained relatively constant until 1968 when the area more than doubled and 9 500 ha. were harvested. From 1969 to 1977 between 4 and 6 thousand hectares were planted. In 1978 the area harvested dropped to 2 300 ha. after several years of steadily declining real prices.

Coffee

Coffee production was negligible until the 1960's. In 1965 most of the 200 ha. planted to coffee were in the Eastern Border region. There has been a marked increase in yields which have risen more than fourfold since 1960. Irrigation has been important to the increased national averages. It has also been important in stimulating the establishment of coffee in suitable regions of northern Mashonaland. Since 1974 there has been a steady rise in the area planted and by 1978 there were 5 000 ha. of coffee established. With the difficulties encountered in marketing an embargoed crop the farmers requested the Agricultural Marketing Authority to handle exports and in 1972, coffee became a controlled commodity marketed through the Grain Marketing Board. There was a sharp rise in international prices in 1976 and whilst output rose by only 35% the gross value trebled. Although, in 1979, the area planted to coffee accounted for less than 1% of total crop area it accounted for over 3% of gross value. Exports went from \$84 000 in 1966 to \$11 million in 1979.

Sugar and Tea

These crops are both plantation crops grown principally on large national or multinational corporate or state-owned estates and are outside the scope of this study.

Tea production increased from 200 ha. in 1940 to over 4 000 ha. in 1972 whereafter it remained relatively static. Tea, which is grown predominantly in the Eastern Highlands, has no cross-effects with the crops discussed in this paper.

Sugar, however, does affect the area planted to wheat, cotton and fruit. It has become a major crop and in 1979 it represented 5% of area planted, 13% of gross crop value and 11% of raw crop exports. It is grown in the Lowveld under irrigation and fields previously planted to wheat have been converted to sugar since 1974. More recently large areas of citrus have also been replaced by sugar.

Sorghum

The area planted by commercial farmers was negligible until the early 1960's except for a brief period from 1951-53 when prices were unusually high. After UDI crop area rose, in 1966, from 4 to 19 000 ha. in response to a high price in 1965 and the need to diversify. Prices then declined until 1970 and from 1969 the area planted remained at approximately 6 000 ha. except in 1973 and 1975. In 1973 over 20 000 ha. were planted after several years of favourable prices but fell sharply in 1974 and by 1975 only 2 600 ha. were grown. A higher preplanting price was announced for 1976 and the area planted went back up to 5 800 ha. Sorghum is used primarily for opaque beer and livestock feeds and has not been exported since 1975. It is a low value crop which accounted for only 1/2% of the gross value of crop production in 1979.

Other Tobacco

Burley tobacco is only grown on a small scale by commercial farmers with a peak of 4 200 ha. grown in 1972. It is a relatively high value crop and ranked second in value per tonne as an export in 1979. Oriental, cigar and fire-cured tobacco production are negligible.

Fruit and Vegetables

Citrus has been grown commercially since the establishment of corporate estates in the early 1900's. Since 1975, with the fall in external demand, some areas have been and are being replaced with other crops, particularly in the Lowveld where large areas of irrigated citrus are being replaced by sugar.

The area planted to vegetables has remained relatively static. Imports of vegetables and vegetable preparations dropped from \$350 000 in 1966 to \$160 000 in 1979. The increased urban population will have caused demand to rise and this must have been met by increased yields and greater informal sector supply.

The value of fruit and vegetable exports was double the 1966 figure in 1974 at \$2.6 million but by 1979 it was down to \$1.4 million.

Other Crops

Seed Maize - Data are relatively limited for this crop but planted area has been steady and from 1966 to 1978 varied between 4 and 7 000 ha. In 1979 the harvested area rose sharply from 6 to 9 000 ha. Seed maize has become an increasingly important export which accounted for less than \$1 000 in 1966 and almost \$2.5 million in 1979.

Other seeds : have also shown an increase in recent years and whereas in 1966, 657 tonnes of seed were imported, 719 tonnes (excluding maize) were exported in 1979.

Barley : is a winter crop grown under irrigation. In 1973, there were still only 603 ha. planted to barley. Yields increased markedly in the latter 1970's and by 1979, 94 farmers were planting 5 046 ha. at an average yield of 4.6 tonnes per ha. (CSO, 1980). Exports of malted barley rose in three years from less than \$1000 to \$2.8 million in 1979.

Conclusion

The paper has shown the decisive role played by high prices in the 1940's and 1950's. These high returns were important in establishing the newly settled farmers and were important for the growth of the national economy; expanding output, demand and foreign currency earnings. The advantages of this prosperous era were not replicated in the peasant farming areas where flue-cured tobacco, the highest-earning crop, was not grown.

In the 1960's and 1970's it was the results of the ongoing, local and locally applied international research efforts of earlier decades, which were essential to the continued expansion of crop production in the commercial sector. The yield increases intensified production and output per hectare and maintained gross returns to farmers despite declining real prices. These substantial yield increases were not seen in the peasant sector (See Appendix), where agriculture became increasingly disadvantaged.

The only continuous data available on the peasant sector are estimates made by the Native Commissioners of the time. The results of the "Sample Survey of African Agriculture, Southern Rhodesia, 1959/60" are compared with the Native Commissioners estimates in the table below:-

Production in Tribal Trust Lands and African Purchase Areas 1959

('000 tonnes)

	<u>Maize</u>	<u>Munga</u>	<u>Rapoko</u>	<u>Sorghum</u>	<u>Groundnuts</u>
Sample survey estimate based on growers' declarations	384	213	141	93	16
Department of Native Affairs' Estimate	273	74	74	51	12

Source : CSO, 1962

The Department of Native Affairs estimates are significantly less than estimates based on growers' declarations. The differences in the estimation methods were so large that it is difficult to draw any definite conclusion except to point to the possibility that production from black farmers may, throughout the years have been seriously underestimated. Department of Native Affairs figures are, however, the only series available and are used in the calculation of yields in this paper (appendix). Low yields in this sector have been confirmed by individual studies (see Johnson or Weinrich).

Up to 1940 yields in the peasant sector declined sharply (Muir, 1981a, Fig. 1) but some of the subsequent effects of research were felt in the peasant sector with those crops which, because they were grown in the commercial sector, received major research inputs. It appears that peasant maize yields have doubled since the early fifties and this may reflect both the importance of maize as a staple food and the concentration of extension officers on this crop. Crops which have been almost ignored by local researchers include munga (bullrush millet), rapoko (finger millet), edible dry beans and sunflowers. Since millets are important for their drought resistant qualities they continue to be grown by peasant farmers in the marginal rainfall regions to protect the family against starvation in case of a maize crop failure.

The potential for intensifying production in the communally-owned farming areas does exist given appropriate conditions. It may not be possible to match commercial sector yields, particularly in the Natural Regions III and IV. But with maize yields five times greater in the commercial sector, sorghum and groundnuts six times and soya beans and cotton three times greater (see Appendix) it must be possible to increase yields in the peasant sector by lifting some of the constraints facing these farmers. There is also potential for research in three important areas: by increasing yields under peasant farming conditions of those crops also grown in the commercial sector, by increasing the yield potential of crops such as munga, rapoko and sunflowers which have been ignored in the past and by isolating new crops suitable to the marginal areas.

It is unlikely that yields will continue to improve rapidly in the commercial sector. It is important, if this sector is to continue to produce, that the terms of trade do not decline faster than production can intensify. The reasons for continued production from this sector and the methods for ensuring such production are beyond the scope of this paper.

The review has shown the difficulties faced by an export crop such as tobacco which relies on world demand. The crop has played a significant role in the development of agriculture and the economy and particularly as an important foreign currency earner. It is likely, however, that demand will continue to fluctuate in response to world weather conditions and subsequent production patterns in competitive nations. This will mean unpredictable returns and tobacco will remain a high risk crop.

Maize price policies have alternated between subsidising farmers when maize output is surplus to local requirements, and subsidising consumers when it is in deficit. With the erratic maize yields a rational price policy is difficult. Maize imports are costly and more important, they are uncertain. Maize exports, however, are also costly particularly in the light of their high opportunity costs.

The era after UDI saw the introduction of crops (particularly wheat) which have a longer lag in responding to price changes and full cognisance of this extended lag does not appear to have been given in the price policies followed.

Agriculture represented only 12% of Gross Domestic Product in 1979 but the sector employed 34% of total wage earners and accounted for 35% of total exports. A significant feature in the period reviewed was the expansion of the crop production base which resulted from the diversification out of tobacco. This resulted in a reduction in imports of food and raw materials and the expansion of local processing industries.

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SECTOR YIELDS 1959-1979

(measured in Kilograms per Hectare)

	MAIZE			SORGHUM			MUNGA			RAPOKO			WHEAT			BARLEY			EDIBLE DRY BEANS		
	a	b	c	a	b	c	b	a	c	b	a	b	c	a	b	c	a	b	c	a	b
1950	1198	n/a	270	370	n/a	230	n/a	390	530	n/a	530	1170	n/a	1620	n/a	360	1620	n/a	360	n/a	216
51	768	"	200	370	"	220	"	320	420	"	420	1810	"	1180	"	167	1180	"	167	"	177
52	1524	"	310	530	"	370	"	560	670	"	670	1020	"	880	"	266	880	"	266	"	391
53	1457	"	420	600	"	400	"	710	840	"	840	1360	"	1500	"	318	1500	"	318	"	455
54	1647	"	420	700	"	330	"	750	690	"	690	1730	"	1150	"	370	1150	"	370	"	358
55	1684	"	370	630	"	220	"	320	420	"	420	1270	"	1300	"	347	1300	"	347	"	177
56	2248	"	480	790	"	300	"	720	700	"	700	1440	"	1510	"	386	1510	"	386	"	268
57	2282	"	450	930	"	270	"	770	790	"	790	1170	"	1510	"	432	1510	"	432	"	287
58	2304	"	410	790	"	270	"	770	850	"	850	1110	"	1290	"	247	1290	"	247	"	250
59	2459	"	510	770	"	360	"	560	430	"	430	950	"	1650	"	340	1650	"	340	"	365
60	1967	"	570	700	"	230	"	300	300	"	300	1280	"	2030	"	271	2030	"	271	"	336
61	3276	"	590	1090	"	520	"	430	410	"	410	1970	"	1970	"	450	1970	"	450	"	290
62	2899	"	n/a	950	"	n/a	"	n/a	n/a	"	n/a	1470	"	2170	"	513	2170	"	513	"	n/a
63	2745	"	"	850	"	"	"	"	"	"	"	1780	"	2440	"	458	2440	"	458	"	n/a
64	2634	"	"	1170	"	"	"	"	"	"	"	2200	"	3120	"	213	3120	"	213	"	139
65	2683	"	500	720	"	270	"	450	430	"	430	2670	"	2810	"	278	2810	"	278	"	192
66	3310	"	590	1380	"	280	"	510	n/a	"	n/a	2230	"	2880	"	645	2880	"	645	"	155
67	4506	"	470	1300	"	280	"	450	"	"	"	2810	"	2950	"	579	2950	"	579	"	377
68	2357	"	890	620	"	360	"	390	"	"	"	3370	"	2120	"	397	2120	"	397	"	290
69	4640	1635	690	1480	550	620	630	530	780	n/a	n/a	3480	"	3130	"	532	3130	"	532	"	420
70	3251	577	610	740	150	600	270	310	1200	"	"	3670	"	3380	"	314	3380	"	314	"	394
71	5100	1508	670	1160	310	560	570	380	450	"	"	4020	"	3360	"	310	3360	"	310	"	375
72	5632	1975	660	2000	810	500	760	540	250	"	"	3750	"	1980	"	345	1980	"	345	"	236
73	2830	527	730	1250	230	610	240	430	230	"	"	3940	"	3930	"	365	3930	"	365	"	367
74	5742	1777	650	1620	500	420	590	n/a	700	"	"	3710	"	3250	"	319	3250	"	319	"	286
75	5206	1792	540	1630	480	540	480	330	610	500	500	3950	2970	3250	2670	325	3250	2670	325	599	750
76	5710	2260	600	2620	740	560	630	360	310	680	680	4310	2440	5050	2930	371	5050	2930	371	521	n/a
77	960	2089	760	2650	690	550	560	380	710	620	620	3930	2570	4680	2230	412	4680	2230	412	306	314
78	5463	2186	640	2290	690	480	630	330	760	310	310	4530	2590	5170	1610	328	5170	1610	328	639	186
79	3699	1167	700	2530	600	400	n/a	380	n/a	390	390	4460	2230	4580	2320	391	4580	2320	391	564	364

a) Commercial Sector b) African Purchase Areas c) Peasant Sector

1) Rapoko data used is not that from the Whitsun data bank (Muir, 1981b)

SOURCES: MUIR (May, 1981)
TATTERSFIELD (1981b)

INDUSTRIAL CROPS - SECTOR YIELDS 1959-1979
(measured in Kilograms per Hectare)

(unshelled)

TOBACCO

	GROUNDNUTS			SUNFLOWERS			SOYA BEANS			SEED COTTON			Flax			Burley			COFFEES	
	a	b	c	a	b	c	a	b	c	a	b	c	a	b	c	a	b	c		
1950	735	n/a	96	478	n/a	n/a	478	n/a	n/a	324	n/a	n/a	774	n/a	n/a	774	n/a	n/a	a	
51	324	"	173	292	"	"	161	"	"	252	"	"	606	"	"	606	"	"	n/a	
52	424	"	244	422	"	"	329	"	"	376	"	"	586	"	"	586	"	"	"	
53	585	"	296	455	"	"	352	"	"	164	"	"	670	"	"	670	"	"	"	
54	714	"	406	503	"	"	660	"	"	323	"	"	805	"	"	805	"	"	"	
55	752	"	173	486	"	"	532	"	"	163	"	"	796	"	"	796	"	"	"	
56	743	"	581	460	"	"	718	"	"	188	"	"	952	"	"	952	"	"	"	
57	738	"	660	459	"	"	570	"	"	428	"	"	897	"	"	897	"	"	"	
58	477	"	502	472	"	"	593	"	"	736	"	"	860	424	"	860	424	"	"	
59	519	"	453	480	"	"	601	"	"	1026	"	"	995	837	"	995	837	"	"	
60	595	"	450	477	"	"	475	"	"	957	"	"	1177	"	"	1177	"	"	"	
61	793	"	621	711	"	"	626	"	"	1120	"	"	1194	826	"	1194	826	"	"	
62	840	"	n/a	566	"	"	631	"	"	976	"	"	1182	925	"	1182	925	"	132	
63	825	"	"	574	"	"	665	"	"	1259	"	"	846	815	"	846	815	"	173	
64	664	"	"	513	"	"	472	"	"	1264	"	"	7315	1061	"	7315	1061	"	303	
65	514	"	"	516	"	"	407	"	"	1181	"	"	1236	1150	"	1236	1150	"	450	
66	1210	"	806	560	"	"	459	"	"	1214	"	"	1357	1183	"	1357	1183	"	381	
67	1023	"	562	785	"	"	1012	"	"	1628	"	"	1363	1234	"	1363	1234	"	414	
68	738	"	589	336	"	"	477	"	"	1176	"	"	1477	1257	"	1477	1257	"	687	
69	1214	504	547	617	532	"	1310	829	"	1800	"	"	1467	1259	"	1467	1259	"	1087	
70	635	235	615	420	262	"	634	292	"	1373	682	1214	1367	1259	"	1367	1259	"	977	
71	1099	623	731	704	261	"	1140	192	319	1956	998	883	1253	1287	713	1253	1287	713	898	
72	1425	866	750	600	592	"	1591	617	400	2069	1129	889	1440	1527	638	1440	1527	638	1047	
73	1548	226	504	471	243	"	1067	178	330	1557	467	900	1385	1206	1091	1385	1206	1091	1000	
74	1941	574	593	499	436	"	1918	568	374	1414	655	727	1417	1370	718	1417	1370	718	800	
75	1550	589	600	545	473	"	1754	442	500	1510	767	750	1271	987	859	1271	987	859	840	
76	2254	733	532	639	649	400	1808	794	324	1866	1016	804	1297	1155	880	1297	1155	880	853	
77	2029	408	566	466	557	469	1938	689	600	1545	864	741	1652	1301	864	1652	1301	864	613	
78	2290	638	505	390	526	386	2010	735	780	1499	751	564	1472	1265	657	1472	1265	657	750	
79	2325	500	417	532	400	350	2108	750	750	1691	672	750	1506	1352	768	1506	1352	768	541	
																				1273
																				1285

Commercial Sector b) African Purchase Areas c) Peasant Sector

SOURCES: MUIR (May, 1981)
TATTERSFIELD (1981b)



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