THE ATHERTON TABLELAND

MAIZE INDUSTRY

RESULTS OF A SURVEY CARRIED

OUT IN THE 1976/77 SEASON

BY THE

QUEENSLAND DEPARTMENT OF PRIMARY INDUSTRIES

AND THE

ATHERTON TABLELAND MAIZE MARKETING BOARD

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INTRODUCTION:

Maize producers on the Atherton Tableland face two major problems - an inhospitable climate, and low returns.

Typical growing conditions are hot and wet, often with prolonged periods of heavy rainfall. These conditions may directly depress yield. In addition, soil erosion, weed growth and disease outbreaks are encouraged. Strong winds, causing lodging, and weather conditions favouring rapid expansion of insect populations also occur. The climatic suitability of the area to maize growing is perhaps best described in the 50th Annual Report and Balance Sheet of the Atherton Tableland Maize Marketing Board (1972-73 Pool). It noted "there are no OTHER grain crops AS SUITABLE as maize for combating wet soil conditions..."

In recent years, the local stock feed market has become the major consumer of Atherton Tableland Maize. This market is of limited size. Its demands depend on the current prosperity of the consuming industries - dairy, pig and poultry production. The ability of this market to bear increased prices for maize is limited. Production in excess of local requirements is exported. With unfavourable world prospects for coarse grains, this market also seems unlikely to provide increased returns to growers. The value of maize produced is consequently unable to keep pace with rising costs of production. Maize returns to growers continue to decline in real value.

Traditionally improved production techniques and marketing strategies have formed the first line of defence against the problem of declining returns. This defence relies on adequate extension of technical developments, and increased marketing ability. A second line of defence - of finding and gradually introducing alternate and more promising crops, may also need to be recognized.

The aim of the current survey has been to identify industry problems, and to assess the usefulness and acceptance of technological solutions to these problems. In addition grower's views of the success of the Atherton Tableland Maize Marketing Board in developing adequate marketing procedures were sought.

It is hoped that the results of the survey will provide a detailed description of the present state of the Tableland maize industry. It should pinpoint continuing problems, highlight new or possible future problems, and

hence aid planning by research and extension personnel of the Department of Primary Industries, and by the Maize Marketing Board.

MAIZE GROWING ON THE ATHERTON TABLELAND : A SUMMARY.

The main maize growing area of the Atherton Tableland is in its northern section. This land is comparatively level, at an average altitude of 780m.

CLIMATE.

The average rainfall in maize growing areas is 1350mm. Three-quarters of the annual rainfall occurs in the summer months between December and March. This rainfall may be accompanied by strong winds of cyclonic origin. During April, May, and sometimes June, there are prolonged periods of dull days and mist. There is more than ample rain during the growing period. Records of the Atherton Tableland Maize Marketing Board show that best yields have been obtained when rainfall over January, February and March was below normal.

Wet conditions in April and May result in depressed yields. Drizzle and lack of sunshine favour high cob rot incidence. Damp conditions in May and June also delay harvest, increasing losses due to cob rots and pest damage.

PLANTING.

The planting season generally extends from November to January, depending on soil moisture status. Land preparation varies with soil type and preceding cropping history.

Planting is generally in 90 cm. rows. The desired population is 35000 plants/ha.

FERTILIZER USE.

The major nutritional requirements of maize on the Tablelands are nitrogen (N) and phosphorus (P).

With the exception of maize crops grown after a legume-based pasture, it is recommended that all maize crops receive an application of 80kgN/ha.

Phosphorus requirements are based on soil analysis results. Where less than 15 p.p.m. available P is registered, an application of 35 kg P/ha. is recommended.

VARIETIES.

A maize breeding programme was commenced at the Kairi Research Station in 1962. Its main objective has been to develop hybrids with high yield potential and effective resistance to disease - including those diseases peculiar to tropical conditions.

The Kairi programme has produced hybrids resistant

to diseases including Tropical Rust, Common Rust, Diplodia Ear Rot, Maize Stripe Virus, and Maydis Leaf Blight. Current hybrids are QK 217 and QK 231. QK 487 a Head Smut resistant variety, is used in areas where this disease occurs.

CULTIVATION AND WEED CONTROL.

The use of interrow cultivation is influenced by the weather and by weed growth. It depends on favourable breaks in the weather occurring at a suitable stage in crop growth.

Herbicides have provided a supplementary tool in weed control. Atrazine and 2,4 - D have been used increasingly as a substitute for, or adjunct to, mechanical cultivation.

PESTS.

Field mice, rats, bandicoots, grasshoppers, army worms, corn ear worms, cut-worms, aphids and weevils all constitute hazards to the maize crop.

Corn ear worms and weevils are constant pests. The remainder cause spasmodic damage of varying intensity. Damage by weevil can be serious when there is a prolonged delay in harvesting operations.

HARVESTING.

Most crops are harvested under contract. Wet weather during harvest, limited intake ability of the Maize Board, and the availability of contractors may combine to produce harvesting difficulties.

Severe lodging may occur as a result of strong winds during or following wet weather. This may necessitate 'one-way' harvesting of affected crops, resulting in slower harvesting.

CROP ROTATION.

The development of a suitable economic rotation has been difficult because of the small size of the farms and the limited range of crops suitable for the area. As a result continuous cropping occurs on many farms. Soil fertility declines, and soil structure suffers. Maize grown after a pasture break out-yields crops on continuous cropping land, and grain quality appears to be improved.

Soil conservation measures are of particular importance on continuously cropped land, where susceptibility to erosion around planting time is particularly high.

PRODUCTION.

Year	Area (ha)	Production (tonnes)	Yield (tonnes/ha)
av. 66/67 - 70/71	8090	18327	2.3
71/72	7000	16755	2.4
72/73	8000	17616	2.2
73/74	10000	12800	1.3
74/75	7000	23592	3.4
75/76	7500	28000	3.7
Av. 71/72 - 75/76	7900	19753	2.5

Production trends over the previous ten seasons are shown above. These figures were supplied by the Atherton Tableland Maize Marketing Board. There was a slight increase in average yield in the second five-year period considered - 1971/72 - 75/76.

It should be noted that in recent years, maize has been received at the Board from Lakeland Downs. Yields at Lakeland have been well below those on the Tableland in each season. Consequently increases in yields on the Atherton Tableland may be underestimated by the above table. Unfortunately it has not been possible to eliminate Lakeland Downs data from the aggregate data.

DISPOSALS.

In recent years the dairy, poultry and pig industries of the Tableland and coastal areas from Mossman to Tully have become the Board's major outlet. Surplus production is sold for export through the Board's facilities at Cairns.

The expected return for maize from the 1976/77 season is $70/tonne.

THE CURRENT SEASON (1976/77).

Climatically, the current season has been far from ideal for maize production.

Useful rains began in the last week of October, 1976. Plantings got into full swing in November, following good general rain. The first cyclone of the season, in mid December, brought further heavy falls, delaying some plantings.

Following the consistently moist conditions early in the season, late December and January were dry, with hot clear days. Many young maize crops showed evidence of moisture stress during this period.

Drought conditions were broken by very heavy rain during the first three weeks of February. Wet conditions extended into mid-March, with sunshine and warmer conditions only returning at the end of March.

Consequently the growth of many maize crops was restricted first by drought, and later by lack of sunshine and warmth. Some crops reached critical stages of development - in particular tasselling - in very unfavourable conditions.

Consistent drizzle occurred during April, followed by an unseasonal downpour of 100 - 150 mm. in mid - May.

The Maize Board opened for intake on 17th May, in drizzling weather. These conditions continued in extended spells until late June, delaying the harvest.

Altogether, the season has been very unfavourable, especially in comparison with the preceding, almost ideal 1975/76 conditions.

WHY SURVEY THE MAIZE INDUSTRY?

With the encouragement of D.P.I. and the Board, there have been substantial changes in the maize industry over the last few years.

In his Annual Review of 1969 -70, Mr. J. Kilpatrick (District Adviser, Atherton) noted three major problems of the maize industry - nutrition and the need for fertilizers, weed control, and plant populations. Extension projects began in the following year aimed at assisting farmers to solve these problems. In 1971 - 72, a questionnaire was sent to maize growers to assess the use of fertilizer on maize. These questionnaires have since become an annual event, and showed that by the 1974-75 season considerable progress had been made in adoption of fertilizer recommendations, improved plant populations, and use of chemical weed control measures. The annual survey has also provided the A.T.M.M.B.

with an estimate of maize crop prospects.

Following a similar successful survey of peanut growers in the 1975/76 season, an enlarged survey of the maize ind industry was carried out for the 1976/77 season. Its aim was to provide a detailed picture of the industry, to take stock of past efforts in research, extension, and marketing, and to aid planning of future requirements of the industry.

SURVEY METHOD.

A detailed questionnaire was constructed, and comments sought from members of the A.T.M.M.B. and D.P.I. The final draft was prepared following consultation with the Maize Liasion Committee, Mr. Kilpatrick, Mr. Hardman (Agricultural Economist, Atherton) and members of Entonology Branch (Mareeba).

The A.T.M.M.B. agreed to assist by distributing the questionnaires. A questionnaire and covering letter were included with payments sent to each grower in early April. A copy of the questionnaire and letter are appended. A press release was prepared to co-incide with the distribution of the forms.

By the end of April, 100 replies had been received. Further replies continued to trickle in, again with the assistance of the A.T.M.M.B. At their first delivery to the Board, growers were asked to fill in a questionnaire if they had not already done so. The result was a very satisfactor return of forms, without using lengthy follow-up procedures.

RESPONSE.

Final results of the survey include greater than ninety percent of the area sown to maize on the Atherton Tablelands in the 1976-77 season. However, due to difficulties in completing the questionnaire, or in interpreting responses to the questionnaire, the total number of responses for any one section of the survey may differ from the overall total of replies received.

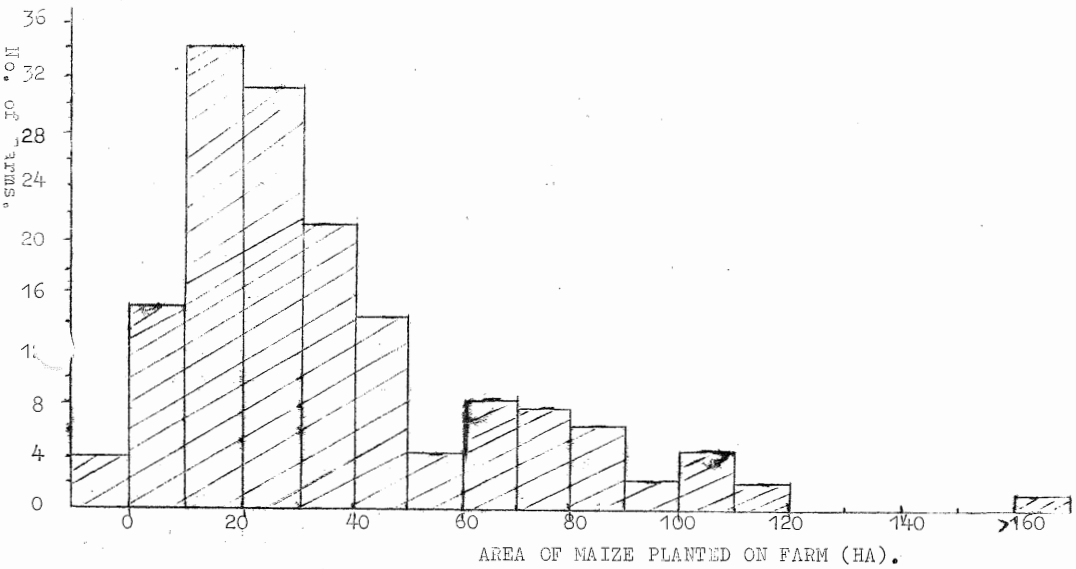
RESULTS OF THE SURVEY.

1. EXPECTED AREA PLANTED AND YIELDS.

Fig 1. 1. Distribution of Maize Production.

EXPECTED TOTAL FARM YIELD	NO. OF FARMS	AREA PLANTED (HA)	AGGREGATE OF EXPECTED FARM YIELDS (TONNES)	AVERAGE EXPECTED YIELD (TONNES/HA)
<50 TONNES	35	376	1040	2.77
50-200 TONNES	78	2315	8149	3.48
>200 TONNES	35	2830	12040	4.25
TOTAL	148	5521	21229	3.85

Fig 1. 2. Distribution of Areas of Maize Planted on Individual Farms.



Responses to the survey were analysed with reference to the total maize tonnage produced on each farm. An arbitrary choice of three classes - farms producing less than 50 tonnes; 50 - 200 tonnes; or greater than 200 tonnes; was made. This classification highlighted the relative importance of growers of different scale in terms of overall production. In particular, the 35 farms producing more than 200 tons of maize, although representing only 24% of growers, accounted for 57% of the total expected yield of maize (Fig 1. 1.)

From estimated total farm deliveries, an estimate of yield was made for each class of growers. This showed a large improvement in yield as the size of production increased. It appears that the greater the importance of maize production among farm activities, the more successful that production is. The overall average estimated yield/ha. was 3.85 tonnes/ha. This compares reasonably with the 1975-76 average of 3.7 tonnes/ha.

However, total production for the entire area in the 1976-77 season was probably over-estimated. At the time of writing, the A.T.M.M.B. believes the total intake will not exceed 18,000 tonnes. Two major reasons for over-estimation of the total production for the season exist. Firstly, many crops reached critical stages of development during periods of stress. Although later conditions recovered the appearance of the crop, many stalks on harvest were found to be barren. Many growers reported a high percentage of plants failing to set grain. Secondly, as yield estimates of individual growers were used in allocating quotas for intake of maize by the Board, it was to the advantage of the unscrupulous grower to overestimate his production.

Fig 1. 2. shows the distribution of areas of maize planted on individual farms. Fifty-nine percent of growers grew between 10 and 40 ha. of maize. The mean area of maize planted was 35 ha.

Fig 1. 3. shows the relative importance of maize as an activity on farms in the three classes.

Combining the results of Figs 1. 1 - 1. 3, some general conclusions can be drawn about the structure of the industry.

Among the growers whose farms produce less than 50 tonnes maize, two groups were evident. One group consisted farmers with very small farms, in some cases 'hobby' farms. The other group had larger farms but grew only a very small area of maize, as a minor sideline, most commonly to either peanuts or dairying. In most cases, members of both groups grew maize because machinery requirements and other costs of production are relatively modest. Perhaps because these growers were not prepared to meet, or capable of meeting reasonable levels of cost and machinery requirements, the yields of farms in this class were lower than average. A further contributing factor was that a number of these farms were in areas less favourable to maize production than the major areas of production.

Fig 1. 3. Relative Importance of Maize as a Farm Activity.

EXPECTED TOTAL FARM YIELD	% FARMS WHERE MAIZE IS MOST IMPORTANT ACTIVITY	% FARMS WHERE MAIZE IS SECOND MOST IMPORTANT ACTIVITY	% FARM WHERE MAIZE IS THIRD MOST IMPORTANT ACTIVITY	MOST COMMON MAJOR ACTIVITY
50	29%	40%	23%	Maize
50 - 200	29%	41%	21%	Peanuts (36%)
200	60%	17%	12%	Maize
OVERALL	36%	35%	19%	

Farms producing 50 - 200 tonnes of maize included the real 'mixed - cropping farms' of the Tableland. The Atherton - Kairi - Tolga triangle, where peanut growing is currently the most important source of farm income, was for the most part, included in this class of farms. Dairying and tobacco growing were other major sources of income for farms producing medium quantities of maize.

Growers whose farms produced more than 200 tonnes of maize were specialist maize growers, and contributed the bulk of the Tableland crop. Production of peanuts, potatoes, beef and pasture seeds were sideline activities on some of these farms. Yields from farms in this class were generally higher than average.

It should be noted that within each class of growers there was great variation. For example, while in general farms producing less than 50 tonnes recorded relatively low yields, individual growers within this group had recorded consistently high yields over a number of years of production. An overall view of the structure of the industry and a knowledge of the individual farmer and farm concerned are needed to give the full picture!

Fig 1. 4. Change in Total Tableland Maize Acreage.

INCREASED PLANTINGS REPORTED	+ 852 ha.
DECREASED PLANTINGS REPORTED	- 549 ha.
CHANGE IN TABLELAND PLANTING	+ 303 ha.

Fig 1. 4. shows a net increase of 303 ha. in planting of maize on the Atherton Tableland for the 1976-77 season. Combined with a decrease in plantings at Lakeland Downs in this season, the total area of maize planted

was believed to be only slightly less than that of the 1975-76 season. Final estimates of areas planted have been based on seed sales. With changing plant populations, prediction of areas planted is not entirely accurate.

2. VARIETIES.

Fig 2. 1. Varieties and Areas Planted.

VARIETY	AREA PLANTED (HA).
QK 217	2294
QK 231	2499
QK 487	227
OTHERS	3
TOTAL	5023

Varieties bred at Kairi Research Station have found total acceptance among maize growers on the Tableland (Fig 2. 1). QK 217 and QK 231 are grown in almost equal areas.

Of those growers expressing a preference between QK 217 and QK 231, 26 preferred QK 217 and 23 preferred QK 231. The almost equal preference for the two varieties is explained by the reasons given for preferring either variety. In general it was suggested that QK 231 yields slightly higher, but QK 217 performs better in adverse conditions, such as prolonged wet weather or when strong winds cause lodging.

Following an unfavourable season this year, there may be a slight swing to QK 217 next year.

QK 487 was planted in Head Smut areas, and was reported to perform well in these areas.

A number of growers expressed interest in any new varieties being developed at Kairi. It seems there will be no problem with farmer acceptance of new varieties, in the near future.

3. PLANT POPULATION.

Observation of maize plantings in 1969-70 indicated that inadequate planting techniques were resulting in non-optimum plant populations. An initial programme emphasizing the importance of adequate plant population was begun in the following season, 1970-71. This programme was continued when

results became availabel from trials at Kairi Research Station. From the data of the Maize Plant Population X Nitrogen Study, 1971-72, 1973-73, firm recommendations of an optimum economic return from a population of 35,000 plants/ha. and application of 100 kg N/ha. were able to be made. These recommendations, combined with the introduction of herbicides for weed control in maize, have formed the basis of a broad extension campaign to the maize industry. As previously mentioned, one of the major aims of the present survey is to assess the success of this campaign.

Optimal, marginal and inadequate seed rates were defined on the basis of the recommended levels (Fig 3. 1.)

Fig 3. 1. Use of Varying Seed Rates.

SEED RATE (Kg/ha)	POPULATION	NO. OF FARMS WITH EXPECTED TOTAL FARM YIELD OF – 50TONNES	50-200TONNES	200TONNES	TOTAL. NO. OF FARMS.
14.4	OPTIMAL	16	33	16	65
12-14.4	MARGINAL PROBABLY ADEQUATE	7	16	4	27
9.6 - 12	NOT ADEQUATE	6	26	8	40
9.6	NOT ADEQUATE	1	3	3	7
TOTAL NO. OF RESPONSES		30	68	31	129
NO. OF FARMS USING INCREASED SEED RATE IN CURRENT SEASON		5	21	10	36

The survey shows that 48% of farmers are using optimal seed rates, with a further 17% using marginal rates. This adoption level indicates that the benefits of higher plant populations have been reasonably well demonstrated and recognized. The scale of maize production on individual farms does not seem to have affected the rate of adoption. Slightly more small producers use higher seed rates. However a higher proportion of large producers are continuing to increase their seed rates.

Overall, 28 % of growers are continuing to increase their seed rate. Of these growers, 67% used the recommended optimal seed rate in the 1976-77 season.

It appears that the extension programme is having continuing effects with regard to plant population.

Rises in seed price envisaged for the coming season may depress the trend to increasing seed rates. It may be worthwhile to point out to growers the small contribution

of seed costs to overall costs of production.

4. LAND PREPARATION.

Problems of soil structure and general soil conditions are assuming increasing importance on the Tableland, particularly in the intensive cropping areas, where no pasture break is employed. Under current market conditions, the frequency and length of pasture breaks in some areas where these have traditionally been used, may also decline. Consequently land preparation and crop rotations as they affect soil structure, are becoming increasingly common topics of discussion between farmers and extension staff.

Wide variability exists in the land preparation methods used by maize farmers on the Tableland. (Fig 4. 1). While one farmer may disc, rake, burn, plough and disc again before planting, another may simply disc twice. The norm however, was two passes with machinery, usually ploughing followed by a discing.

Fig. 4. 1. Land Preparation.

EXPECTED TOTAL FARM YIELD (TONNES)	BURNT	NO. OF MACHINERY PASSES TO PLANTING (INCLUDING PLANTING IF CULTIVATION CARRIED OUT AT PLANTING)					TOTAL NO OF FARMS
		1	2	3	4	5	
50	1	3	18	9	4	-	34
50-200	5	7	39	24	7	2	79
200	5	5	19	1	3	1	29
TOTAL	11	15	76	34	14	3	142

For a relatively low return crop, there seems little justification for four or five machinery passes except in exceptional circumstances. Combined with at least one cultivation, and final harvesting, this level of preparation must contribute to compaction problems and damaged soil structure.

Burning appears to be relatively unpopular. No relationship was found between incidence of pests and diseases and farms using or not using burning to destroy trash.

Some interest was expressed at the beginning of the season in minimum tillage, as an economic strategy to improve the profitability of maize, and as a soil protection measure. One innovator used a very reduced tillage programme, but subsequently recorded high levels of lodging and stalk rots. These he attributed to inadequate breakdown of trash. Despite

this unfavourable outcome, reduced tillage in maize may be a worthwhile area for thought in maize production.

5. CROP NUTRITION.

Fertilizer usage on maize has been the subject of extension programmes since the 1971/72 season. The current recommendation is 80 kg N/ha. on all crops except those following a legume - based pasture. Phosphorus requirements are determined by soil test. Where soil P levels are less than 15 ppm. (B.S.E.S.), it is recommended that 35 Kg. P/ha. is applied. No response by maize to potassium has been recorded on the Atherton Tableland.

Analysis of survey data on fertilizer usage is difficult, as soil tests are not available for every maize-growing farm. Using a combination of reported fertilizer rates, crop rotation practices and local knowledge, levels of fertilizer application were defined as adequate, probably adequate or inadequate. (Fig 5. 1). While the figures derived may not be precisely accurate, they should supply a reasonable description of maize nutrition.

Fig 5. 1. Levels of Fertilizer Usage on Maize.

EXPECTED TOTAL FARM YIELD (TONNES)	FERTILIZER LEVELS						TOTAL NO. OF RESPONSES
	ADEQUATE		PROBABLY ADEQUATE		NOT ADEQUATE		
	N	P	N	P	N	P	
50	15	11	6	10	9	9	30
50-200	58	41	11	30	10	11	79
200	24	11	3	10	4	10	31
	97	63	20	50	23	30	140

Over eighty percent of growers are applying adequate, or near adequate amounts of fertilizer. Requirements of nitrogen and phosphorus appear to be about equally well recognized.

Of those growers not applying adequate fertilizers about one-third are producers of less than 50 tonnes of maize. While one in eight large or medium size producers uses insufficient nitrogenous fertilizer, one in three small producers uses an inadequate level. There are two possible explanations. Firstly information may not reach smaller producers as effectively as it reaches larger producers. Alternatively, small producers may recognize the need for fertilizers as clearly as larger producers, but may be less able or less inclined to outlay cash on fertilizer. Local knowledge suggests that the later explanation

is probably correct. Where maize is a very minor farm activity, fertilizer for maize has a low priority among general farm costs. Where a farm produces less than 50 tonnes of maize and maize is a major farm activity, the total financial situation of the farm may not provide funds for fertilizer.

Trends in type of fertilizer used and time of application are shown in Fig. 5.2. The most common technique is the

Fig 5.3 Type of Fertilizer and Time of Application

Fertilizer	Time of Planting		
	Before Planting	At Planting	With Cultivation
Superphosphate	15	9	4
DAP	-	43	3
MAP	-	2	-
Urea	-	8	69
Nitram	-	2	14
12-1 or CK 55	1	3	1
Q5	2	4	-
Aqua	-	-	1
Fowl Manure	1	-	-

application of DAP at planting (recommended rate 3.75 bags/ha), followed by urea (recommended rate 2 bags/ha) at the last cultivation. With the fairly high rainfall often experienced during the Tableland growing season, this represents a method of supplying nutrients throughout the crop's development. Superphosphate applied before or at planting is the other major method of P application. A few growers continue to use compound fertilizers. Since no response to K has been recorded on the Tableland, this represents a waste of money, and is particularly unfavourable considering the relatively low returns from maize.

The success of the extension programme on maize nutrition is evidenced by the fact that over 80% of growers are satisfied with their fertilizer practices - rates, types, and times of fertilizer application (Fig 5.3), and propose no change.

Of the remaining growers, eight will begin fertilizer use in the next season; eight will use more fertilizer, and seven will change to a different fertilizer. Only four growers plan to use less fertilizer. There appears to be some continuing adoption of recommended fertilizer levels.

Fig 5.3 Proposed Changes in Fertilizer Usage in the 1977/78 Season

Expected Total Farm Yield (tonnes)	Proposed Changes in Fertilizer Usage					Total
	None	Using Less Fertilizer	Will Begin to use Fertilizer	Using More Fertilizer	Change to Different Fertilizer	
< 50	27	1	4	-	1	33
50 - 200	68	1	4	5	3	81
> 200	23	2	-	3	5	31
TOTAL	118	4	8	8	7	145

6. CULTIVATION AND WEED CONTROL

Cultivation has traditionally been, and still remains, the major method of weed control. More than 80% of producers cultivated their crop in the1976-77 season (Fig 6.1). Of these growers, two-thirds used

Fig 6.1 Use and Frequency of Mechanical Cultivation

Expected Total Farm Yield (tonnes	Used Mechanical Cultivation		No. of cultivations	
	YES	NO	ONCE	TWICE
<50	22	4	11	10
50 - 200	63	14	44	16
>200	26	6	15	9
TOTAL	111	24	70	35

a single cultivation, and the remainder cultivated twice.

It might be expected that less large producers would cultivate their crop, since they may not have time, manpower, or machinery available to do so. However, a similar proportion of producers of all sizes used mechanical cultivation. A higher proportion of small producers, however, were able to cultivate their crop twice.

Of those growers not using mechanical cultivation, many noted in their responses that they felt the value of a maize crop did not warrant the time and expense of cultivation.

Despite the difficult season, results of weed control by mechanical cultivation were generally considered satisfactory (Fig 6.2). The majority of growers responding, stated that they intended to cultivate in the coming season.

Fig 6.2 Results of Weed Control by Mechanical Cultivation, and Intentions for the 1977/78 Season

Expected Total Farm Yield (tonnes)	Standard of Weed Control by Mechanical Cultivation			Will Cultivate Next Season	Won't Cultivate Next Season
	GOOD	FAIR	POOR		
<50	12	9	1	20	4
50 - 200	49	16	1	60	5
>200	18	6	-	23	1
TOTAL	79	31	2	103	10

Weed control by mechanical cultivation may be limited by wet weather. In a heavy wet season, a farmer may not be able to get on to his paddocks when cultivation is required. In these conditions in particular, herbicides, which may be applied by aeroplane, are valuable.

Following trials testing appropriate herbicides for Tableland maize weeds (of which wild hops, Nicandra physalodes, is the major pest), advice on the use of herbicides was included in extension projects to maize producers. A programme proposal - "Maize Weed Control" was submitted in 1974. The current survey allows evaluation of that programme.

Ideally both mechanical cultivation and herbicides have a place in weed control in maize. They should be used strategically with respect to time and labour available conditions and costs. Grower comments indicate some initial confusion about the role of herbicides. Some growers expected that with the advent of chemical methods of weed control, mechanical methods could be completely abandoned. In the current season, however, most growers seem to have mastered the essential points in choice and method of weed control, with generally satisfactory results.

The use of various weed control methods in the 1976/77 season are shown in Fig 6.3. In a season with different weather patterns, this use of cultivation and herbicides could, and should, be quite different.

Fig 6.3 Methods of Weed Control in the 1976/77 Season

Expected Total Farm Yield (tonnes)	Cultivation Only	Cultivation and Herbicides	Herbicides Only	Total
<50	19	4	4	27
50 - 200	36	27	12	75
>200	12	15	4	31
TOTAL	67	46	20	133

It is interesting to note that a higher proportion of small producers used only cultivation as their method of weed control. While greater than 50% of growers producing more than 50 tonnes of maize used herbicides, less than 30% of smaller producers included herbicides in their weed control practices. Small producers may be more likely to be able to cultivate their crop in a break in the weather than larger producers. They may be less able to outlay herbicide costs, and if necessary costs of contract aerial application, than larger producers. An alternative explanation may be that the extension programme has reached larger producers rather than small producers.

The overall proportion of farmers using herbicides is shown in fig 6.4. This figure includes those farmers who did not

Fig 6.4 Numbers of Farmers Using Herbicides

Expected Total Farm Yield (tonnes)	No Herbicide Used	Farmer Used Herbicide	Total
< 50	25	8	33
50 - 200	39	39	78
> 200	14	18	32
TOTAL	78	65	143

cultivate or use herbicides.

The first commercial application of herbicides on maize was to 30 acres on a trial basis in the 1972/73 season. In five seasons, the practice has been adopted by sixty-five growers. Herbicide was applied to 1790 ha in the current season (fig 6.5). Most farmers reported (Fig 6.6) satisfactory results of herbicide use.

Fig 6.5 Area of Herbicide Application

Total Area - Herbicide Applied	1790 ha (35%)
Total Area - Herbicide Not Applied	3370 ha
TOTAL RESPONSE	5160 ha

Fig 6.6 Reported Effectiveness of Herbicides

Expected Total Farm Yield (tonnes)	Results of Herbicide Usage		
	GOOD	FAIR	POOR
< 50	4	2	1
50 - 200	30	6	-
> 200	10	1	1
TOTAL	44	9	2

This was emphasized by the number of growers reporting increased use of herbicides on their farms in the 1976-77 season (Fig 6.7). This represents 29% of all farmers responding to the weed control section

Fig 6.7 Number of Farmers Increasing Their Use of Herbicides

Expected Total Farm Yield (tonnes)	No. of Farmers Using Herbicide on an increased area
< 50	-
50 - 200	27
> 200	8
TOTAL	35

of the questionnaire. It indicates continued impetus of the weed control extension programme. Local results have presumably been good evidence of the advantages of herbicide usage.

Herbicide practices are indicated in Figs 6.8, 6.9 and 6.10.

Fig 6.8 Type of Herbicide

Expected Total Farm Yield (tonnes)	Herbicide Used	
	2,4-D	Atrazine
< 50	-	7
50 - 200	8	36
> 200	2	17
TOTAL	10	60

Fig 6.9 Time of Herbicide Application

Expected Total Farm Yield (tonnes)	At Planting	Post-Emergence	Prior to Harvest	Total
< 50	1	7	-	8
50 - 200	3	35	-	38
> 200	1	16	1	18
TOTAL	5	58	1	64

Fig 6.10 Method of Herbicide Application

Expected Total Farm Yield (tonnes)	Boom Spray	Aeroplane	Total
< 50	6	2	8
50 - 200	18	20	38
> 200	5	13	18
TOTAL	29	35	64

Atrazine is the recommended herbicide for use in the wetter maize growing areas where tall-growing broad-leaved weeds are a major problem. That atrazine is the most commonly used herbicide reflects the areas in which it is used.

The time of application - post-emergence - is as recommended, considering that many growers apply fertilizer at 3-6 weeks after emergence. If atrazine is to be used for weed control, the soil should not be disturbed to any substantial depth after herbicide application. The times used for fertilizer incorporation could dilute the atrazine with too much soil, and bring back fresh soil and weed seeds to the surface. Hence atrazine may be best applied after side-dressing.

Ground and aerial application techniques are about equally common. With increasing scale of maize production there is an increasing trend to aerial application. Again constraints of time for larger producers, and of cash for small producers, may explain this trend.

7. CROP ROTATION

As previously indicated in Section 3, Land Preparation, many continuously cropped farms show evidence of declining soil structure and fertility. Current trials at Kairi Research Station suggest a increased yield following a pasture break, which can only be explained in terms of these factors.

The land use in the previous season, 1975/76 of areas growing maize in the 1976/77 season, is shown in Fig 7.1. Over half the area of maize in the current season was grown on areas which

Fig 7.1 Previous Land Use of Areas Growing Maize in the 1976/77 Season

Previous Crop or Pasture	Area of Maize (ha) on Farms with Individual Expected Total Farm Yield of -			Total Area (ha)
	<50 tonnes	50-200 tonnes	>300 tonnes	
Pasture	39	387	236	662
Maize	132	1255	1687	3074
Peanuts	84	498	124	706
Potatoes	3	114	100	217
Tobacco	17	29	-	46
Other Crops	11	54	9	74
Fallow	-	46	56	102
Not Available	68	131	271	470
TOTAL	354	2514	2483	5351
Maize Following Maize as % of Total Area	37%	50%	68%	57%

had been planted to maize in the preceding season. This practice was most common among large-scale producers, as expected.

Only 12% of maize was grown on land which had supported pasture the previous year. Assuming the beneficial effects of a pasture break persist for three seasons and that a similar area of pasture was ploughed in for the 1974/75 and 1973/74 seasons, a maximum of 37% of maize grown in the current season might be growing on land previously spelled to pasture.

Most maize producers expressed concern over the maintenance of soil structure (Fig 7.2). However, only a small

Fig 7.2 Concern for Soil Structure and Use of Crop Rotation

Expected Total Farm Yields (tonnes)	Expressed Concern for Soil Structure		Practice Crop Rotation		Use Planned Crop Rotation Programme	
	YES	NO	YES	NO	YES	NO
<50	14	11	22	8	8	19
50 - 200	48	21	62	12	19	54
>200	21	8	25	6	11	19
TOTAL	83	40	109	26	38	92

proportion - less than one third - used a planned crop rotation. Most farmers rotated crops with only year to year planning. Their rotation in many cases simply alternated peanuts and maize with no pasture phase. This rotation is valuable in restricting disease build-up, but is of little value in restoring soil surface.

In the current economic climate it is difficult to see how farmers are to be induced to include a pasture phase, unless drastic losses of yield or soil losses occur. Most intensely cropped farms lack fences, yards, watering facilities, etc., which would be required to graze stock. Returns would not justify installing these items. The alternative - pasture for seed production - is an activity which involves considerable uncertainty of yield and price. As such, it is not attractive. Even those farmers most concerned about yields of maize, peanuts and potatoes declining despite increased fertilizer inputs, have yet to be sufficiently worried to change their basic rotational practices.

It is encouraging to note that of those farmers currently using a planned crop rotation (that is, a four or five year programme, incorporating a pasture phase), there is a higher proportion among larger producers. This is probably due to the past development of these farms, rather than a response by those who have most to lose.

Producers of less than 50 tonnes of maize in general showed lower concern for soil structure and practised fewer crop

rotational procedures than larger producers. In the case of farmers with very small acreages, small areas may have restricted the farmer's ability to economically alternate or rotate crops.

8. PLANTING DATE

Planting dates depend directly on the weather pattern of each season. Hence the extended planting season of the 1976/77 season reflects the rainfall distribution (Fig 8.1).

Fig 8.1 Planting Dates-1976/77 Season

Expected Total Farm Yield (tonnes)	PLANTING DATE					
	NOV	EARLY DEC.	LATE DEC.	EARLY JAN.	LATE JAN.	EARLY FEB.
< 50	8	10	6	4	-	-
50 - 200	33	24	9	5	1	-
> 200	20	9	4	-	-	-
TOTAL	61	43	19	9	1	0

It is interesting to note a general trend for planting to begin earlier, the larger the crop. Perhaps the larger the crop, the higher the priority given to preparation for planting with the onset of the wet season. A grower planting a small acreage of maize might give it lower priority - for example compared with another summer crop, such as peanuts - or may be confident of sufficient break in the weather to plant a small acreage.

No general relationship between time of planting and expected yield was obvious in the current season.

9. DISEASE INCIDENCE

With the introduction of Kairi-bred disease resistant maize varieties, Head Smut is the disease of greatest current importance. Reports of Head Smut in 1976/77 and in previous seasons (Fig 9.1) indicates only a slight increase in incidence of the disease this season.

Fig 9.1 Incidence and Severity of Head Smut

Expected Total Farm Yield (tonnes)	Head Smut Present in Current Crop		Head Smut Present in Previous Crops		% of Crop Affected by Head Smut		
	YES	NO	YES	NO	1	1-5	5
<50	2	24	2	24	-	1	1
50 - 200	14	64	11	66	2	3	6
>200	8	23	8	22	-	2	5
TOTAL	24	111	21	112	2	6	12

Considering the movement of contract harvesting machinery from farm to farm, which would be expected to increase the incidence of the disease, this is a favourable report.

The reported incidence of Head Smut increases with the scale of maize production. This may be a real effect due to build-up of the disease in soil continuously growing maize. Alternatively, the lower reported incidence may be due to lower grower awareness of Head Smut among smaller producers. Pathology research work has often found Head Smut to be present in crops reported by their owners to be free of the disease.

The only other widespread disease which occurred in the 1976/77 season was Maydis Leaf Blight. Twenty growers reported a severe infection.

No relationship was evident between any cultural practice, such as borning, and the incidence of diseases.

10. INSECT DAMAGE

Some insect damage occurs in Tableland crops each season. However this rarely reaches an economic level (Fig 10.1).

Fig 10.1 Insect Damage to Tableland Maize Crops

Expected Total Farm Yield (tonnes)	Sprayed for Insect Control in Past 10 years		PEST	Crop Failure in Past 5 Yrs due to Insect Damage		PEST
	YES	NO		YES	NO	
<50	6	16	Cutworms (1) Armyworms (4)	1	21	Armyworm
50 - 200	16	63	Grasshoppers(2) White Grubs (2) Armyworms (13)	2	71	White Grubs(2)
>200	5	18	Armyworms (5)	-	21	
TOTAL	27	97		3	113	

Army worm is the pest most commonly requiring chemical control.

Only three crop failures due to insect damage were reported for the last 5 years. These results were to expected, as maize production would not have continued to be an economic proposition had frequent sprayings for insect control been necessary.

11. MACHINERY

The survey of machinery used on the Atherton Tableland for maize production was made almost impossible by the wide variety of 'makes and types'used. For example, planters from 12 different manufacturers were used by farmers growing 50 - 200 tonnes of maize and various types of each brand had then to be considered. For this reason, analysis of machinery has been simplified to indicate only the number of machines owned and the most popular machine.

Fig 11.1 Number and Type of Planter Units Used for Maize Production

Expected Total Farm Yield (tonnes)	No. of Planter Units					Most Popular Make
	0	2	4	6	8	
<50	6	21	2	-	-	John Deere
50 - 200	3	61	13	-	1	IHC 186
>200	2	7	19	1	1	IHC 186
TOTAL	11	89	34	1	2	

As expected, the larger the amount of maize produced, the larger the planting machinery was likely to be (fig 11.1). While most growers producing up to 200 tonnes of maize had two planter units, the majority of growers producing more than 200 tonnes used 4 planter units.

Those growers having no planting equipment generally indicated a permanent arrangement with a neighbouring farm or partner's farm to plant their crop. Again the number of growers using such an arrangement declined as the scale of production increased.

As expected, the number of growers owning a harvester increased as the scale of production increased. While less than 10% of growers producing 50 tonnes or less maize per season, owned a harvester, more than 60% of growers producing more than 200 tonnes of maize owned a harvester.

Fig 11.2 Number and Type of Maize Harvesters

Expected Total Farm Yield (tonnes)	No. of Farmers Owning a Harvester	No. of Farmers Not Owning a Harvester	Most Popular Make
<50	3	26	John Deere Case 1010 New Holland
50 - 200	21	57	IHC, A 8-5
>200	19	11	IHC, A 8-5
TOTAL	43	94	

Harvesting delays have contributed to substantial losses in most years on the Tableland. Insect damage, cob rots and increased lodging reduce the quantity and quality of maize harvested. Delays maybe due to limited intake capacity at the Marketing Board, and/or to contract harvesting equipment being unavailable. For growers owning their own machinery, one of these problems is solved.

Increasing interest in on-farm drying and storage of maize may assist growers with their own harvesting equipment to overcome the problem of limited intake. At least two growers in the current season took their maize off early, and dried it in peanut drying bins. While this method of drying was inefficient, both growers reported an overall profit, considering the difference between loss of yield avoided, and the costs of drying and storage. Maize drying equipment and methods are the subject of a continuing extension programme.

The total area of maize reported in the survey was 5,521 ha. Assuming as indicated above, that 43 harvesters are available to harvest this area, this represents an average area of 128 ha/harvester. There may not be justification for increasing the intake capacity of the Board's facilities, but if on-farm facilities were developed to dry and store grain, the present protracted harvesting period could be very much reduced.

Few growers are planning changes to machinery used in maize production in the coming season (Fig 11.3)

Fig 11.3 Planned Changes and Problems with Machinery

Expected Total Farm Yield (tonnes)	Planning Changes to Machinery Used		Planned Change/ Purchase	Major Problems
	YES	NO		
<50	3	28	Planter 2 Plough 1 Tractor 1	Replacement Expense 4 Availability of Contract Machines 2 Breakages 1 Spare Parts 1
50 - 200	10	66	Planter 3 Cultivation Implements 5 Tractor 2 Trailer 1 On-farm Drier 1	Replacement Expense 13 Breakages 10 Spare Parts 25 Running Costs 4 Planter Accuracy 1
>200	5	23	Planter 3 Tractor 1	Replacement Expense 8 Breakages 2 Spare Parts 14 Planter Accuracy 1 Harvester Efficiency 1
TOTAL	18	117		

From the changes and purchases reported, growers are maintaining rather than expanding their machinery inputs to maize production.

In fact, machinery inputs to maize are probably declining. Many growers noted that low returns from maize could not justify high replacement costs of ageing maching. Costs of spare parts and running costs were also major problems. It is interesting to note that while 40 growers indicated that the cost and availability of spare parts was a major problem, only 13 growers were worried about breakages, and only 3 growers reported inefficiency of machines as a problem. This reflects more interest in making old machines continue to operate than in new, improved, and expensive replacements.

12. GROWER SUGGESTIONS - OPERATIONS OF THE MAIZE BOARD AND THE INDUSTRY IN GENERAL

The final section of the questionnaire asked growers to comment on the operation of the Maize Board, and on the industry in general. Ninety-one of a total of 149 growers made suggestions. Those growers not responding to this section included members of the Maize Board and inexperienced growers, who were not able to comment.

Comments covered a wide variety of topics and attitudes (Fig 12.1). The intake policy of the Board, and the return to grower, were the most frequently mentioned topics.

Many growers commented on methods to counter losses to harvest delays. From these comments (shown in Fig 12.1 under Moisture Content), it appears that some interest has been generated by the "On-farm Drying" extension programme.

Comments about the operation of the ATMMB covered general efficiency, services to growers, and marketing performance. Many of the suggestions with regard to provision of services by the Board are beyond the Board's jurisdiction. This indicates a lack of understanding by some growers of the Board's statutory responsibilities.

An interesting suggestion was the continuation of Annual General Meetings. The maize industry is unusual in its lack of a strong grower organization.

Fig 12.1 GROWER SUGGESTIONS

SUGGESTION	Expected Total Farm Yield(t)			Total No. of Responses
	<50	50 - 200	>200	
INTAKE				
- Improved intake policy - faster intake	10	25	11	46
- Separate maize at intake on basis of quality	-	-	1	1
- Base intake on tons, not loads	-	1	1	2
PRICE				
- Increase the return to grower	6	25	7	38
- Recognize increasing costs to the grower	3	13	3	19
MOISTURE CONTENT				
- Encourage early harvesting and drying on-farm	2	7	9	18
- Charge growers for daying based on grain moisture %	-	7	3	10
- Accept maize at higher grain moisture %	-	8	7	15
BOARD EFFICIENCY				
- Improve general Board efficiency; extend working hours	1	12	6	19
- Use dryer in Tolga	-	3	2	5
BOARD SERVICES				
- Act as agent for machinery, fertilizer, chemicals	1	3	-	4
- Operate cash grains scheme	-	3	4	7
- Allow credit to growers for production costs	3	5	1	9
- Quota production - exclude new growers	-	1	-	1
- Continue annual general meetings	-	-	1	1
MARKETING				
- Improve marketing, especially export sales	3	1	1	5
- Lower difference between price to growers and purchasers	-	3	-	3
- Sell in bulk to Butter Factory	-	1	-	1
RESEARCH				
- Improve varieties, and quality of seed maize	1	6	4	11
- Pest control research - pigs rats, birds, etc.	1	-	-	1

A number of growers suggested that further research should take place with respect to maize varieties. A shorter stemmed variety was specifically mentioned. In addition there were a number of comments about control of seed production and seed quality. There appears to be a lack of understanding by growers of the method of production of certified hybrid maize seed and of the standards enforced in seed production. It may be worthwhile for D.P.I. officers to consider writing a press release or article on this topic.

The 'comments' section of the questionnaire is to be detached and will be given to the Maize Board for their consideration.

COMMENTS ABOUT THE QUESTIONNAIRE

A total of five growers made specific comments regarding the questionnaire.

Three growers made unfavourable comments. Tow of these regarded the questionnaire as too long, and the other considered that D.P.I. and the Maize Board should be sufficiently in touch with the industry that a questionnaire would be unnecessary. Presumably these views were shared by a number of growers who completed only a fraction of the questionnaire. The remaining two growers commented favourably on the questionnaire, saying they were pleased to see efforts to assess the industry.

Overall, the response to the survey was satisfactory. With farmers being required to complete increasing numbers of surveys, forms, applications, etc., it will probably be wise to use the questionnaire sparingly as a tool in the future.

CONCLUSIONS

The aim of the survey was to collect and collate information to allow the ATMMB and DPI staff to assess their positions and progress. It would be presumptuous, then, to dwell too long on conclusions which may be best drawn by the persons or bodies to which they directly relate. However, two major topics of importance are evident from the survey.

The first concerns the mechanics of maize production. Technically, the industry has progressed well. Use of new varieties, fertilizers, herbicides, higher plant populations, etc. has become widely accepted. These practices represent successful research and extension programmes. It appears that continuation of maize breeding and on-farm drying programmes, and consideration of crop rotation/land preparation practices, are now the major areas of possible future improvement in production.

The second major area of concern is that of returns. Maize growers are caught in a cost-price squeeze. Many are practising cost-cutting, for example by not cultivating, but this can only be carried to a certain extent. Future improvements in yields cannot be expected to be sufficient to cover rising costs. Similarly the local domestic maize market cannot bear steep increases in maize price. The future of the industry therefore needs serious consideration. As one grower commented "The only reason I plant maize is for crop rotation. Costs of production have caught up with the price paid for our produce". If a limited future is seen for the maize industry, there will also need to be consideration given by growers and officers of DPI to possible alternative land uses, and to how and when the level of production may change.

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ATHERTON TABLELAND MAIZE QUESTIONNAIRE

1976-77

For a number of years now, the Atherton Tableland Maize Marketing Board has sought the co-operation of growers in a survey of maize crop prospects. This information assists the Board both in planning and in marketing.

This year a survey is again being conducted. It is a joint project of the Maize Board and D.P.I. You will notice that this questionnaire is more detailed and consequently longer than previously. This is for a good reason - we need to assess the state of the whole industry!

With the encouragement of D.P.I. and the Board, the industry has changed over the last few years. New varieties, new planting and fertilizer rates, and better methods of weed control are being used. As a basis for future development, we need to stop and take stock of how successful new methods have been, and where they can be improved.

A similar survey of peanut growers last year proved very successful. It was a useful guide to D.P.I. in planning further research, and to the Peanut Marketing Board in planning handling and marketing requirements. We are hoping for similar good response from maize growers.

You will notice that you have a choice of filling in your answers in the old units or by the metric system. Please try to return this form to the Maize Marketig Board as soon as possible. We thank you in anticipation.

Beth Woods

BETH WOODS,
(D.P.I., ATHERTON)

MAIZE SURVEY 1976/77

NAME .....

Note - Where maize is supplied by more than one producer from the same farm, please fill out one form for the whole farm.

AREA

1. What area of maize is growing on your farm this season?

.....hectares
(.....acres)

2. Is that more or less maize than last season?

.....hectares MORE or .....hectares LESS
(.....acres MORE) or (.....acres LESS)

3. With regard to your farm income, where do you rate maize in your farming system. Fill in the boxes in order of importance.

Maize	☐
Peanuts	☐
Potatoes	☐
Beef	☐
Dairying	☐
Pasture Seed	☐
Poultry	☐
Pigs	☐
Other	☐

4. What seed rate did you use this season? (.....acres/bag)

.....kg/ha (.....lbs/acre)

5. Was that a higher or lower seed rate than last season?

Higher	☐
Same	☐
Lower	☐

VARIETIES

1. The varieties growing this year are:-

QK 217	.....hectares	(OR .....acres)
QK 231	.....hectares	(OR .....acres)
QK 487	.....hectares	(OR .....acres)
Others	.....hectares	(OR .....acres)
TOTAL	Hectares	(acres)

2. Have you developed a preference for QK 217 or QK 231? Why?

.....
.....
.....
.....

3. What varieties will you plant next year?
(The same varieties will be available)

.....
.....
.....
.....

NUTRITION

1. Did you use fertilizer this season?

Yes ☐

No ☐

2. If Yes, what type of fertilizer did you use, at what rates, and on what area?

		AREA	RATE
NITROGEN			
Urea	☐	on	at .....
Nitram	☐	on	at .....
Aqua-ammonia	☐	on	at .....
PHOSPHORUS			
Super	☐	on	at .....
MIXTURES			
DAP	☐	on	at .....
MAP	☐	on	at .....
Q5 or Plant 4	☐	on	at .....
12-1 or CK55	☐	on	at .....
Others	☐	on	at .....

3. How and when did you apply the fertilizer?

.....

.....

.....

4. Do you plan any changes in your fertilizer practices for maize next season?

.....

.....

.....

CROP ROTATION

1. What was growing last year in the paddocks where now have maize?

CROP/PASTURE	AREA
.....	.....hectares (.....acres)
.....	.....hectares (.....acres)
.....	.....hectares (.....acres)
.....	.....hectares (.....acres)
.....	.....hectares (.....acres)
TOTAL NOW UNDER MAIZE	hectares (acres)

2. Are you concerned about damage to the structure of your soil or a decline in the yield of your crops as a result of continuous annual cropping?

.....

.....

.....

.....

3. Do you practice crop rotation? If Yes - Why? If No - Why not?

.....

.....

.....

.....

4. Do you use a planned rotation programme (say - for 5 years) or do you operate from year to year?

.....

.....

.....

.....

LAND PREPARATION

1. How did you prepare the land before planting?

.....

.....

.....

.....

2. Were you satisfied with this preparation? .....
.....
.....

3. Will you do the same again next year?

YES ☐ NO ☐

4. If not, what changes will you make? .....
.....
.....

HERBICIDES

1. Did you use a herbicide this year?

YES ☐ NO ☐

2. If yes, are the results

GOOD ☐ FAIR ☐ POOR ☐

3. What type did you use? On what area?

2,4-D ☐ on .....hectares (.....acres)

Atrazine ☐ on .....hectares (.....acres)

Other ☐ on .....hectares (.....acres)

4. Was this a greater total area than last year?

YES ☐ NO ☐

5. What rate of application was used?

2,4-D .....litres/hectare (.....pints/acre)
Atrazine ..... kg/hectare (.....lbs/acre)

6. When did you apply the herbicide? (e.g. at planting, 2 weeks after emergence).
.....
.....
.....

7. How did you apply the herbicide?
.....
.....
.....

8. Do you plan any changes in your use of herbicides on maize next season?
.....
.....
.....
.....

CULTIVATION FOR WEED CONTROL

1. Did you cultivate to control weeds this season?

   YES ☐ ONCE ☐ TWICE ☐ MORE ☐

   NO ☐

2. If Yes, what area did you cultivate?

   .....hectares (.....acres)

3. How successful was your cultivation in controlling weeds?

   GOOD ☐ FAIR ☐ POOR ☐

4. Will you cultivate again next year?

   YES ☐ NO ☐

PLANTING DATES

1. When did you plant? (e.g. 15 hectares mid November; 30 hectares early January).

   .....
   .....
   .....

DISEASES

1. Have you got Head Smut in your maize? YES ☐ NO ☐

2. Hav. you had this disease on your farm before? YES ☐ NO ☐

3. What percentage of your crop was affected? .....%

4. Did you notice any other disease problem in your maize this season?
   How serious was it? .....
   .....
   .....
   .....

INSECTS

1. Have you sprayed your maize to control insects in the last 10 years?

   YES ☐ NO ☐

   If Yes, which year and what was the pest(s)? .....
   .....

2. Have you had a complete crop failure caused by insects in the past 5 years?

   YES ☐ NO ☐

   If Yes, what was the pest(s)? .....
   .....
   .....

MACHINERY

1. How many planter units do you own? .....

2. What make and type are they? .....
.....
.....

3. Do you own a harvester? YES ☐ NO ☐

4. If Yes, what make and type is it? .....
.....

5. Do you intend to buy any more machinery for use with your maize crop next season?
YES ☐ NO ☐

6. If Yes, what? .....
.....

7. What are your major problems with machinery? .....
.....
.....

GENERAL

1. What total farm yield do you expect to get from the area planted this year?
.....
.....

2. What total farm yield did you get last year? .....
.....
.....

3. What are the three main things you would like to see the Maize Board do?
(1) .....
.....
(2) .....
.....
(3) .....
.....

4. Have you any general comments on the Maize Industry?
.....
.....
.....
.....
.....
.....
.....
.....
.....

-oooo0oooo-