Agriculture Branch Project Report No. P-10-77

THE ATHERTON TABLELAND MAIZE INDUSTRY SURVEY, 1976-77

Elizabeth J. Woods, formerly Extension Officer

J. Kilpatrick, District Adviser in Agriculture

THE ATHERTON TABLELAND MAIZE INDUSTRY SURVEY

1976-77

INTRODUCTION

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

Growing conditions are typically 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 can also cause lodging. 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. 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. 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 (A.T.M.M.B.) 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 Atherton Tableland Maize Marketing Board.

MAIZE GROWING ON THE ATHERTON TABLELAND : A SUMMARY.

The main maize growing area of the Atherton Tableland is comparatively level at an average altitude of 700 m. It lies north of a line from Atherton to Malanda.

CLIMATE

The average rainfall in the maize growing areas is 1 100 mm. 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 A.T.M.M.B. 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, lodging and pest damage.

PLANTING

The planting season may extend from November to February, 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 35 000 plants/ha.

FERTILIZER USE

The major nutritional requirements of maize on the Tablelands are nitrogen and phosphorus.

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

Phosphorus requirements are based on soil analysis results. Where less than 30 p.p.m. available P is indicated 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 - particularly those diseases peculiar to tropical conditions.

The Kairi programme has produced hybrids resistant to many common diseases of maize found in the Tableland environment. Details are given in Appendix II.

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. As growers gain confidence in using herbicides, mechanical cultivation should become less common.

PESTS

Field mice, rats, bandicoots, grasshoppers, army worms, corn ear worms, cut-worms, aphids and weevils all constitute minor hazards to the maize crop. Damage from cockatoos can occasionally cause some losses.

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

HARVESTING

Most crops are harvested under contract. Wet weather during harvest and limited intake ability of the A.T.M.M.B. may sometimes 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 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.

TABLE 1
Maize/Pasture Rotation Trial

Kairi Research Station

Treatment	Yield t ha^{-1} 6 yr average
Continuous maize	2.6
Continuous maize + 100 kg N ha^{-1}	4.6
4th maize crop after pasture	4.1
3rd maize crop after pasture	4.5
2nd maize crop after pasture	4.9
1st maize crop after pasture	4.9

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

PRODUCTION

TABLE 2

Year	Area (ha)	Production (tonnes)	Yield (tonnes/ha)
Av. 66/67 - 70/71	8 090	18 327	2.3
71/72	7 000	16 755	2.4
72/73	8 000	17 616	2.2
73/74	10 000	12 800	1.3
74/75	7 000	23 592	3.4
75/76	7 500	28 000	3.7
Av. 71/72 - 75/76	7 900	19 753	2.5

Production trends over the previous ten seasons are shown in Table 2. These figures were supplied by the A.T.M.M.B.. There was a slight increase in average yield in the second five-year period considered - 1971/72 to 75/76.

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.

GROWERS RETURNS AND BOARD COSTS

Trends in growers' payments, Board costs and gross value of maize delivered together with percentages of growers' average payment to gross value (shown in brackets), are illustrated in the following table:-

TABLE 3

Period of Pool Year	Average Payment to Grower per tonne		Average Cost per tonne	Gross Value per tonne
	$	%	$	$
1924-25 to 1935-36	13.58	(80.6)	3.26	16.84
1936-37 to 1947-48	19.27	(82.9)	3.98	23.25
1948-49 to 1959-60	41.96	(75.7)	13.49	55.45
1960-61 to 1971-72	46.20	(76.5)	14.18	60.38
1972-73	50.27	(76.8)	15.21	65.48
1973-74	58.95	(78.4)	16.28	75.23
1974-75	69.54	(75.3)	22.83	92.37
1975-76	70.19	(80.9)	16.48	86.67
1976-77	70.24	(80.2)	17.36	87.60

N.B. The 1976-77 Pool Year deals with the crop harvested in 1976.

SOURCE: A.T.M.M.B. Fifty-fourth Annual Report.

THE CURRENT SEASON (1976/77)

Climatically, the current season has been far from ideal for maize production, especially in comparison with the almost ideal conditions of 1975/76.

Useful rains began in the last week of October, 1976. Plantings got into full swing in late 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 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 A.T.M.M.B. opened for intake on 17th May, in drizzling weather. This opening was earlier than usual as the A.T.M.M.B. agreed for the first time to accept maize with a moisture content of up to 22%. These conditions continued in extended spells until late June, delaying the harvest.

WHY SURVEY THE MAIZE INDUSTRY?

With the encouragement of D.P.I. and the A.T.M.M.B. there have been substantial changes in the maize industry over the last few years.

In his Annual Review of 1969-70, 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.

An enlarged survey of the maize industry was carried out in the 1976/77 season. The 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 Liaison Committee, J.R. Hardman (Agricultural Economist, Atherton) and members of Entomology 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. (See Appendix I). A press release was prepared to coincide 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 satisfactory return of forms, without using lengthy follow-up procedures.

RESPONSE

Final results of the survey cover greater than 90% 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

SUMMARY

The aim of the survey was to collect and collate information to allow the A.T.M.M.B. and D.P.I. 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 D.P.I. to possible alternative land uses, and to how and when the level of production may change.

1. EXPECTED AREA PLANTED AND YIELDS

Fig. 1. 1. Distribution of Maize Production

EXPECTED TOTAL FARM PRODUCTION	NO. OF FARMS	AREA PLANTED (ha)	AGGREGATE OF EXPECTED FARM YIELDS (tonnes)	AVERAGE EXPECTED YIELD (tonnes/ha)
<50 tonnes	35	376	1 040	2.77
50-200 tonnes	78	2 315	8 149	3.48
>200 tonnes	35	2 830	12 040	4.25
TOTAL	148	5 521	21 229	3.85

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 is that production. The average estimated yield/ha was 3.85 tonnes/ha. This compares reasonably with the 1975-76 average of 3.7 tonnes/ha.

Total gross production for the entire area in the 1976-77 season was 21 730 tonnes. Prior to harvest, the aggregate of expected farm yields indicated by the survey was 21 229 tonnes gross. (Fig. 1. 1.) This result is most encouraging.

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

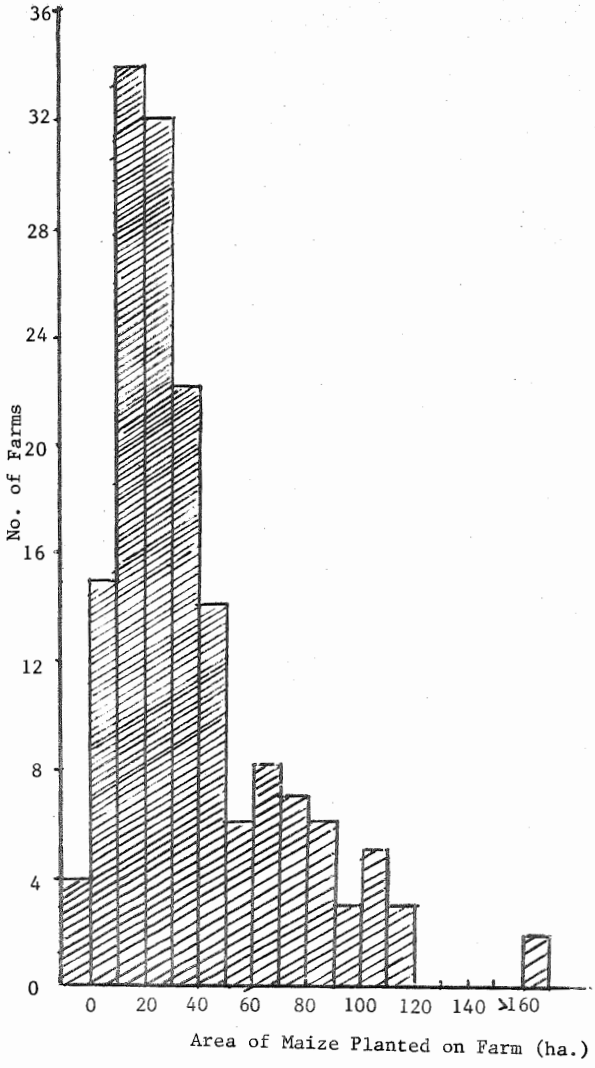

Fig. 1. 2. shows the distribution of areas of maize planted on individual farms. Fifty-nine percent of growers grew between 10 and 40 ha of maize. The mean area of maize planted was 35 ha.

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 t 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 PRODUCTION tonnes	% FARMS WHERE MAIZE IS MOST IMPORTANT ACTIVITY	% FARMS WHERE MAIZE IS SECOND MOST IMPORTANT ACTIVITY	% FARMS 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 - Rocky Creek 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 in this category.

Growers whose farms produced more than 200 tonnes of maize were specialist maize growers. They supplied 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.

Within each class of growers, however, there was great variation. For example, while farms producing less than 50 tonnes generally recorded relatively low yields, individual growers within this group had produced 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 from 1975-76 to 76-77

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

There was 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.

2. VARIETIES

Fig. 2. 1. Varieties and Areas Planted

VARIETY	AREA PLANTED (ha)
QK 217	2 294
QK 231	2 499
QK 487	227
OTHERS	3
TOTAL	5 023

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. 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. 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. 3. 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. 3. 1. Land Preparation

EXPECTED TOTAL FARM PRODUCTION (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. Combined with at least one cultivation, and final harvesting, this level of preparation must contribute to compaction problems and damage 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 development.

4. 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 available from trials at Kairi Research Station. From the data of the Maize plant population x nitrogen studies 1971-72 and 1972-73, 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 is to assess the success of this campaign.

Optimal, marginal and inadequate seed rates were defined on the basis of the recommended levels (Fig. 4. 1.).

Fig. 4. 1. Use of Varying Seed Rates

SEED RATE (Kg/ha)	POPULATION	NO. OF FARMS WITH EXPECTED TOTAL FARM PRODUCTION OF –			TOTAL NO. OF FARMS
		< 50 tonnes	50–200 tonnes	> 200 tonnes	
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 indicated 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 despite the small cost of seed in relation to other production costs.

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 30 ppm (using the B.S.E.S. acid extraction test), 35 kg P/ha is recommended. 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 current maize nutrition.

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

EXPECTED TOTAL FARM PRODUCTION (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 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 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.

Fig. 5. 2. 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	-	-

The success of the extension programme on maize nutrition is evident 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 Production (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 the 1976-77 season (Fig. 6. 1.). Of these growers, two-thirds used a single cultivation, and the remainder cultivated twice.

Fig. 6. 1. Use and Frequency of Mechanical Cultivation

Expected Total Farm Production (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 similar proportion of producers (in all production categories) 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 Production (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 aeroplanes, 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. An extension programme "Maize Weed Control" was submitted and implemented in 1974. This survey evaluates the programme.

Both mechanical cultivation and herbicides are used to control weeds in maize.

Grower comments indicate some initial confusion about the role of herbicides. Some growers expected, and correctly so, that with the advent of chemical methods of weed control, mechanical methods could be completely abandoned under certain circumstances. Other growers however, seem to believe incorrectly that herbicides should be used only as a supplementary aid to cultivation.

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 Production (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

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 able to cultivate their crop in a break in the weather than larger producers.

The overall proportion of farmers using herbicides is shown in Fig. 6. 4..

Fig. 6. 4. Numbers of Farmers Using Herbicides*

Expected Total Farm Production (tonnes)	No Herbicide Used	Farmer Used Herbicide	Total
<50	25	8	33
50 - 200	39	39	78
>200	13	19	32
TOTAL	77	66	143

* The data includes those farmers who did not 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 (45%). Herbicide was applied to 1 790 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	1 790 ha (35%)
Total Area - Herbicide Not Applied	3 370 ha
TOTAL RESPONSE	5 160 ha

Fig. 6. 6. Reported Effectiveness of Herbicides

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

Comparing Fig. 6. 2. with Fig. 6. 6, a larger proportion of herbicide users reported good results than did those using cultivation.

A number of growers reported 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 of the questionnaire. It indicates continued impact of the weed control extension programme. Local results have presumably been good evidence of the advantages of herbicide usage.

Fig. 6. 7. Number of Farmers Increasing Their Use of Herbicides

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

Herbicide practices are indicated in Figs. 6. 8., 6. 9., and 6. 10..

Fig. 6. 8. Type of Herbicide

Expected Total Farm Production (tonnes)	Herbicide Used (No. farms*)	
	2,4-D	Atrazine
<50	-	7
50 - 200	8	36
>200	2	17
TOTAL	10	60

* Some farms used both chemicals.

Fig. 6. 9. Time of Herbicide Application (No. of farms)

Expected Total Farm Production (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

* The information in table 6. 9. indicates that atrazine is not being used by many farmers as recommended. In crops planted before late December, atrazine should be applied in split application - 1.4 kg/ha as an overall pre-emergence treatment and another 1.4 kg/ha as an inter-row spray five to six weeks after planting. This can be done while side-dressing the crop with urea. Atrazine can also be used at 2.8 kg/ha pre-emergence as a single application in late season maize plantings.

Much of the atrazine mis-use arises from confusion as to the term pre-emergence. It refers to the crop and not the weeds.

Fig. 6. 10. Method of Herbicide Application (No. of farms)

Expected Total Farm Production (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.

Many growers apply fertilizer at 3 - 6 weeks after emergence. If atrazine is to be used for weed control, the soil should be undisturbed to any substantial depth after herbicide application. The

tines used for fertilizer incorporation at 3 - 6 weeks after emergence could dilute the atrazine with too much soil, and bring back fresh soil and weed seeds to the surface.

To avoid these problems of weed control if fertilizer is to be side-dressed, farmers should consider the practice of applying all their fertilizer needs at planting, followed by an immediate pre-emergence application of atrazine.

Providing suitable equipment is available, considerable cost reductions as well as labour saving can be enjoyed.

Ground and aerial application techniques are equally common. With increasing scale of maize production there is a trend to aerial application.

7. CROP ROTATION

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 previous season's land use 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 had been planted to maize in the preceding season. This practice was most common among large-scale producers.

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 Production of -			Total Area (ha)
	<50 tonnes	50-200 tonnes	>200 tonnes	
Pasture	39	387	236	662
Maize	132	1 255	1 687	3 074
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	2.71	470
TOTAL	354	2 514	2 483	5 351
Maize Following Maize as % of Total Area	37%	50%	68%	57%

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 1975-76 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 proportion - less than one-third - used a planned crop rotation. Most farmers

rotated crops with only one 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 structure.

Fig. 7. 2. Concern for Soil Structure and Use of Crop Rotation

Expected Total Farm Production (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

In the current economic climate it is difficult to see how farmers are to be induced to include a pasture phase, unless drastic yield or soil losses occur. Most intensely cropped farms lack fences, yards, watering facilities, etc., which are 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, are not yet sufficiently worried to change their basic rotational practices.

56% of the producers of less than 50 tonnes of maize showed concern for soil structure damage but 73% practised crop rotation. 70% of the larger producers were concerned about damage to soil structure and 83% practised crop rotation. In the case of farmers with very small acreages, the small areas may restrict the farmer's ability to 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 Production (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

There is a trend that the larger crops tended to be planted earlier. 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

Head smut is a disease of significant 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 Production (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

This is a favourable report, considering the movement of contract harvesting machinery from farm to farm, and the associated expected increase in incidence of the disease.

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. Plant Pathologists have often found head smut to be present in crops reported by their owners to be free of 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 burning, and the incidence of disease.

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 Production (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.

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. Size of Planter Owned by Farm

Expected Total Farm Production (tonnes)	No Planter	2 Row	4 Row	6 Row	8 Row
<50	6	21	2	-	-
50 - 200	3	61	13	-	1
>200	2	7	19	1	1
TOTAL	11	89	34	1	2

The most popular machine was the I.H.C. 186.

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 row planters, the majority of growers producing more than 200 tonnes used 4 row machines.

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 Production (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 crop losses in most years on the Tableland. Insect damage, cob rots and increased lodging reduce the quantity and quality of maize harvested. Delays may be due to limited intake capacity at the A.T.M.M.B., and/or to contract harvesting equipment being unavailable.

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 at present 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 Production (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.

In fact, machinery inputs are probably declining. Many growers noted that low returns from maize could not justify high replacement costs of ageing machinery. Costs of spare parts and running costs were also major problems. 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 - OPERATING OF THE MAIZE BOARD AND THE INDUSTRY IN GENERAL

The final section of the questionnaire asked growers to comment on the operation of the A.T.M.M.B., and on the industry in general. 91 of 149 growers made suggestions. Those growers not responding to this section included members of the A.T.M.M.B. 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.

Fig. 12. 1. Grower Suggestions

SUGGESTION	Expected Total Farm Production (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 tonnes, 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 drying 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

Fig. 12. 1. (Cont'd)

SUGGESTION	Expected Total Farm Production (t)			Total No. of Responses
	<50	50 - 200	>200	
BOARD SERVICES (CONT'D)				
- 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

Many growers commented on methods to counter losses due 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 A.T.M.M.B. 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.

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 was detached and given to the A.T.M.M.B. for their consideration.

COMMENTS ABOUT THE QUESTIONNAIRE

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

Three growers made unfavourable comments. Two of these regarded the questionnaire as too long, and the other considered that D.P.I. and the A.T.M.M.B. 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 be wise to issue questionnaires sparingly in the future when assessing the state of the maize industry in Far North Queensland.

APPENDIX I

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 considered. 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 Marketing Board as soon as possible. We thank you in anticipation.

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?

NITROGEN		AREA	RATE
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. Have 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?
   .....
   .....
   .....
   .....
   .....
   .....
   .....
   .....
   .....
   .....

APPENDIX II

AGRONOMIC CHARACTERISTICS AND GENERAL DESCRIPTION OF KAIRI RESEARCH STATION BRED HYBRIDS *

N.B. Most of the data used in formulating these descriptions was collected in an environment 17°S latitude 145° longitude, 800 m altitude, 1 000 mm rainfall (during the growing season).

	QK 217	QK 231	QK 487
Maturity Class	: Late	Late	Mid to Late
Days to 50% Silking	: 65 - 75 days	65 - 72 days	64 - 68 days
Days to Physiologic Maturity (maximum grain dry weight)	: 130 days	125 - 130 days	120 days approximately
Days to Harvest Maturity (approx. 20% grain moisture)	: 160 days	150 - 160 days	150 - 160 days
Ear Height	: 1.5 to 1.6 metres	1.4 to 1.5 metres	1.40 to 1.50 metres
Plant Height	: 2.6 to 2.8 metres	2.7 to 2.9 metres	2.50 to 2.70 metres
Ear Characteristics	: Long, tapering ears, good husk cover and held upright at maturity.	Short, girthy, pendulous at maturity	Mid-length ear
Grain Type and Colour	: Deep yellow dent	Yellow dent	Yellow-Orange flint-dent
Yielding Capacity	: Given reasonable agronomic inputs it will yield 5.0 t/ha consistently. With ideal conditions it has yielded 7.1 t/ha.	The hybrid will consistently yield 4.5 to 5.0 tonnes/ha given reasonable agronomic inputs. With optimum plant spacing and applied fertilizer it has yielded 6.6 t/ha.	QK487 has the capacity to consistently produce 5.0 tonnes/ hectare given moderate cultural inputs. It has not demonstrated the ability to produce very high yields under favourable conditions, but has achieved 7.0 t/ha.
Disease Resistances	: The hybrid has single gene resistance to *Puccinia polysora* (Southern Corn Rust).	The hybrid possesses the gene Rpp2, which gives complete resistance to Southern Corn Rust (*Puccinia polysora*).	The hybrid was bred primarily for its resistance to Head Smut (*Sphacelotheca reiliana*) and has

	QK 217	QK 231	QK 487
Disease Resistances (Cont'd)	The gene Rpp2 gives it resistance to races EA1 and EA2 of this organism. It also possesses excellent resistance to Common Rust (*P. sorghi*). Resistance to the Johnson Grass Strain of Sugar Cane Mosaic Virus (i.e. M.D.M.V.) is almost of immune nature. Resistance to Northern Leaf Blight (*Helminthosporium turicum*) is moderate to good, while Southern Leaf Blight (*H. maydis*) is resisted adequately. Resistance to Gibberella Ear Rot is good but to Diplodia Ear Rot is only fair. The hybrid is moderately susceptible to Gibberella Stalk and Root Rot but resists Diplodia Stalk Rot adequately (*D. macrospora*). It is highly susceptible to Head Smut (*Sphacelotheca reiliana*).	It also has good resistance to Common Rust (*P. sorghi*). The leaf blights, Northern Leaf Blight (*Helminthosporium turicum* and Southern Leaf Blight (*H. maydis*) are resisted moderately, but adequately, under most field conditions. QK 231 has greater resistance to Northern Leaf Blight than QK 217. Resistance to Diplodia Ear Rot is only fair, but expression of resistance to Gibberella Ear Rot is good. On the other hand, the hybrid has only moderate resistance to Gibberella Stalk and Root Rot (*G. zeae*) and (*G. fujikuroi*). QK231 has good resistance to Sugar Cane Mosaic Virus (Maize Dwarf Mosaic Virus) and Maize Mosaic Virus. Head Smut (*Sphacelotheca reiliana*) can inflict heavy damage.	excellent resistance to this pathogen. It has only moderate resistance to Maydis (Southern) Leaf Blight and Turcica (Northern)Leaf Blight, and is susceptible to Maize Dwarf Mosaic Virus (Johnson Grass Strain). Resistance to Diplodia Ear Rot (*Diplodia macrospora*) is fair to good, and resistance to Gibberella Ear Rot (*G. zeae*) is good.
Insects	Possesses good resistance to Heliothis Ear Worm and Grain Weevil.	QK231 possesses good resistance to Corn Ear Worm (*Heliothis spp.*) and moderate to good resistance to weevils (*Sitophilus spp.*)	No insect problems have been encountered with the hybrid.

	QK 217	QK 231	QK 487
General	: QK217 is a widely adapted, high yielding hybrid with a broad spectrum of disease resistance.	QK231 was developed as a hybrid with a comprehensive disease resistance. However it is capable of good yields particularly at high plant densities.	QK487 has given good service in commercial corn fields. Its good resistance to lodging is of particular value.
Desireable Cultural Conditions:	(i) 35 000 - 50 000 plants/ hectare in 75 to 90 cm row spacing. (ii) 90 - 150 kg N/ha. (iii) good weed control (eg. atrazine 2 kg a.i/ha)	(i) 35 000 - 50 000 plants/ hectare in 75 to 90 cm row spacing. (ii) 90 - 150 kg N/ha. (iii) good weed control (eg. atrazine 2kg ai/ha)	(i) 35 000 - 50 000 plants/ hectare in 75 to 90 cm. row spacing. (ii) 90 - 150 kg N/ha. (iii) good weed control (eg. atrazine 2kg a.i./ha)

* Source: I.F. Martin, Senior Plant Breeder, Kairi Research Station, Kairi, 4872.

Previous Reports in this Series

Number	Title	Author(s)	Date Published
P-1-77	Agricultural development in the Julatten district, North Queensland. The introduction, performance and role of sown pastures.	B.A. Middleton & J.W. Wright	January 1977
P-2-77	Planned extension activities to minimize herbicide spray drift on the Central Darling Downs.	I.N. McClement & N.G. Grainger*	June 1977
P-3-77	Legume species and fertilizer studies at Manumbar Station in the South Burnett, Qld.	H.W. Beger	May 1977
P-4-77	An evaluation of a range of grasses and legume species on the McBride basalt soils of North Queensland.	C.P. Miller	September 1977
P-5-77	Observations on the performance of a range of commercial pasture plants on the friable red earths at Lakeland Downs, Cape York Peninsula.	P. Anning	October 1977
P-6-77	A study of the effects of sown companion grasses on the persistence of naturalized Townsville stylo (*Stylosanthes humilis*) at Lilyvale, Cape York Peninsula.	P. Anning	October 1977
P-7-77	A preliminary field assessment of the nutrient status of a red earth at Kalinga Station, Cape York Peninsula.	P. Anning	October 1977
P-8-77	Utilization of Improved Pastures on low heath: Regeneration of white clover in Pangola through late summer /autumn slashing and cultivation.	J.P. Ebersohn	In press
P-9-77	An evaluation of a range of temperate pasture legumes and grasses for winter production on the wet heath areas of the coastal lowlands of S.E. Queensland.	S.L. Stillman	November 1977.

Agriculture Branch Project Reports

This series provides an easily accessible record of project results in forms which are essentially of local interest to extension officers and research workers in closely related fields.

They have a restricted primary circulation but may be cited in publications and are available on request from the Director of Agriculture, Queensland Department of Primary Industries, G.P.O. Box 46, Brisbane.

* Officer not a member of Agriculture Branch