POSSIBILITY OF RAISING TWO CROPS OF MAIZE IN A YEAR IN IRRIGATED AREAS

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Two crops of maize in a year (whether fodder and grain or grain plus grain) is better than single crop of maize at Lyallpur and is recommended for other parts of the country with similar soil and climatic conditions. Fifty pounds nitrogen per acre is the optimum dose for open pollinated maize crop, and any application in excess of that is wasteful. Application of fertilizers may be undertaken at planting or at preflowering time without risking any loss of efficiency of the fertilizer.

INTRODUCTION

Maize is planted in the canal colonies of the former Punjab late in the summer season, mostly to avoid borer attack which takes a heavy toll of the early sown crop. Moreover, mild temperature prevalent in late summer is ideal to obtain better yields as these temperatures favour maximum pollination and grain formation. The difficulty with crop sown in spring, on the other hand, is that the pollination time coincides with the hottest months of May and June and this results in incomplete pollination and subsequent poor yield. It has been suggested that losses incurred due to unfavourable weather may be reduced by light applications of fertilizers at proper times. The present study was initiated to determine a suitable scheme of raising two crops of maize in spring and late summer from the same field with fertiliser application.

REVIEW OF LITERATURE

Little agronomic work on raising two crops of maize in a year in Pakistan has been reported. Only Singh and Singh (1947) had tried it, but without combining it with other agronomic factors and concluded that two crops of maize in a year were not possible at Lyallpur.

As regards the use of fertilizer, Jack and William (1953) found that the application of nitrogen increased the yield of maize. Similar observations were recorded at Tarnab by Hussain *et al.* (1956) and at Lyallpur by Gill (1960).

As to time of application, Scarseth *et al.* (1943) concluded that nitrogen should be applied to maize at seeding, thus offsetting the contention of William

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and Helms (1929), who held that application of nitrogen six weeks after planting of maize would give the best results. But results obtained from the experiments at Tarnab by Hussain *et al.* (1956) and at Lyallpur by Gill (1960) were non-significant.

MATERIALS AND METHODS

The local open pollinated maize variety was used in the trial which was laid out at Lyallpur Farm, on a heavy loam soil for two consecutive years, 1956 and 1957. A basal dose of 80 pounds nitrogen per acre as farmyard manure was applied 3 to 4 weeks before sowing. The three factors tested for their different levels in all possible combinations were as follows :

(*a*) *Cropping treatments :* The treatments comprised late summer maize for grain sown in August (D_1), spring maize for grain sown in March ($D_2/1$) plus late summer maize for grain sown in August ($D_2/2$), and spring maize for fodder sown in March ($D_3/1$) plus late summer maize for grain sown in August ($D_3/2$).

(*b*) *Nitrogen Fertilization :* The application of 50 lbs nitrogen (M_2), 75 lbs. nitrogen (M_3) and 100 lbs N (M_4) per acre in the form of ammonium sulphate were compared with unfertilised check (M_1).

(*c*) *Time of Fertilizer Application :* The fertiliser was applied at seeding time (T_1) and at proflowering (T_2).

The experiment was laid out in a split plot design with four replications placing cropping treatments in the main plots and the fertilizer treatments in the sub-plots. The experimental plot measured 1/92th of an acre. The grain and fodder yields per plot were recorded in seers. L.S.D. values were computed for comparison of individual treatment means. The crop received due care in respect of all other cultural requirements.

RESULTS AND DISCUSSION

The experimental results on different aspects of the study are presented in Tables 1, 2 and 3.

It is evident from the data in Tables 1 and 2 that the single grain crop (D_1) sown in August gave higher grain yield per acre than the March sown crop ($D_2/1$) during both the years and remained at par with the second grain crops ($D_2/2$) and ($D_3/2$) sown after the first grain ($D_2/1$) and fodder ($D_3/1$) crops in the same field. Although average acre yield of March sown crop for the second year was considerably higher than that obtained in the first year, the difference from the August sown crop, however, remained significant (Table 1), due probably to relatively less borer attack, better growth, earliness of tasseling, silking and maturity, greater cob length, more number of rows and grains in each row,

TABLE 1. *Average grain and fodder yield in mds. per acre with 5 per cent L.S.D.*

Treatments	1956					1957				
	D_1	D_2		D_3		D_1	D_2		D_3	
		$D_2/1$	$D_2/2$	$D_3/1$	$D_3/2$		$D_2/1$	$D_2/2$	$D_3/1$	$D_3/2$
T_1 ..	41.65	4.81	37.75	373.61	37.91	32.37	17.56	29.90	643.05	31.79
T_2 ..	41.62	3.84	39.53	368.64	41.15	31.95	19.72	28.19	667.27	30.65
L. S. D. ..	16.00	0.85	5.72	29.73	4.62	6.16	5.42	3.54	64.12	5.04
M_1 ..	37.69	2.55	29.40	309.31	30.26	26.02	14.95	23.57	644.62	24.31
M_2 ..	44.11	4.55	40.90	360.52	43.11	34.07	19.37	28.09	661.52	34.34
M_3 ..	42.91	4.78	41.40	382.01	44.49	34.59	19.48	31.57	660.10	33.45
M_4 ..	40.28	5.30	42.81	391.72	43.91	33.98	21.75	30.92	664.40	32.79
L. S. D. ..	1.05	1.06	4.10	97.20	4.76	2.55	0.28	0.56	43.47	4.76

TABLE 2.—*Statistical summary of main treatment with 5 per cent L.S.D.*

Treatments	1956		1957	
	Yields (mds.) per acre	L.S.D.	Yields (mds.) per acre	L.S.D.
Cropping treatments				
Late summer grain crop (D_1) ..	41.64	3.97	32.20	9.92
Spring grain crop ($D_3/_1$) ..	4.32		18.64	
Late Summer grain crop ($D_2/_2$) ..	38.64		28.55	
Spring fodder crop ($D_3/_1$) ..	361.12		655.16	
Late summer grain crop ($D_3/_2$) ..	39.53		31.22	
Nitrogen level				
Unfertilised (M_1) ..	33.30	2.28	29.62	9.04
50 lbs. N (M_2) ..	44.22		38.62	
75 lbs. N (M_3) ..	44.53		39.61	
100 lbs. N (M_4) ..	43.74		39.88	
Time of fertilizer application				
At seeding time (T_1) ..	41.15	19.75	37.37	19.73
At preflowering (T_2) ..	41.47		36.20	

TABLE 3.—*Effect of different sowing times on various growth character*

Growth Character.	March sown crop		August sown crop	
	1956	1957	1956	1957
1. Borer infested plants in 12' length row.	12.02	4.09	4.13	4.49
2. No. of days to tasseling	66.38	56.99	46.08	49.64
3. No. of days to silking	76.89	70.07	59.47	55.58
4. No. of days to maturity	100.67	91.19	84.03	107.58
5. Length of cobs in 'cm'	11.44	10.56	13.49	9.22
6. No. of row per cob	11.63	14.19	15.45	15.15
7. No. of grain in each row	14.14	29.91	31.35	27.40
8. Weight of 100 grain (grm.)	21.47	16.72	24.38	19.90
9. Shelling percentage	56.60	81.80	76.17	73.63

higher grain weight, shelling percentage (Table 3). But taking into consideration the two crops average additional advantage of 8.17 maunds of grain and 508.14 maunds of green fodder per acre were obtained in case of two grain crops ($D_2/1 + D_2/2$) and fodder plus grain ($D_3/1 + D_3/2$) crops, respectively.

Even if fodder is ignored and only grain is taken into account, it will be seen that the average of two years provides good evidence in favour of sowing two grain crops, yielding 8.17 maunds of grain per acre more than single grain crop (D_1). These results are significant in these days of food shortage and can help to a great extent in solving the food problem by providing 22 per cent more grain over a single grain crop.

The response exhibited by the maize variety to nitrogen fertilization for both the years was substantial, as the increase in acre yield over the control ranged between 9 and 11 maunds for the three different nitrogen levels used. The differences in the average grain yields among the three nitrogen levels, *i.e.*, 50 pounds, 75 pounds, and 100 pounds per acre, however, were non-significant each year (Tables I, 2). It was shown that 50 pounds of nitrogen per acre in both crops produced as good results as 75 pounds or 100 pounds of nitrogen and that under similar soil and climatic conditions application of nitrogen exceeding 50 pounds per acre would mostly be superfluous and wasteful. These results conform with the results obtained by Jack and William (1953), and those obtained at Tarnab by Husain *et al.* (1956) and at Lyallpur by Gill (1960).

Time of application of the fertilizers had no effect on the yield of maize as the data pertaining to this factor lacked significance. It did not matter whether the fertilizer was applied at planting time or just before the on set of flowering phase. These results correspond with the results obtained by Hussain *et al.* (1956).

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