

Yield and Quality of Two Maize Hybrids as Affected by Different Planting Patterns

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Abstract: The experiment was laid out in randomized complete block design with factorial arrangement and three replications to evaluate the effect of different planting patterns viz. 60-cm spaced single rows, 70-cm spaced single rows, 30/90 cm spaced double row and 35/105-cm spaced double rows on yield and quality of two maize hybrids viz. 'Highcorn 11' and 'Cargil 777'. Max-1000 grain weight (438.47 g), grain yield (9.6 t/ha), and stover yield (15.85 t/ha) was recorded when Highcorn 11 was sown at 60 cm spaced single rows. While maximum no of grains/cob (372.45) was recorded from 'Cargil 777' sown at 30/90 cm apart double row.

Key words: Planting patterns, maize hybrids, quality

Introduction

In Pakistan, maize is grown on an area of 868.6 thousand hectares with an annual grain production of 1251.2 thousand tones giving on an average of 1440 kg ha⁻¹ (Anonymous, 1998). Although it is a big figure yet there exists a tremendous gap between actual and potential yield. To bridge up this gap, different agro-management practices need to be adopted. Among different agro-management practices, different planting patterns and selection of suitable genotype play pivotal role in maize production. Hybrids and row patterns both influence yield and yield components of maize (Cox, 1996 and Dong *et al.*, 1993). Different planting patterns, affecting leaf area photosynthesis (Dwyer *et al.*, 1991), radiation-use efficiency (Tollenaar and Aguilera, 1992) water use efficiency (Yao and Shaw, 1964) and light interception (Denmead *et al.*, 1962) influence yield of maize. An increase in yield of maize in double row planting pattern than single rows have been reported (Jafar *et al.*, 1988 Khan *et al.*, 1994; Ottman and Welch, 1989). Different hybrids also affect grain yield (Chen *et al.*, 1994 and Godshalk and Kauffman, 1995). Compared with older varieties, modern hybrids respond more favorably to nutrients because of higher leaf area index (Tollenaar and Aguilera, 1992), higher leaf photosynthesis rate (Dwyer *et al.*, 1991) and higher crop growth rate and ultimately give more yield. Thus effect of planting patterns on yield and quality of different maize hybrids has been investigated.

Materials and Methods

Experiment was conducted under field conditions at the Agronomic Research Area, University of Agriculture, Faisalabad during Autumn, 1998. Experiment was laid out in a randomized complete block design with factorial arrangement and three replications. Following treatments were included in the experiment.

A. Maize hybrids

H₁ : Highcorn 11
H₂ : Cargil 777

B. Planting patterns

P₁ : 60-cm spaced single rows (111111 plants ha⁻¹)
P₂ : 70-cm spaced single rows (95238 plants ha⁻¹)
P₃ : 30/90 cm spaced double row (111111 plants ha⁻¹)
P₄ : 35/105 cm spaced double row (95238 plants ha⁻¹)

Net plot size was 7 m x 3.6 m for P₁ and P₃ and 7 m x 4.2 m for P₂ and P₄. Crop was sown on July 27, 1998 with the help of dibbler. Fertilizers were applied @ 250 kg N and 150 kg P₂O₅ ha⁻¹. Full phosphorous and half of N fertilizer in the form of TSP and Urea, respectively were applied at sowing and remaining half N fertilizer was applied by band placement at tassel initiation. All other agronomic practices were kept normal and uniform for all treatments.

Number of grains/cob, 1000-grain weight, grain yield, stover yield, grain crude protein content by Micro-Kjeldahl method (Jackson, 1960) and grain oil content by using Soxhlet fat extraction method (Low, 1990) were calculated. Data collected were analyzed statistically using Fishers analysis of variance technique and treatment means were compared by using the least significant difference (LSD) test at 5% level of probability (Steel and Torrie, 1984).

Results and Discussion

Number of grains per cob: There was no effect of treatments and their interaction on number of grains/cob. Similar findings were reported by Pissaia *et al.* (1993). However, maximum number of grains/cob (372.45) were recorded when 'Cargil 777' was sown at 30/90-cm spaced double row. While minimum grains/cob (341.97) was recorded from 'Highcorn II' when sown in 60 cm spaced single rows.

1000-grain weight: 1000 grain weight of 'Highcorn 11' (435.44g) was significantly higher than those of 'Cargil 777' (377.36 g). Baenziger and Glover (1980) were of same opinion that hybrids were significantly different for their 1000-grain weight. While effect of planting pattern and its interaction with hybrids was found to be non-significant.

Grain yield t/ha: Hybrids differed significantly in their final yield. 'Highcorn 11' gave significantly higher yield (8.94 t ha⁻¹) as compared to 'Cargil 777' (7.13 t ha⁻¹). These findings are in accordance with Dong *et al.* (1993). By contrast, planting pattern had non-significant effect on grain yield. However, maximum grain yield (8.41 t ha⁻¹) was recorded from plots sown in a fashion of 90 cm spaced double row as compared to minimum yield (7.56 t ha⁻¹) produced from 70-cm spaced single rows. Similarly, the interactive effect of planting patterns and hybrids was also found to be non-significant. However grain yield ranged between 9.60 to 6.62 t ha⁻¹.

Stover yield/ha: 'Highcorn II' produced significantly more stover yield than 'Cargil 777'. Similarly planting pattern showed significant effect on stover yield. Maximum stover yield (15.07 t ha⁻¹) was recorded from plot sown in a fashion of 90-cm apart double row followed by 70 cm spaced single

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Table 1: Yield and Quality of two maize hybrids as affected by different planting patterns

	No. Of Granins Per cob	1000-grain wt. (g)	Grain yield/ha (t/ha)	Stover yield (T/ha)	Grains crude protein content (%)	Grain oil content (%)
Hybrids (H)	NS				NS	NS
Hybrids H ₁	348.94	435.44a	8.94a	15.09a	10.87	4.51
Cargill 777 H ₂	361.42	377.36b	7.13b	13.48b	11.28	4.43
Planting Patterns (P)	NS	NS	NS		NS	NS
60 cm spaced single rows	350.09	399.85	8.24	14.86a	11.03	4.48
70 cm spaced single rows	359.13	379.19	7.56	13.72b	11.05	4.55
30/90 cm spaced double row	369.72	432.12	8.41	15.07a	11.01	4.43
35/105 cm spaced double row	341.79	414.44	7.94	13.49b	11.19	4.40
Interaction (H x P)	NS	NS	NS		NS	NS
H ₁ P ₁	341.97	449.38	9.60	15.85a	10.77	4.50
H ₂ P ₂	354.13	428.07	8.51	15.49ab	11.02	4.63
H ₁ P ₃	366.98	438.47	9.04	15.62ab	10.54	4.47
H ₁ P ₄	332.69	425.83	8.62	13.40c	11.13	4.43
H ₂ P ₁	358.22	350.31	6.87	13.87c	11.29	4.47
H ₂ P ₂	364.12	330.33	6.62	11.95d	11.08	4.47
H ₂ P ₃	372.45	425.76	7.77	14.52bc	11.47	4.40
H ₂ P ₄	359.90	403.06	7.26	13.58c	11.27	4.37

rows but the difference between 90 cm spaced double row and 60 cm spaced single rows was found to be non-significant. The interactive effect of hybrids and planting patterns were also found significant. Maximum stover yield (15.85 t ha⁻¹) was recorded when 'Highcorn II' was sown in a fashion of 60 cm apart single rows which was statistically at par when 'Highcorn II' was sown both as 90 cm apart double row and 70 cm apart single rows. Where a significantly minimum stover yield (13.40 t ha⁻¹) was recorded when 'Cargill 777' was sown in a fashion of 105 cm apart double row strip.

Grain crude protein contents (%): Individual effect of Hybrids and planting patterns as well as their interaction could not reach the level of significance. However, maximum crude protein contents (11.47%) of maize grain was recorded when 'Cargill 777' was planted in a fashion of 35/105 cm spaced double row. Ottman and Welch (1989) and Akcin (1994), reported higher protein content in wider row spacings than narrower spacings. Wei *et al.* (1995) also mentioned the same results. While, these results are contradictory to the results of Graybil *et al.* (1991). They reported that genotypes had significant effects on grain crude protein contents.

Grain oil content (%): Difference among individual treatments means as well as their interactive effect on maize grain oil content were non-significant. However maximum grain oil content (4.63%) was observed in case of 'Highcorn 11' when planted as 70-cm spaced single rows. While the minimum grain oil content (4.37%) was recorded when 'Cargill 777' planted in fashion of 35/105 cm spaced double row.

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