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RESPONSE OF MAIZE VARIETIES TO DIFFERENT PLANTING METHODS

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ABSTRACT

An experiment was conducted at the Agricultural Research Farm of NWFP Agricultural University, Peshawar during Spring, 1999 to study the reponse of maize varieties to different planting methods. The experiment was laid out in RCB design with split plot arrangement and four replications. Planting methods studied were ridge planting, furrow planting, line planting and broadcast planting. Varieties included in the experiment were Hybrid-922, Sarhad White and Sweet corn. Urea and DAP were used as sources of basal dose of fertilizers at the rate of 200:100 N:P kg NP per hectare. Planting methods, varieties and their interaction significantly affected all the parameters studied except for emergence per m^2 which was only significantly affected by varieties. Number of cobs per plant (1.03), cob length (20.32 cm), number of grains per cob (451.83), grain weight per cob (128.9 g), biological yield (53.91 kg/plot) and grain yield (4629.62 kg/ha) had maximum values in ridge planting. Maximum cob length (25.07 cm), number of grains per cob (614.14), grain weight per cob (217.26 g), biological yield per plot (73.82 kg) and grain yield/ha (6791.66 kg) were noted in Hybrid-922.

INTRODUCTION

Maize *(Zea mays L.)*, a member of the family poaceae (Gramineae) is an annual, short duration, long day, cross-pollinated, determinate, C_4 plant. It is the third important cereal crop of Pakistan after wheat and rice in terms of area and production. It can be grown twice a year, kharif season and Spring season, both for grain and fodder purposes in the plains of the country.

Maize cultivation is gaining popularity in Spring season because Spring maize usually gives more production as compared to kharif crop. Spring maize is relatively safe from insect pests attacks. Spring maize can easily be grown in the areas where adequate irrigation facilities are available. Because of higher temperatures during flowering, the risk of failure in seed set can be avoided by applying adequate irrigation water and early sowing. Although soils and climatic conditions of Pakistan are favourable and high yielding varieties are available yet, the yield recovery of maize at farmers' field is very low as compared to other maize producing countries such as Italy, U.S.A., Canada and Egypt etc.

To boost up maize production, management techniques are imperative and one of the major agro-techniques is the proper method of planting. Maize can be planted in four ways i.e. Ridge planting, Furrow planting, Line planting and Broadcast planting. All these methods have superiority over one another with respect to crop stand, irrigation management, drainage of excess water, utilization of natural moisture in the soil, root stability against lodging and weed control etc.

Comparative study of promising maize varieties was also necessary in order to sort out the most promising varieties for spring plantation in Peshawar Valley. Therefore, the present study was undertaken to screen out the high yielding maize variety and best planting method for Spring maize plantation in Peshawar Valley.

MATERIALS AND METHOD

The experiment was conducted at Agricultural Research Farm of the NWFP Agricultural University, Peshawar during spring 1999. The experiment was laid out in RCB design with split plot arrangement. Planting methods were allotted to the main plots while varieties to the sub

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plots. Sub plot size was 4m x 4.5m. Row to row distance was 75 *cm*. The experiment included the following variables;

I. Varieties

a. Hybrid No.922 (V_1) b. Sarhad White (V_2)
c. Sweet corn (V_3)

II. Planting methods

a. Ridge planting (I)
b. Furrow planting (II)
c. Line planting (III)
d. Broadcast planting (IV)

The following observations were recorded during the course of study.

1. Seedling emergence
2. Number of cobs per plant
3. Cob length
4. Number of grains per cob
5. Grains weight per cob
6. Biological yield
7. Grain yield

RESULTS AND DISCUSSION

Seedling emergence

Seedling emergence per m^2 was significantly affected by varieties (Table I). The highest emergence per m^2 was recorded for sweet corn. The probable reason for it could be that the seeds of Sweet corn were smaller in size and therefore, more seeds per unit weight were responsible for higher emergence/m^2 as same seed rate was used for all the varieties. Spaner et al.(1995) had stated field emergence as a varietal trait.

Number of cobs per plant

Number of cobs per plant was significantly affected by planting method and varieties (Table-II). Maximum cobs per plant were found in ridge planting. The probable reason for it could be that fertilizer application showed better results and produced more cobs per plant. Similar results have been reported by Okigbo (1972) who noticed ridge planting an efficient method for fertilizer application. This might also be due to varietal characteristics. The statement is confirmed by Hong et al. (1988) who reported varieties with high number of cobs per plant.

Cob length

Cob length was significantly affected by planting methods and varieties (Table-III). Maximum cob length was in ridge planting. This may be due to the fact that ridging improved storage and utilization of rain water efficiently for plant growth as reported by Gupta et al.(1979). The largest cob length was in Hybrid-922 which might be due to genotypic characteristics of this variety supported by Malvar et al. (1990) and Yu (1993) who also reported different cob length for different varieties.

Number of grains per cob

Number of grains per cob is an important yield component and contributes greatly to final grain yield. Significant differences for number of grains per cob were found among planting methods and varieties (Table-IV). The highest number of grains per cob was found in ridge planting among the sowing methods. This finding is supported by Sorour et al. (1975) and Jafar et al. (1988) who concluded that number of grains per cob and grain yield per hectare were significantly influenced by different planting patterns. The highest number of grains per cob was recorded in Hybrid-922 which might be due to its different genotypic and varietal characteristics.

Biological yield

Biological yield is an important consideration in the overall farming system of NWFP. Biological yield was significantly affected by planting methods and varieties (Table-VI). The highest biological yield was recorded in ridge planting which might be due to optimum uptake of water and nutrients from the soil by plants on ridges. The results were in agreement with that of Gupta et al. (1979). The highest biological yield was recovered from Hybrid-922 which might be due to its taller plants and larger cobs.

Grain weight per cob

Grain weight per cob is an important yield component and contributes greatly to final grain yield. Grain weight per cob was significantly affected by planting methods and varieties (Table-V). Among the planting methods the highest grain weight per cob was in ridge planting and among the varieties in Hybrid-922. This might be

due to optimum water and nutrient absorption and best aeration on ridges which resulted in more filled grain and higher number of grains per cob. The highest grain weight of Hybrid-922 might be due to its superior genetic makeup as it is an established hybrid in this area.

Grain yield

Grain yield is the function of integrated effect of all individual yield components and interaction between the genetic makeup and plant environment during the period of growth. Grain yield was significantly affected by planting methods and varieties (Table-VII). Among the planting methods the highest grain yield was recorded in ridge planting which might be due to the superiority of the method with respect to nutrients and water uptake than the others. These findings are in agreement with those of Buchele (1956), Brown (1958), Collings (1961), Okigbo (1972), Sorour et al. (1975) and Gupta et al. (1979). The highest grain yield was recorded for Hybrid-922 and it could be due to genetic potential of the variety. Samad et al.(1990)and Abdul et al. (1992) also reported maize grain yield as varietal character.

Table I Emergence per m^2 as affected by planting methods and varieties of maize.

Planting Methods	Varieties			Mean
	Hybrid-922	Sarhad White	Sweet corn	
Ridge	9.88	8.94	11.10	9.98
Furrow	15.33	9.66	14.55	13.18
Line	13,88	9.19	12.88	11.99
Broadcast	13.33	14.83	15.74	14.63
Mean	13.11 a	10.66 b	13.57 a	

Mean of the same category followed by different letters are significantly different from one another using LSD test at 5% level of probability.

Table II Number of cobs/plant as affected by planting methods and varieties of maize.

Planting Methods	Varieties			Mean
	Hybrid-922	Sarhad White	Sweet corn	
Ridge	1.01 b	0.95 ef	1.11 a	1.03 a
Furrow	0.99 cd	0.94 f	1.01 be	0.98 b
Line	0.99 d	0.91 g	0.99 bed	0.97 c
Broadcast	0.99 d	0.90 g	0.96 e	0.95 d
Mean	0.99 b	0.93 c	1.02 a	

Mean of the same category followed by different letters are significantly different from one another using LSD test at 5% level of probability.

Table III Cob length (cm) as affected by planting methods and varieties of maize.

Planting Methods	Varieties			Mean
	Hybrid-922	Sarhad White	Sweet corn	
Ridge	26.32	18.30	16.35	20.32 a
Furrow	25.07	17.70	15.17	19.32 b
Line	24.65	17.10	14.65	18.80 c
Broadcast	24.24	17.50	14.32	18.69 c
Mean	25.07 a	17.65 b	15.12 c	

Mean of the same category followed by different letters are significantly different from one another using LSD test at 5% level of probability.

Table IV Number of grains per cob as affected by planting methods and varieties of maize.

Planting Methods	Varieties			Mean
	Hybrid-922	Sarhad White	Sweet corn	
Ridge	616.25	368.05	371.20	451.83 a
Furrow	613.20	366.77	366.82	448.93 b
Line	614.47	365.92	365.45	448.62 b
Broadcast	612.62	364.52	365.90	447.68 b
Mean	614.14 a	366.32 b	367.34 b	

Mean of the same category followed by different letters are significantly different from one another using LSD test at 5% level of probability.

Table V Grain weight per cob (g) as affected by planting methods and varieties of maize.

Planting Methods	Varieties			Mean
	Hybrid-922	Sarhad White	Sweet corn	
Ridge	222.70	87.14	76.83	128.9 a-
Furrow	218.93	84.93	73.08	125.6 b
Line	213.26	81.55	71.23	122.0 c
Broadcast	214.14	81.65	66.90	120.9 c
Mean	217.26 a	83.82 b	72.01 c	

Mean of the same category followed by different letters are significantly different from one another using LSD test at 5% level of probability.

Table VI Biological yield (kg/plot) as affected by planting methods and varieties of maize.

Planting Methods	Varieties			Mean
	Hybrid-922	Sarhad White	Sweet corn	
Ridge	76.45	44.47	40.80	53.91 a
Furrow	73.54	43.60	38.85	52.00 b
Line	72.77	41.15	38.97	50.97 c
Broadcast	72.50	41.95	36.92	50.46 c
Mean	73.82 a	42.79 b	38.89 c	

Mean of the same category followed by different letters are significantly different from one another using LSD test at 5% level of probability.

Table VII Grain yield (kg/ha) as affected by planting methods and varieties of maize.

Planting Methods	Varieties			Mean
	Hybrid-922	Sarhad White	Sweet corn	
Ridge	7166.66	2861.11	3861.10	4629.62 a
Furrow	6791.66	2749.99	3765.27	4435.64 b
Line	6749.99	2722.22	3705.55	4392.59 b
Broadcast	6458.33	2430.55	3472.22	4120.36 c
Mean	6791.66 a	2690.97 c	3701.04 b	

Mean of the same category followed by different letters are significantly different from one another using LSD test at 5% level of probability.

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