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Evaluation of Growth of Different Maize Varieties in Field Under the Climatic Conditions of Peshawar

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Abstract
A field experiment on "Evaluation of maize varieties under the climatic condition of Peshawar" was conducted at Agricultural Research Institute Tarnab (ARI) during Kharif season 2012. The experiment was conducted in Randomized Complete block Design (RCB). emergence was non significant those plot sown with Iqbal taken maximum days to emergence of (7) days while plot sown with pop-2011 taken minimum days to emergence of (4) days . Higher emergence m-²(8) was recorded for pop-08 and Jalal showed lowest (3) emergence m-². Jalal took (53) days to tasseling while Pir sabaq evaluation showed the lowest (46) days to tasseling among the different maize varieties. Analysis of the data indicated that days to silking were significantly affected by maize varieties. Minimum (52) days to silking were observed in pop-2011 while maximum (56) days to silking were observed in Sarhad white.Lowest plant height was observed in jalal (160 cm) while highest plant height was recorded in pop-07 (184 cm). Different varieties have different plant height, lowest cob height was observed in jalal (48 cm) while highest cob height was recorded in pop-09 (66 cm). Minimum (76) days to physiological were observed in pop-2011 while maximum (81) days to physiological maturity were observed in Sarhad white. Minimum (90) days to harvest maturity were observed in pop-2011 while maximum (97) days to harvest maturity were observed in Sarhad white. maximum 1000 grain weight was recorded for pop-2011 (275 g) while minimum 1000 grain weight was recorded for Iqbal (227 g).Statistical analysis of the data revealed that the data for grain yield was significant those plot sown with Jalal have the minimum grain yield of (1500 kgha^{-1}) while plot sown with pop-2011 have the maximum grain yield of (4666 kg ha^{-1}).
Keywords: Maize, Emergence, Days to Maturity, Grain yield, Harvest, Analysis

INTRODUCTION

Maize (Zea mays L.) has attained the status of major cereal in the world market and is the leading world cereal in terms of both total production (695 million tonnes) and per unit area yield (4815 kg ha-1) (FAOSTAT, 2008). It is the third most important summer cereal in Pakistan, after wheat and rice. In the farming system of Khyber Pukhtunkhawa, maize is 2nd to wheat in its importance (Ihsan et al., 2005). During 2008-2009, maize was grown on an area of 1052.1 ha with total production 3593.0 tons sand national average yield of 3415kg/ha in Pakistan, whereas in Khyber Pukhtunkhawa, It is grown on about 509.5 ha with total production of 957.9 tons and average yield of 1880 kgs/ha. It is both the primary crop in majority of the farming systems and the staple food of the rural population in much of the province (Khan et al., 2003). The yield obtain from maize in Pakistan is very low as compared to other country due to many constraints. Maize being the highest yielding cereal crop in the world is of significant importance for countries like Pakistan, where rapidly increasing population has already out stripped the available food supplies. In Pakistan, it is the third important cereal after wheat and rice and plays an important role in the overall progress of the national economy (MINFAL, 2007). Grain yield in maize increases with increase in grains cob-1 and number of ears 100-1 plants (Soliman et al., 1999). Plant height and ear height increase with increasing plant density, but leaf area, ear length, grains row-1 and thousand grain weight decrease with increase in plant density, while number of leaves plant-1, number of leaves above main ear and number of rows ear-1 are not affected by plant density (Hassan, 2000). Maize height and maturity are highly correlated to leaf number (Cross and Zuber, 1973). Peshawar has a warm to hot; semi arid, sub-tropical, continental climate with mean annual rainfall of about 360mm. summer(may-sep) has a mean maximum temperature of 40 0c and mean minimum temperature of 25 0c.winter(dec-march) has mean min temperature of 4oc and a maximum of 18.4 0c. Increase in the grain yield of maize in high density plots is due to the improvement in light interception during the critical period for grain set, while number of seeds plant-1 and plant growth rate is adversely affected by N deficiency and shading in the high density plots (Andrade et al., 2002).

MATERAIALS AND METHODS

A field experiment on "Evaluation of maize varieties under the climatic condition of Peshawar" was conducted at Agricultural Research Institute Tarnab (ARI) during Kharif season 2012. The experiment was conducted in Randomized Complete block Design (RCB). Eleven indigenous maize varieties were sown with two rows per plot. Plot size was ten meter square of 5m length and 2m width. Row to row and plant to plant distance was kept 75cm and 25cm respectively. Nitrogen (Urea) was applied in split doses (half at sowing and half at knee height) and full P-fertilizer (SSP) dose was applied before final ploughing. Generally a fertilizer dose of 120 kg N and 60 kg P_2O_5/ha seems to be sufficient for a healthy crop stand. Irrigation was applied as when needed by the

crop.All the standard agronomic practices was kept constant for all the treatment.Days to emergence were recorded by counting number of days from sowing to the date on which 50% seedling emerge. Emergence m^{-2} was calculated by using the following formula.

Emergence m^{-2} = # of plants/unit area.

Days to tasseling were recorded by counting number of days from sowing to the date on which 50% plants developed tassel.Days to silking were counted from the date of sowing to the date on which 50% ears of plants develop silks. Height of the plant was measured from soil to the tip of the tassel of ten randomly selected plants in each plot and average was calculatedHeight of cobs from soil surface of ten randomly selected plants from each plot was measured using a tape and averaged for height of cob.The number of days requires to reach maximum dry matter accumulation or physiological maturity were recorded by observing black layer formation on the middle of kernels on randomly taken ears from eight plants per plot.Days to harvest maturity were counted from the date of sowing to the date on which 50% plants matured completely and loss green color.Thousand grains were counted randomly from each plot of each variety and weighed.The grain yield was determined by harvesting two central rows in each plot. The ears from harvested plants were detached, dried then was threshed, weighed and was converted to kg/ha.The data were subjected to ANOVA appropriate for RCB design using computer programme "MSTAT C".

RESULTS AND DISCUSSION

Days to emergence

Data regarding days to emergence of maize varieties are shown in table 1. Statistical analysis of the data revealed that the data for days to emergence was non significant those plot sown with Iqbal taken maximum days to emergence of (7) days while plot sown with pop-2011 taken minimum days to emergence of (4) days.

Emergence m^{-2}

Data pertaining Emergence m^{-2} of maize varieties are shown in table 1. Perusal of the data indicated that the data was non significant. Higher emergence m^{-2}(8) was recorded for pop-08 and Jalal showed lowest (3) emergence - m^{-2}.

Days to 50% tasseling

Data on number of days to tasseling depicted in table 2. Different varieties of maize has significantly effected days to tasseling. Jalal took (53) days to tasseling while Pir sabaq evaluation showed the lowest (46) days to tasseling among the different maize varieties.

Days to 50% silking

Data pertaining days to silking are shown in table 2. Analysis of the data indicated that days to silking were significantly affected by maize varieties. Minimum (52) days to silking were observed in pop-2011 while maximum (56) days to silking were observed in Sarhad white.

Table 1. Days to emergence and emergence m^{-2} of maize as affected by different verities.

Treatments	Days to emergence	Emergence m^{-2}
Azam	6	4
Sd(w)	5	5
Pahari	7	7
Pop-07	7	9
Pop-08	7	8
Pop-09	7	7
Pop-2010	6	7
Pop-2011	4	7
Psev	6	6
Iqbal	7	7
Jalal	6	3
L.S.D		
D/E	ns	
E/M	ns	

Table 2. Number of days to 50% tasseling and number of days to 50% silking of maize as affected by different varieties.

Treatments	Number of days to 50% tasseling	Number of days 50% to silking
Azam	51abc	55 b
Sd(w)	53 ab	56 ab
Pahari	49cd	53cd
Pop-07	52 ac	56ab
Pop-08	52ac	56ab
Pop-09	52 ac	56ab
Pop-2010	51 ac	55bcd
Pop-2011	49 bcd	52 d
Psev	46 d	53cd
Iqbal	50 abc	53 d
Jalal	53 a	57 a
L.S.D	3.91	2.20

L.S.D value at P ≥0.05 for D/T = 3.9
L.S.D value at P ≥0.05 for D/S = 2.20

Plant height

Data on plant height is depicted in table 3. Analysis of the data indicated that plant height was significantly affected by maize varieties. Lowest plant height was observed in jalal (160 cm) while highest plant height was recorded in pop-07 (184 cm).

Cob height

Data pertaining cob height of maize varieties are shown in table 3. Perusal of the data indicated that the data was significant. Different varieties have different plant height, lowest cob height was observed in jalal (48 cm) while highest cob height was recorded in pop-09 (66 cm).

Days to physiological maturity

Data pertaining days to physiological maturity are shown in table 4. Analysis of the data indicated that days to physiological maturity were significantly affected by maize varieties. Minimum (76) days to physiological were observed in pop-2011 while maximum (81) days to physiological maturity were observed in Sarhad white.

Days to harvest maturity

Data regarding days to harvest maturity are shown in table 4. Statistical Analysis of the data indicated that days to harvest maturity were significantly affected by maize varieties. Minimum (90) days to harvest maturity were observed in pop-2011 while maximum (97) days to harvest maturity were observed in Sarhad white.

Table 3.Plant height and cob height of maize as affected by different verities.

Treatments	Plant height (cm)	Cob height (cm)
Azam	177 bcd	51 d
Sd(w)	176 cd	58 bc
Pahari	172 de	53 cd
Pop-07	185 a	60 ab
Pop-08	183 ab	58 bc
Pop-09	180 abc	66 a
Pop-2010	180 abc	63 ab
Pop-2011	182 abc	64 ab
Psev	168 e	52 cd
Iqbal	166 ef	52 cd
Jalal	160 f	48 d
L.S.D	6.71	6.95

L.S.D value at P ≥0.05 for plant height = 6.71
L.S.D value at P ≥0.05 for cob height = 6.95

Table 4. Number of days to Physiological maturity and number of days to Harvest maturity of maize as affected by different verities

Treatments	Number of days PM	Number of days to HM
Azam	77 bc	92 cd
Sd(w)	81 a	97 a
Pahari	77 bc	91 cd
Pop-07	78 bc	95 abc
Pop-08	78 bc	96 ab
Pop-09	80 ab	93 bcd
Pop-2010	78 bc	93 bcd
Pop-2011	76 bc	90 cd
Psev	78 bc	93 bcd
Iqbal	77 bc	92 cd
Jalal	77 bc	92 cd
L.S.D	2.47	3.17

L.S.D value at P ≥0.05 for days to P/M = 2.47
L.S.D value at P ≥0.05 for days H/M = 3.17

1000 grain weight

Data on 1000 grain weight are depicted in table 5.analysis of the data showed that different varieties of maize has significantly effected 1000 grain weight. maximum 1000 grain weight was recorded for pop-2011 (275 g) while minimum 1000 grain weight was recorded for Iqbal (227 g).

Grain yield

Data regarding grain yield of maize varieties are shown in table 5. Statistical analysis of the data revealed that the data for grain yield was significant those plot sown with Jalal have the minimum grain yield of (1500 $kgha^{-1}$) while plot sown with pop-2011 have the maximum grain yield of (4666 kg ha^{-1}).

Table 5. 1000 grain weight and grain yield kg/ha of maize as affected by different varieties.

Treatments	1000 grain weight	Grain yield $kgha^{-1}$
Azam	230.00 cd	3166 b
Sd(w)	236.00 bcd	3000 b
Pahari	248.33 bc	2833 bc
Pop-07	250.00 b	3333 ab
Pop-08	252.67 b	3833 ab
Pop-09	240.00 bcd	3500 ab
Pop-2010	253.33 b	3500 ab
Pop-2011	275.00 a	4666 a
Psev	248.33 bc	3333 ab
Iqbal	227.00 cd	3000 b
Jalal	228.33 cd	1500 d
L.S.D	18.27	1470

L.S.D value at P ≥0.05 for 1000 grain weight = 18.27
L.S.D value at P ≥0.05 for grain yield = 1470

DISCUSSION

Non significant difference were observed in days to emergence ,emergence per meter square due to varieties .this results were observed by Muhammad(2000) and Gupta et al.(1979) who reported that emergence m^{-2},days to emergence were non significantly affected by verities . Different varieties of maize has significantly effected days to tasseling and days to silking Highly significant difference was observed in plant height and cob height for varieties. Maximum plant height was recorded in variety pop-07 while minimum recorded for Jalal while maximum cob height was observed in pop-09 and minimum cob height was observed in Jalal. The results agree with Mohammad (2000). Days to physiological maturity were significantly affected by maize varieties. Minimum days to physiological were observed in pop-2011 while maximum days to physiological maturity were observed in Sarhad white. Days to harvest maturity were significantly affected by maize varieties. Minimum days to harvest maturity were observed in pop-2011 while maximum days to harvest maturity were observed in Sarhad white. The result agree with (Cross and Zuber, 1973). 1000-Grain weight (g) was significantly affected by varieties. maximum 1000- Grain weight was recorded in pop-2011 sowing plot while minimum recorded in Iqbal sowing plots. The result agrees with Hassan, 2000). Who reported that thousand grain weight decrease with

increase in plant density. Grain yield was highly significantly affected by varieties .maximum grain yield was recorded from pop-2011 while minimum recorded from Jalal. The result agree with Aziz et al., (1992) who reported that to increase maize yield per unit area is imperative for the plant breeders to develop maize varieties that are high yielding, early maturing, disease resistant, responsive to improved production practices and adjustable in the exiting cropping pattern.

CONCLUSION

Maximum 1000 grain weight was recorded for pop-2011 (275 g) while minimum 1000 grain weight was recorded for Iqbal (227 g). Jalal have the minimum grain yield of (1500 $kgha^{-1}$) while plot sown with pop-2011 have the maximum grain yield of (4666 kg ha^{-1}). Optimum grain yield kg ha^{-1} was given by pop-2011 as compare to rest of the varieties.Pop-2011 variety is recommended for general cultivation under the agro-climatic condition of Peshawar valley

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