AENSI Journals

Advances in Environmental Biology

ISSN-1995-0756 EISSN-1998-1066

Journal home page: http://www.aensiweb.com/AEB/

The Effect of Planting Date and Leaf Cutting on Yield and Yield Components in Zea Mays L. (Hybrid 604)

[1]Ebrahim Panahpour, [2]Ali Gholami, [3]Mohammad Moradi

[1,2]Department of Soil Science, College of Agriculture, Ahvaz Branch, Islamic Azad University, ahvaz, Iran.
[3]Department of Agronomy and Plant Breeding, Isfahan branch (Khorasgan), Islamic Azad University, Isfahan, Iran.

ARTICLE INFO

Article history:
Received 19 August 2014
Received in revised form
19 September 2014
Accepted 29 September 2014
Available online 12 November 2014

Keywords:
Corn, planting date, leaf cutting, seed yield, yield components

ABSTRACT

In order to evaluation of the effect of different planting dates and leaf cutting times on seed yield and it's componentsin maize hybrid single cross 604 an experiment was conducted in year 2011 in Izeh using split plot design in the layout randomized complete block design with four replications. Planting date with three levels involving 25 Jun, 10 Jul and 26 Jul considered as main factor and arranged randomly in main plots. Leaf cutting times comprising three levels; no cutting, cutting in tasseling and cutting in anthesis considered as sub factor and placed randomly in sub plots. Analysis of variance showed that planting dates have significant differences for all traits excepting traits no.rows/ear and 1000-kernel weight. Leaf cutting times have significant effect on all the traits studied except for 1000-kernel weight. Interaction effects between planting dates and leaf cutting times were significant only for no.rows/ear. Mean comparison using Duncans'new multiple range test designed that 26 Jun is the best planting date for resulting maximum amount of seed yield and its components. On the other hand, no cutting produced the highest amount of all the traits in compare with leaf cutting in tasseling and cutting in anthesis. The minimum seeds yield was produced in 27 Jul and leaf cutting in tasseling. In conclusion, delay in planting date and leaf cutting resulted decreasing in seed yield and it's components in maize hybrid single cross 604.

To Cite This Article: Ebrahim Panahpour, Ali Gholami, Mohammad Moradi., The Effect of Planting Date and Leaf Cutting on Yield and Yield Components in Zea Mays L. (Hybrid 604). ***Adv. Environ. Biol., 8(12),*** *1370-1373, 2014*

INTRODUCTION

Zea mays L. is one of the most important grain forage crop in Iran. The average grain yield of corn is more than 8ton ha^{-1} and is increasing annually. In order to optimize the use of moisture, nutrients and solar radiation, grain corn must be grown under optimum planting date.

Determination of the best planting date for different environments is important in using the maximum yield potential of crops [3]. Hunter [5] reported that delay in planting date resulted decreasing in photosynthetic substances that needed for reserving in seeds.

Shanway and Cothren [11] emphasized that delay in planting date resulted decline in seed yield in corn hybrids.

Leaf cutting with low intensity especially in final growth period is agent for low amount decrease in accumulation dry matter in seeds [12]. The maximum reduction in seed yield is caused by leaf cutting in flowering.

Detasseling and leaf cutting in different plant densities and planting dates showed that response of corn is vary from one genotypes to another [1].

This experiment was conducted to determine the best planting dates and the effects of different leaf cutting times on seed yield and it's components in maize hybrid single cross 604.

MATERIALS AND METHODS

This study was conducted at the field of Izeh, Khuzestan, Iran. The treatments comprised three planting dates (25 Jun, 10 Jul and 26 Jul) and three leaf cutting times (no cutting as control, cutting in tasseling and cutting inanthesis).

Corresponding Auteurs: Ebrahim Panahpour, Department of Soil Science, College of Agriculture, Ahvaz Branch, Islamic Azad University, ahvaz, Iran.
E-mail: e.panahpour@gmail.com

The plots comprising four rows were 7 m long and 0.75 m apart. Distance between plants with in rows was 0.2 m. Therefore, plant densities were 67,000-plant ha^{-1}. In spring 2011 the trial was irrigated every 7 days. Amount of annual precipitation in this region was 646 mm.

The experiment was laid out in split plot design in the lay out randomized complete block design with four replications. Planting date with three levels involving 25 Jun, 10 Jul and 26 Jul considered as main factor and arranged randomly in main plots. Leaf cutting times comprising three levels; no cutting, cutting in tasseling and cutting in anthesis considered as sub factor and placed randomly in sub plots.

The variety modern long maturity maize hybrid single cross 604 was used. The fertilizer dose used in growth duration was 300-200-150 (N.P.K.) kg ha . Half nitrogen and whole phosphorous and potassium in the forms of urea, ammonium phosphate and potassium sulphate, respectively, were applied at the time of planting, while remaining half dose of nitrogen was applied at side dressing after thinning.

The seed were sown at a 5-6 cm depth with 3 seeds per hill in 25 Jun, 10 Jul and 26 Jul, respectively. Thinning was practiced at 4-6-leaf stage. Hand weeding was practiced to control weeds. Standards cultural practices were carried out until the plant was matured. Ten plants (excluding border plants) were randomly selected from each plot prior to harvest for measure yield components.

The traits seed yield, No.rows/ear, No.seed/row, No.seed/ear, seed weight/ear and 1000-seed weight were measured when plants maturation. An analysis of variance of data was conducted based on statistical model of split plot design in the lay out randomized complete block deign. Mean comparison between planting dates, leaf cutting times and interaction effects of main and sub factor was achieved using Duncan's new multiple range test at 5% probability level. The data analysis was done using MSTAT-C program.

RESULTS AND DISCUSSION

Analysis of variance showed significant differences between planting dates (25 Jun, 10 Jul and 26 Jul) only for the traits No.seed/row;No.seed/ear, seed weight/ear and seed yield (Table 1). On the other hand, mean comparison between planting dates revealed that the first date (25 Jun) had maximum amount of all the traits studied, while this difference was significant for the mentioned traits namely; No.seed/row, No.seed/ear, seed weight/ear and seed yield (Table 2). Difference of the second and the third planting dates also was meaningful only for No.seed/row and No.seed/ear traits that the second date (10 Jul) had the higher mean than the third date (26 Jul).

Leaf cutting times showed highly significant difference for all the traits except trait 1000-seed weight using analysis of variance (Table 1). Mean comparison for leaf cutting times (Table 2) detected the highest mean for all the traits in control (no cutting). For all the traits, cutting in anthesis had the higher mean than cutting in tasseling. Also, this difference was significant only for the traits; seed yield, No.rows/ear, No.seed/row, No.seed/ear and seed weight/ear (Table 2).

Interaction effects between planting dates and leaf cutting times were not significant for all the traits (Table 1) that emphasized planting dates are independent from leaf cutting times for the traits studied. Indeed, leaf cutting is caused decreases in seed yield and its components of maize in every planting dates.

Table 1: Analysis of variance for planting dates and leaf cutting times in maize hybrid single cross 604

Mean of squares							
Source of variation	d.f	No.rows/ear	No.seed/row	No.seed/ear	Seed weight/ear	1000-seed weight	Seed yield
Replication	3	0.661	0.698	1911.064	75.73	300.705	0.019
Planting dates	2	4.041**	177.714**	66373.654**	4395.10**	7031.149**	13.063**
Error a	6	0.120	2.687	314.733	156.20	243.648	0.348
Leaf cutting times	2	1.871**	0.368	2236.842**	10237.50**	3314.779**	8.431**
Interaction effects	4	0.971ns	0.756ns	1334.158ns	153.70ns	817.052ns	1.776ns
Error b	18	0.267	1.955	721.696	294.30	780.688	0.648

*, **: Significant at 5% and 1% probability levels, respectively.

Table 2: Mean comparison between planting date and leaf cutting levels using Duncan's new multiple range test *

Factors	No. Rows/ear	No. Seed/row	No. Seed/ear	Seed weight/ear (g)	1000-seed weight (g)	Seed yield (Kg/ha)
Planting date levels						
25 Jun	1 4.02 [a]	44.208[a]	621.07 [a]	161.28 [a]	284.783[a]	8839 [a]
10 Jul	13.70[ab]	39.856[b]	540.258 [b]	151.382 [b]	258.587[b]	7687[b]
26 Jul	12.917[ab]	36.592[c]	472.518 [c]	152.491 [b]	236.427[c]	6756[c]
Leaf cutting time levels						
Cutting in tasseling	13.1 [c]	38.34 [c]	528.86[c]	108.291[c]	243.783[c]	7480 [c]
Cutting in anthesis	13.8 [b]	39.33 [b]	552.01[ab]	114.382 [b]	260.587[b]	9627 [b]
No cutting (Control)	13.90 [a]	40.91 [a]	552.96 [a]	119.738 [a]	276.427 [a]	10980 [a]

* : Means having the same letter(s) in the same column are not significantly different ($p \leq 0.05$).

Sepehri *et al* [10] reported the significant effect of planting dates on seed yield and it's components in maize hybrid varieties and founded that delay-planting causes yield and 1000-seed weight decreases. These results are consistent with my report.

Ebrahimi [4] resulted that planting dates have meaningful effect on No.seed/ear and seed yield but non-significant effect on No.row/ear and 1000-seed weight.

Selection of the most suitable planting date for maize is affected by temperature degrees variation in plant growing season. Therefore, planting date must be select in the manner of reproductive phase impact with proper temperature.

Willhen and Etioran [13] evaluated the effects of leaf cutting on the agronomic traits of maize inbred lines and reported seed yield decreases with leaf cutting that has been caused mainly by decline in seed number. Also, they resulted any leaf cutting causes severe yield decreases. This result is claimed with the founding by other researcher [5,12,1].

Leaf cutting not only reduce seed yield in maize, but also decrease seed weight and number. One of the reasons for this reduction is the heat stress in night. In warm night that photosynthesis isn't achieved and plant is obliged for respiration, this action will conduct only using carbohydrates reserved that synthesized in day condition.

Therefore, plant will have low amount of reservoirs and is compelled for consuming all the produced carbohydrates in day and especial night respiration. Probably, because of that leaf cutting causes seed yield decline in maize.

Finally, from this research is concluded that delay in planting date and leaf cutting resulted decreasing in seed yield and its components in maize hybrid single cross 604.

ACKNOWLEDGEMENTS

This research project has been supported by Science and Research Branch, Islamic Azad University (IAU), Khouzestan, Iran. This support is highly appreciated.

REFERENCES

[1] Allison, J.C., 1995. The production and defoliation of dry matter in maize after flowering. Ann. Bot., 30: 365-381.
[2] Borras, L. and G.A. Salfer, 2004. Seed dry weight Response to source–sink manipulation in wheat, maize and soybean. Field Crops Res., 86: 131-146.
[3] Chugan, R., 2008. Maize production. Agriculture research and education institute publication. 103 pp. (In Persian).
[4] Ebrahimi, C.H., 2007. Study and determination of planting dates of maize hybrid sc 704 and its effects on some morphological traits and yield components under Lorestan (KoohDasht) condition.Msc. Thesis, college of Agriculture, university of Tehran., pp143.
[5] Handter, R.B., 1980. Increased leaf area (source) and yield of maize in short season areas. Crop Sci., 20: 571-574.
[6] Hixon, M.M., M.E. Bauer and D.K. Scholz, 2003. An assessment of land set data acquisition history on identification and area estimation of corn and soybeans. Biol., 68: 81-92.
[7] Inhoit, A.A. and P.R. Carter, 1987. Planting date and tillage effects on corn following corn.Agron. J. 79: 746-75
[8] Jones, R.J. and S.R. Simmons, 1983. Effects of altered source-sink ratio on growth of maize kernels. Crop Sci., 23: 129-134.

[9] Prioul, J.L and N.S. Dugue, 1992. Source-sink manipulation and carbohydrate metabolism in maize. Crop Sci., 32: 752-756.
[10] Sepehri, A., Gh. Noormohammadi and A. Kashani, 1994. Effects of planting date and urea on grain maize sc 604 yield in Hamedan region. Tabriz university, pp: 93.
[11] Shanway, C.R. and J.T. Cothren, 1992. Planting date and moisture effects on yield, quality and alkalin processing characteristics of food grain maize.Crop Sci., 32: 1265-1268.
[12] Tilaoun, A.J., 1993. Quantative and physiological traits in maize.Associated with different level of plant density and leaf defoliation in Ethiopin., pp: 74-80.
[13] Wilhelm, W.W. and L. Etoran, 1995. Yield quality and nitrogen use of inbreed corn with very numbers of leaves removed during detasselling. Crop Sci., 35: 209-210.