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ORIGINAL ARTICLE

Effect of crowding on some quantitative and qualitative traits of new varieties of forage maize in Rey

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ABSTRACT
This experiment was conducted to study the effects of plant density on yield and some morphological and physiological characteristics of new maize hybrids. Factorial experiment in a randomized complete block design with three replications, two factors (density and cultivar) was conducted in the village of Saeed Abad Rey. Hybrid forage cultivar were evaluated in four late-type (1 - NK Factor, 2 - Dracma G-4662, 3 - NK Gigantic and 4 - KSC 704) densities and also includes four levels 80000, 95000, 110000 and 125000 plants ha. The distance between rows was 70 cm. Traits of flag leaf length, leaf area index, fresh yield and biological yield were measured Coefficient Depreciation Light. The results showed that all traits were affected by planting density, plant density increased as the flag leaf length, and Coefficient Depreciation Lightwere decreased, while biological yield, yield fresh, LAI increased. The highest LAI vs. KSC Density of 704 per 125 thousand, respectively. K.S.C. The biological function of the density and the density of the top 704 95000 then accounted for, but in Density 125,000 cultivars Dracma G-4662, Gigantic NK and KSC 704 had no significant differences in terms of biological function and were superior to the NK factor. The density cultivar of 125 thousand plants Dracma G-4662 from fresh or silage yield Duncan were grouped in the first category . If the goal is to achieve the highest possible level of performance is fresh or silage , Dracma G-4662 cultivar of 125 thousand plants per hectare best alternative in the density of KSC Rey area are 704 farming.
Keywords: *Plant density, forage maize, leaf area index, Coefficient Depreciation Light, biological function*

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INTRODUCTION

Forage maize with scientific name Zea mays L. Is one of important and strategic products of country that play a major contribution in providing the needed protein, especially red and white meat? In recent years because of building central animal husbandry and cattlemen, the area under forage maize increased. According to the importance of this product and the implanted area in Iran and the important role in prepare and supply needed protein for growing population , increasing this product per area unit is necessary [1] .

Commercial production of corn in the world, about 604 million tons and nearly 140 million hectares is under cultivation. 252 thousand hectares of corn are planted and its performance approximately is 8/7 in hectare. It is expected that by 2020, demand for corn increase 45 percent. International Maize and Wheat Breeding Center (CIMMYT) maize regional trials aimed at evaluating , selecting high yielding and stable varieties in a wide range of environments [2]. Numbers of maize have considerable genetic variation for different traits which this diversity is the key to reform and the introduction of superior varieties [3,4].

It has been reported forage maize energy value creation is from 1 to 1/5 million calories per kilogram of dry matter . Silage corn production needs fewer workers than other forage. In Iran due to climate variations and high potential agriculture each year the lands under cultivation increase. In order to reach production with high quality and self-sufficiency it is necessary to recognize effective factor for production and try to reach to their goals by using cultivation methods [5].

Researchers have concluded that the potential product because of adequate moisture, increase soil fertility and finally lead to genetic capacity for crop is achieved only by arranging the density of vegetation in area unit [6]. Density of 75 thousand plants per hectare [7] , 85 thousand to 95 thousand

plants per hectare [8], 90 thousand plants [9], 102700 plants per hectare [10], 138 thousand plants, and finally 190 thousand plants [11] as well as the optimal density of corn are presented . During 3 years study in center and south of America 63 density per hectare was proper for late silage corn group investigations of these researchers in Missouri shows that in 69 density per hectare silage corn increased , while the density of 59 density per hectare, was the best density for grain production [12].
By using new hybrid cultivars of corn it is possible to increase grain and forage performance with regard to proper density [4]. The purpose of this study is to identify high yielding hybrids of forage maize and compatible with Rey area and setting proper density for them.

MATERIALS AND METHOD

This study, in May 2011, in latitude 35 degrees and 34 minutes north and longitude 5 degrees and 21 minutes east , and the height of 1051 meters above sea level in the village of Saeed Abad environs of Ray city has been done . These schemes implemented in June 2011, in the village of Saeed Abad environs of Ray city. Test area at a distance of 350 meters north corner of Rey University and in latitude 35 degrees & 34 minutes north and longitude 51 degrees & 22 minutes east , and elevation of 1049 meters above sea level , was performed . Tested by two-factor factorial block completely randomized design with three replications, in which the cultivar of late maturate four hybrid forage maize (1 - NK Factor, 2 - Dracma G-4662, 3 - NK Gigantic and 4 - KSC 704) , and the density consists of four levels , 80 thousand , 95 thousand , 110 thousand and 125 thousand bushes in hectare were studied. Every plot16/ 8 square meters with dimensions 2/8 × 6 includes four ridges 70 cm . Each plot contained four rows planted to six meters apart and line distances 70 cm in the first and last line and a half meters from the beginning and end of each line were regarded as marginal. The overall numbers of stack during experiment were considered over 94 trials. Between the first and second or second and third blocks there is a 4 meters Street , which relate to two meters with two input and output streams and regard two meters as a corridor.
Leaf area index (LAI)
To do this by measuring the total area of leaves per unit area and division on unit area the index obtained
Coefficient Depreciation Light
The amount of absorbed solar radiation by vegetation can be calculated using Beer's law . One of the main elements of Beer's law was the Coefficient Depreciation Light that shows the amount of plant prevention (k) from light.
- K.LAI = 0I/Iln biological function and fresh
Due to the huge mass of corn plants , and many samples that is impossible to dry them completely in the oven ventilated , first of all components of the plants sampled, the wet weight have already recorded , spread separately in the stock room on the flat layer and after drying them in a free air the bushes collected and in the next step bushes related to each plot mix with each other and through obtained mixture of samples in oven ventilated dry for 72 hours , in 70 centigrade and by using the amount of dry matter toward the biological function of each treatment were calculated .
to statistical analysis was used Minitab and SAS programs used and also to design the charts statistical Excel.

RESULTS AND DISCUSSION

Flag leaf length

Table 1 Analysis of variance showed that the effect of seeding rate effect on flag leaf length at 5% and 1% level of significance on the flag leaf, also the flag leaf length and seeding rate interaction was significant at the 1% level. Varieties Dracma G-4662, K.S.C. 704 and NK Factor highest flag leaf length was less than NK Gigantic has been significantly increased. The highest leaf density of 80 thousand plants per hectare obtained at higher compression ratio has been increased significantly. Cultivar NK Factor, the highest rate in flag leaf length density of 80 thousand plants per hectare allocated to the density levels than any other has shown a significant increase, while the cultivar K.S.C. 704 of flag leaf length was significantly different densities at different levels (Table 2).

Leaf area index

Results Table 1 Analysis of variance showed that the simple effect of density on the surface of a Cultivar of simple effects of significant interaction effects were not significant cultivar in density. Cultivar in terms of Leaf area index have been grouped into three distinct groups, as Cultivar KSC Density of 704 to 125 thousand LAI 7.47 alone at the top of the Duncan grouping, Cultivar of cultivars Gigantic NK and NK Factor in second and third place were Dracma G-4662. looking at the comparison table is clearly visible between different levels of density and Leaf area index a direct linear relationship exists, this means that with increasing plant density Leaf area index significantly increased with an increasing trend. As it was clear from the analysis of variance showed significant interaction between the experimental factors are

not significant. This concept implies that the response of all cultivars at different levels of the same density, all cultivars are as of the end of the level density, the highest Leaf area index to have had a significant increase compared to the lower levels (Table 2).

Coefficient Depreciation Light

Results Table 1 Analysis of variance revealed a simple effect of concentration on the Coefficient Depreciation Light was significant at the one percent level, as well as the simple effect Cultivar was significant at the one percent level. The interaction was not significant cultivar in density. It is concluded that the average Cultivar of comparison in terms of the Coefficient Depreciation Light are grouped into three categories, as Gigantic NK, Dracma G-4662 in the first category and NK Factor in second and KSC 704 Duncan placed third grouping. In all cultivars with higher density levels and Coefficient Depreciation Light is significantly reduced. There is an inverse linear relationship appears between levels (Table 2).

Fresh yield

Results Table 1 Analysis of variance showed significant not fresh in relation to Cultivar and density of the simple effects were significant at one percent level and their interaction. Varieties K.S.C. 704 Dracma G-4662 both in terms of Fresh yield in the first category were grouped and compared to other varieties Duncan has been a significant increase. With increasing plant density up to 110 thousand plants per hectare as well as Fresh yield has increased significantly, but no significant difference between the densities of the surface (Table 2).

Biological yield

Analysis of variance (Table 1) showed that the simple effect of density on the biological yield the one percent and five percent of cultivar was significant. Cultivar KSC 704 with the highest biological yield Duncan grouping was alone in the first category than the other cultivars studied were significantly increased. Second density than the first density level, in terms of Biological yield, have shown a significant increase. Since no differences between the density and has led to higher levels, thus independent of the Cultivar density of 95 thousand plants per hectare is optimal. According to the comparison table, the optimal density for KSC 704 and 95 thousand plants per hectare, for NK Factor, 110 thousand plants for Dracma G-4662 and NK Gigantic 125 thousand plants ha (Table 2).

CONCLUSIONS

Although a single plant dry matter decreased with increasing density, but increase the number of plants per unit area caused a significant advantage in terms of biological yields higher densities. Largest amount of fresh or silage variety performance Dracma G-4662 (95.5 tones per hectare) was obtained density of 125,000 plants. The number density of biological function Dracma G-4662 (31.3 ha) in the first category were grouped Duncan.

Table 1 Analysis of variance of leaf length flag, leaf area index, fresh performance, Coefficient Depreciation Light, biological function

biological function	Coefficient Depreciation Light	fresh performance	leaf area index	Leaf length flag	DF	S.O.V
74.49**	0.0903**	517.28**	12.68**	37.42*	3	Seed density
43/17*	0.0146**	86.80**	2.14**	131.91**	3	Cultivar
10/94n.s	0.001n.s	44.95n.s	0.115n.s	34/18**	9	Seed density * Cultivar
8.8	4.2	7.1	5.2	6.4	8.8	(%) Index changes

respectively significant at 5% and 1 % levels** & *،without meaning n.s

Table 2 the result of simple effect and interaction and density for leaf length flag, leaf area index, fresh performance, Coefficient Depreciation Light, biological function

Biological function	Coefficient Depreciation Light	fresh performance	leaf area index	leaf length flag	Experiment factor
Cultivar					
30.1a	0.43c	83.8a	6.23a	42.1 a	K.S.C. 704
27.9b	0.47b	80.0b	5.76b	41.9a	NK Factor
27.2b	0.50a	80.7b	5.40c	35.0b	Gigantic NK
27.1b	0.51a	85.7a	5.30c	39.6 b	Dracma G-4662
Seed density					
24.2b	0.59a	73.2c	4.52d	42.2a	80000
28.2a	0.49b	82.8b	5.36 c	39.3b	95000
28.6a	0.46c	86.2 ab	5.83b	38.4b	110000

30.8a	0.38d	87.8a	6.99a	38.6b	125000
Seed density * Cultivar					
27.6de	0.52b	78.1c	5.10e	44.1b	K.S.C. 704
30.4ab	045cd	85.2b	5.71de	43.3b	
30.9ab	0.41ef	87.3b	6.38bc	42.7bc	
31.5a	0.35g	84.4b	7.74a	42.3bc	
25.5f	0.60a	72.0d	4.41f	48.8a	NK Factor
28.3d	0.48bc	77.9c	5.45e	41.0cd	
29.3bc	0.43de	86.1b	6.18cd	38.1ef	
28.7cd	0.38fg	84.0b	7.01b	36.9f	
20.6g	0.61a	65.9e	4.30f	36.9f	Gigantic NK
28.2d	0.52b	85.2b	5.20e	33.1g	
28.6d	0.50bc	84.0b	5.31e	32.9g	
31.6a	0.38fg	87.7b	6.79bc	36.8f	
25.3f	0.63a	79.9c	4.28f	44.01b	Dracma G-4662
26.1ef	0.51bc	83.0b	5.08e	39.7de	
25.6f	0.46bc	87.6b	5.44e	37.1f	
31.3a	0.41fe	95.5a	6.40bc	37.0f	
Comparisons with similar letters in each column according to LSD test at the 5% level were not significant.					

REFERENCES

1. Ashofteh Bigrami, M., Siya sar, B., Khavari, S., Golbashi, M., Mehdi Nejad, N.. And Alizadeh, A.. (2010). Interaction Effects in the cultivar on morphological characteristics, yield and yield components of new varieties of maize (Zea mays L). *Journal of Agricultural Ecology*, Volume 2, Issue 1, pp. 145.
2. Banziger M, De Meyer. J. (2002). Collaborative maize variety development for stress-prone environments in Southern Africa. In: Cleveland, D.A., Soleri, D. (Eds.), Farmers, Scientists and Plant Breeding: Integrating Knowledge and Practice. CABI, Oxon, UK, pp. 269-296.
3. Ihsan H, Khalil IH, Rehman H, Iqbal M.(2005).Genotypic Variability for morpHological traits among exotic maize hybrids. Sarhad *J. Agric*., 21(4): 599-602.
4. Griag, W. F. (1997). Production of hybrid seed corn. In: Spraque, G. F. (ed.)Corn and Corn Improvement. 2nd ed. American Society of Agronomy.Madison, Wisconsin, USA. pp. 671-719.
5. Khodabandeh, Naser. 1995. Cereals. Tehran University Press. Eighth Edition.
6. Khaje Poor Naser. (2000). Agriculture. Center of Tehran University Press.
7. Sadeghi, F.., Chokan, R. , (2009). Effect of planting date on hybrid maize Karaj 700 performance in humid region of Islamabad of Kermanshah. *Seed and Plant Journal*: Volume 24, pp. 235-221.
8. Cox WJ, Cherney DJR, Hanchar J.J .(1998).Row spacing, hybrid, and plant density effects on corn silage yield and quality. *J. Prod.Agr*., 11: 128-134.
9. Widdicombe WD, Thelen KD .(2002). Row width and plant density effects on corn grain production in the northern corn belt.*Agron. J.,* 94: 1020-1023.
10. Porter, P.M., Hicks, D.R., Lueschen, W.E., Ford, J.H., Warnes, D.D., and Hoverstad, T.R. (1997). Corn response to row width and plant density in the Northern Corn Belt. *J. Prod. Agric*. 10: 293-300.
11. Andrade, F.H., P. Calvino, A. Cirilo and P. Barberi, (2002).Yield responses to narrow rows depend on increased radiation interception. *Agron. J*., 94: 975-980.
12. Olson. R.A, Sander D.H .(1988).Corn production. In: Sprague, G.F., J.W. Dudley (eds.), Maize and Maize Improvement, 3rd edition, pp. 659-662. 18 Agron, Series, America, Society Agronomy, Madison.

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