ORIGINAL ARTICLE

The effect of aggregation on some quantitative and qualitative traits of new varieties of forage maize in Rey area

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ABSTRACT

This test has been done to study the effect of bush density on forge and some other morphological and physiological traits of some of new corn hybrids. Factorial experiment in a randomized complete block designed with three repetition, two factors (density and number) was performed in Saeed Abad village of Ray city . the factor number has four late maturated - type hybrid forage   (1 - NK Factor, 2 - Dracma G-4662, 3 - NK Gigantic and 4 - KSC 704) and includes four levels of density 80 thousand , 95 thousand , 110 thousand and 125 thousand were assess in hectare . The distances specified 70 cm between rows . The evaluated traits include of leaf area index , fresh performance of optical amortization coefficient and biological performance were measured . The result showed all the traits has been affected by implant density , so through increasing bush density characteristics of flag leaf , flag leaf length , and optical amortization coefficient were decreased , while biological yield, leaf area index increased. Interactions between experimental factors except leaf area index , biological yield and optical amortization coefficient of the other traits became meaningful . The highest index of fresh bush level weight and leaf obtained from density of 125 thousand plants in the same number. K.S.C. 704 allocate the highest biological function of the density 95000 , but in density of the digits 125000 Dracma G-4662, GiganticNK and KSC 704 don't have meaningful differences in terms of biological performance and were superior to the NK factor . In the density of 125 thousand plants Dracma G-4662 in terms of biological function (31/3 hectare) were grouped in the first category of Duncan. So if the goal simultaneously is to achieve the highest possible level of quality and quantity of forage , the amount of 125 thousand plants per hectare density Dracma G-4662 KSC is the most suitable alternative K.S.C. 704 for cultivation in Rey city .
Keywords: date of implant, forage maize , leaf surface index , optical amortization coefficient , biological function .

INTRODCTION

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].

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 land under cultivation increases. In order to reach

production with high quality and self-sufficiency it is neccessary to recognize effective factor for production and try to reach to their goals by using cultivation methods [4] .

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 [5].

Density of 75 thousand plants per hectare [6], 85 thousand to 95 thousand plants per hectare [7] , 90 thousand plants [8], 102700 plants per hectare [9] , 138 thousand plants [10] , 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].

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 1390, 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 1390, 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 digit 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 expriment 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.

Extinction coefficient: The amount of absorbed solar radiation by vegetation can be calculated using Beer's law . One of the main element of Beer's law was the extinction coefficient 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. Tto statistical analysis Minitab and SAS programs used and also to design the charts statistical Excel was used .

RESULTS AND DISCUSSION

Flag leaf length

Results of table (1) analysis of variance showed that the effect of seed density on leaf length in area %5 and effect of   digits also on Flag leaf length is meaningful in %1 area also Flag leaf length become meaningful by the effect of digit and density interaction in %1 area . digits Dracma G-4662, K.S.C 704 and NK Factor had highest flag leaf length that toward NK Gigantic has been significantly increased . The highest leaf density of 80 thousand plants per hectare achieved higher compression ratio which has been increased significantly. Figures NK Factor, Dracma G-4662 and NK Gigantic obtained highest rates of flag leaf length at the density of 80 thousand plants per hectare than toward other density levels , has increased significantly , while in the number of K.S.C 704 first surface density toward higher density , significantly decreased from the aspect of , flag leaf length (Table 2).

Leaf Area Index

Results of table (1) analysis of variance showed that the simple effect of density and the simple effect of digit on the surface of %1became meaningful and interaction   of digits in density did not become meaningful . Varieties in terms of LAI have been grouped into three distinct groups , in a way that digit K.S.C 704 in density of 125 thousand LAI 7/74 alone at the top of the Duncan grouping , figure NK Factor

in second and figures GiganticNK and Dracma G-4662 in third place situated . by looking to the table of averages comparison it is obvious there is a straight line relation between different area of density and indexes it means that by increasing plant leaf area LAI   significantly increased with an increasing trend . As obvious from the analysis of variance significant interaction between the experimental factors are not significant . This concept implies that all cultivars in response to different levels have the same density , so that the surface density of all cultivars , allocate the highest LAI that toward lower area had meaningful growth (table 2) .

Extinction coefficient

Results of table (1) analysis of variance showed that the effect of density on extinction coefficient and one percentage became meaningful also the simple effect of digit on percent level became meaningful. The interaction of digit was not significant in density. From the table it is concluded that the digits on the phase of extinction coefficient have been grouped into two categories, so Gigantic NK, Dracma G-4662 in the first category and K.S.C 704& NK Factor 704 and are in second place. In all cultivars with higher density levels and extinction coefficient is significantly reduced. There is an inverse linear relationship appears between levels (Table 2).

Fresh performance

Results of table (1) analysis of variance showed that in relationship with fresh performance that is only the effect of variety and density at the one percent level were significant, and their interaction was not significant. Figures K.S.C 704 and Dracma G-4662 both from fresh performance situated in Duncan grouping and toward two other digits has a meaningful growth.   With increasing plant density up to 110 thousand plants per hectare as well as fresh functionality has increased significantly, but between two last area of density observed no significant difference (Table 2).

Biological function

Results of table (1) analysis of variance showed that the simple effect of density on biological performance was significant. Figure K.S.C 704 with the highest biological yield was alone in the first category of Duncan grouping that toward three other digits under study has meaningful growth. Second density to the rest of them toward the first density level, in terms of biological function, has shown a significant increase. Since there is no differences between second density area and higher levels, thus separate from the number density of 95 thousand plants per hectare is optimal . According to average comparison table, the optimal density for K.S.C 704 Gigantic NK, 95 thousand plants per hectare, for NK Factor, 110 thousand plants for Dracma G-4662 80 thousand plants per hectare (table 2).

biological function	extinction coefficient	fresh performance	leaf area index	leaf length flag	Level of freedom	Source of changes
						Table 1 Analysis of variance of leaf length flag, leaf area index, fresh performance, extinction coefficient, biological function
74.49**	0.0903**	517.28**	12.68**	37.42*	3	Seed density
43/17*	0.0146**	86.80**	2.14**	131.91**	3	Digit
10/94n.s	0.001n.s	44.95n.s	0.115n.s	34/18**	9	Seed density * Digit
8.8	4.2	7.1	5.2	6.4	8.8	(%) Index changes
		respectively significant at 5% and 1 % levels** & *‹n.s without meaning				

Biological function	Extinction coefficient	fresh performance	leaf area index	leaf length flag	Experiment factor
					Table 2 the result of simple effect and interaction and density for leaf length flag, leaf area index, fresh performance, extinction coefficient, biological function
					Digit
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 * Digit
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.					

CONCLUSIONS

Result showed all the traits are being affected by implantation. Traits and extinction coefficient with increasing plant density had decreased, while traits, biological performance, fresh performance, leaf area index increased. Interactions between experimental factors except leaf area index, biological yield and extinction coefficient of the other traits were significant. Increase of number of plant in area unit in terms of the biological function significantly improved . Competition between plants for absorb active radiation photosynthetic increased therefore length and corn diameter and rate of chlorophyll content of flag leaf reduced . The highest rates of flag leaf chlorophyll obtained in density of 80 thousand, while corn leaf chlorophyll concentration only decreased to 125 thousand plants. High densities (110000 and 125000) due to tension of competition between plants the plant, numbers of kernels per row, and the whole number of grains per corn decreased. according to the importance of agronomic traits including corn number , seed number and seed weight , protein forage, leaf area index , fresh and biological yield performance in improvement the quality and quantity of forage , the results of this study revealed , figures Gigantic NK and Dracma G-4662 in the number density of 110 thousand plant on the aspect of protein traits on Factor NK and KSC 704 were dominant . Despite the lack of significant changes in traits such as protein content and seed weight in different density figure Gigantic NK, the figure can be assessed with high genetic potential by correction view .The highest values of LAI form KSC 704 digit , obtained   the densities of 80000 and 125000 respectively. K.S.C 704 The highest biological function of the density and the density of 95000 and devote next densities to its own , but the in density of 125000 digits Dracma G-4662, Gigantic NK and KSC 704 from biological function   doesn't have meaningful differences and were superior to NK factor .   If focused on obtaining the highest biological yield and yield components in low density and high quality are not considered K.S.C 704 in density of 95 thousand plants is the best option for implantation in this area .

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