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ORIGINAL ARTICLE

Studying of Planting Density on Yield of Maize (*Zea mays* L.)

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ABSTRACT

This study was conducted as factorial on the basis complete randomized block design with four replications for one year planting in 2010-2011 at Islamic Azad University Shahr-e-Qods Branch, Tehran, Iran. The factor of study included planting densities (70000, 90000, 110000 and 130000 plants/ha). The characters were measured consist of: corn length, dry biomass, number of grain in spot and 1000 seed weight. The results showed that the effect of planting densities was significant on spot length, dry biomass, number of grain in corn and 1000 seed weight in $P \leq 0.05$. Mean comparison showed that the highest corn length (18.74 cm), number of grain in corn (390.95) and 1000 seed weight (260.20 g) were achieved by 70000 planting density but the highest dry biomass (19.14 t/ha) was achieved by 130000 planting density.

Key words: Planting density, spot length, dry biomass, number of grain in spot, weight of 1000 grain and maize.

Introduction

Maize (*Zea mays* L.) is the most important food crop in Kenya with a national production of 2.4 million tons in a total area of 1.6 million hectares [7]. Shortage of maize in Kenya always results in famine among the poor urban and rural people. Optimum plant density is another important factor for high grain yield. Plant density is invariably linked with yield, the more plant stands there are up to a certain limit, the higher the expected yield [5]. The crop plants depend largely on temperature, solar radiation, moisture and soil fertility for their growth and nutritional requirements. A thick population crop may have limitations in the maximum availability of these factors. It is, therefore, necessary to determine the optimum density of plant population per unit area for obtaining maximum yields. Earlier studies reported that consistency of plant spacing was more important than total plant density [13]. Reducing plant density may also have implications on fiber quality, although Baker [1], Bridge *et al*. [4], and Hawkins and Peacock [10] reported that fiber length, strength, and elongation were unaffected by plant population. Micronaire tended to increase as population decreased [4,11]. In addition to changes in yield performance, cotton morphology can undergo drastic changes when plants are grown under varying plant densities and configurations. Previous research indicates that cotton plant height increases as population increases to a point, thereafter intraspecific competition between plants for water, space, light, and nutrients presumably limit plant height. The effects of plant density on kernel dimension were also identified during different panicle development stages [15,12,2,9,17]. Sezer and Yanbeyi [16] demonstrated that ear characteristics were negatively affected by increases in plant densities, although plant height, ear height and grain yield increased with increases in plant densities. This study was conducted to Studying of planting density on yield of maize (Zea mays L.).

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Materials and methods

This study was conducted as factorial on the basis complete randomized block design with four replications for one year planting in 2010-2011 at Islamic Azad University Shahr-e-Qods Branch, Tehran, Iran. The factor of study included planting densities (70000, 90000, 110000 and 130000 plants/ha). The characters were measured consist of: spot length, dry biomass, number of grain in spot and weight of 1000 grain.

Statistics Analysis:

Data were subjected to analysis of variance (ANOVA) using Statistical Analysis System (Spss) computer software at $P < 0.05$.

Results and discussion

Corn Length:

The results showed that the effect of planting densities was significant on corn length, in $P \leq 0.05$. Mean comparison showed that the highest corn dry weight (18.74 cm) were achieved by 70000 planting density and lowest corn dry weight (15.61 cm) were achieved by 130000 planting density. Also decreased spot dry weight by increasing planting density (Fig 4).

Dry Biomass:

The results showed that the effect of planting densities was significant on dry biomass, in $P \leq 0.05$. Mean comparison showed that the highest spot dry weight (19.14 t/ha) were achieved by 130000 planting density and lowest spot dry weight (13.93 t/ha) were achieved by 70000 planting density. Also increased spot dry weight by increasing planting density (Fig 2).

Nomber of Grain in Corn:

The results showed that the effect of planting densities was significant on number of grain in corn, in $P \leq 0.05$. Mean comparison showed that the highest number of grain in corn (390.95) were achieved by 70000 planting density and lowest number of grain in corn (359.30) were achieved by 130000 planting density. Also decreased spot dry weight by increasing planting density (Fig 3).

1000 Seed Weight:

The results showed that the effect of planting densities was significant on 1000 seed weight, in $P \leq 0.05$. Mean comparison showed that the highest 1000 seed weight (260.20 g) were achieved by 70000 planting density and lowest 1000 seed weight (241.15 g) were achieved by 130000 planting density.

Table 1: Means Comparison.

plant density (plant/ha)	corn length (cm)	dry biomass (t/ha)	number of grain in corn	1000 seed weight (g)
70000	18.74a	13.93b	390.95a	260.20a
90000	17.77b	15.68b	377.55b	252.10b
110000	16.30c	18.31a	368.65c	246.76c
130000	15.61c	19.14a	359.3d	241.15d

Means within the same column and factors, followed by the same letter are not significantly difference.

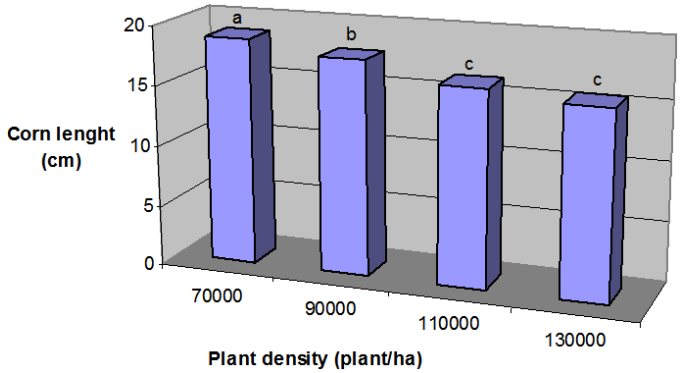

Fig. 1: Effect of plant density on corn length in maize.

Also decreased spot dry weight by increasing planting density (Fig 4).

El-Gengai and Abdallah [6] and Bianco *et al*. [3] reported significant effect of plant density on seed yield. Also, El-Gengai and Abdallah [6] and Bianco *et al*. [3] found that plant density had significant effect on plant height. Increasing plant density may mediate density-dependent effects by diminishing cosmetic encounters. Alternatively, high plant density can provide a safer habitat from predators, but may interfere with an organism's ability to disperse or find food [8]. Also [18] who found plants produced at highest densities were taller and more sparsely branches. On the contrary, Mohamed [14] reported

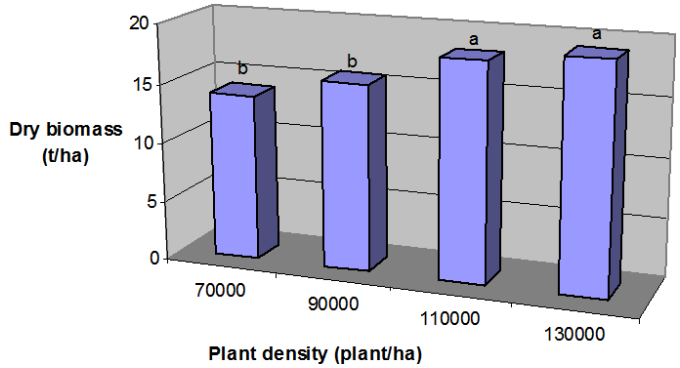

Fig. 2: Effect of plant density on dry biomass in maize.

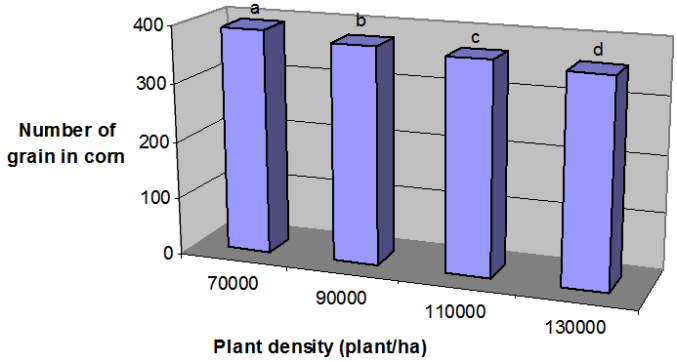

Fig. 3: Effect of plant density on number of grain in corn in maize.

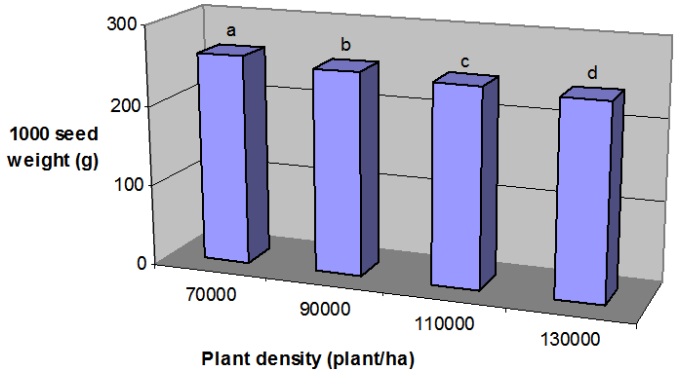

Fig. 4: Effect of plant density on 1000 seed weight in maize.

that plant population had no significant effect on plant height. Therefore, the use of high plant populations under limited water supply may increase plant water stress and dramatically reduce grain yield, especially if a water shortage coincides with the period of 2-3 weeks bracketing silking [19].

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