Effects of Planting Density on Some of Yield Parameters in 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: seed row, seed in row and corn tail flower length. The results showed that the effect of planting densities was significant on seed row, seed in row and corn tail flower length in P ≤ 0.05. Mean comparison showed that the highest seed row (16.7), seed in row (28.5) and corn tail flower length (7.4 cm) were achieved by 70000 planting density.

Key words: Planting density, seed row, seed in row, corn tail flower length and maize.

Introduction

Maize is one of the most important cereal crops grown in Iran. Maize or corn (Zea mays L.) is an annual grass belongs to the family Gramineae. The probable center of origin is the Central American and Mexico region. Maize has a wide range of plasticity to the environmental conditions. It is grown from latitude 58 N to 40 S on a range of 400 – 900 mm rain and temperature of 20- 30°C [2]. Maize is an important cereal food crop, and it ranks in the third position after wheat and rice in the world production of cereals [1]. The largest production countries in the world are USA, China, France, India, Canada, Argentina, Spain, Romania and Yugoslavia. The total world cultivated area is about 601.66 million hectares. The world productivity according to FAO statistics is about 4.2 tons per hectare. In the Sudan, Maize grown in small scales under rainfed conditions in Kordofan, Darfour, and Southern states, under irrigation in Northern States and under flood irrigation in Kassala State [3]. The total cultivated area of maize in the Sudan increased from 80 thousand hectares in 1989/91 to 187 thousand hectares in 1998. Average yield was 632 kg/hectare [4]. Many studies have suggested that crop density is related to sclerotinia stem rot incidence [5,6,7,8], but few have demonstrated this relationship in canola. Turkington et al., [9] found a positive relationship between canopy density and sclerotinia stem rot disease incidence over a six-year study period sampling hundreds of farmers’ fields. Some disease forecast models indicate that canopy density contributes to the development of sclerotinia stem rot. Sigvald et al., [6] created a computer-based sclerotinia stem rot prediction model, which included crop density as one of the major factors. Both size and density of a plant species are known to affect pollination and subsequent reproductive performance [10,11]. This study was conducted to effects of planting density on some of yield parameters in maize (Zea mays L.).

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: seed row, seed in row and corn tail flower length.

Statistics analysis:

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

Results and discussion

Seed row:

The results showed that the effect of planting densities was significant on seed row, in $P \leq 0.05$. Mean comparison showed that the highest seed row (16.7) were achieved by 70000 planting density and lowest seed row (14.45) were achieved by 130000 planting density (Table 1, Fig 1).

Seed in row

The results showed that the effect of planting densities was significant on seed in row, in $P \leq 0.05$. Mean comparison showed that the highest seed in row (28.5) were achieved by 70000 planting density and lowest seed in row (19.9) were achieved by 130000 planting density (Table 1, Fig 2).

Corn cob length

The results showed that the effect of planting densities was significant on corn tail flower length in $P \leq 0.05$. Mean comparison showed that the highest leaves corn tail flower length (7.4 cm) were achieved by 70000 planting density and lowest corn tail flower length (6.08 cm) were achieved by 130000 planting density (Table 1, Fig 3).

Yield increases with increasing plant density up to a maximum for a corn genotype and other plant species grown under a set of particular environmental and management conditions and declines when plant density is increased further [12,17,18,21]; Sharifmoghaddasi, and Omidi; [22]; Mir et al., [20]. Water availability is probably the most important uncontrollable factor affecting optimum plant density for maize grain yield under rainfed production systems [13]. Increasing plant density increases leaf area index and consequently water consumption [14]. Maize grain yield declines when plant density is increased beyond the optimum plant density primarily because of decline in the harvest index and increased stem lodging [15]. Turkington and Morrall [16] tried to establish the relationship between plant density and sclerotinia stem rot, finding that disease was inconsistently related to their measures of canopy density. This inconsistent relationship was attributed to the difficulty in quantifying crop density.

Table 1: Means Comparison

<table>
<thead>
<tr>
<th>plant density (plant/ha)</th>
<th>Seed row</th>
<th>Seed in row</th>
<th>Corn cob length (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>70000</td>
<td>16.7 a</td>
<td>28.5 a</td>
<td>7.3 a</td>
</tr>
<tr>
<td>90000</td>
<td>15.85 b</td>
<td>27.15 b</td>
<td>6.92 b</td>
</tr>
<tr>
<td>110000</td>
<td>14.65 c</td>
<td>24.1 c</td>
<td>6.35 c</td>
</tr>
<tr>
<td>130000</td>
<td>13.45 d</td>
<td>19.9 d</td>
<td>6.08 c</td>
</tr>
</tbody>
</table>

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

Fig. 1: Effect of plant density on seed row in maize.
Fig. 2: Effect of plant density on seed in row in maize.

Fig. 3: Effect of plant density on corn tail flower length in maize.

Reference


