

## **EFFECTS OF PLANTING DENSITY ON GROWTH AND FLOWERING OF THE AFRICAN MARIGOLD *Tagetes erecta* L.**

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### **ABSTRACT**

African marigold (*Tagetes erecta* L.) plants were planted 12x25, 25x30, 30x60 and 40x90 cm apart during 1991/1992 and 1992/1993 under the condition of Lahg Governorate, Yemen in order to study the effect of planting density on growth and flower characteristics of the plants. Results showed that increasing the planting spaces between plants over 12x25 cm resulted in significant increase in plant height, weight and flower production and quality. No significant increase in plant weight or flower production and quality were achieved when spaces between plants exceeded 30x60 cm.

### **INTRODUCTION**

Ornamental plants had been introduction to Yemen long ago on individual basis only. In the last twenty years, there has been a great interest in gardening and the use of ornamental plants in parks, streets, and resort areas. During this period, many nurseries, association and research centers dealing with import and cultivation of ornamental plants. Many ornamental plants still need basic research dealing with their success under the local conditions of different areas of Yemen. African marigold *Tagetes erecta* L. is a hardy summer annual and has showy flower with color orange range between yellow to deep orange. Doordium (1993) pointed out that corms of freesia were planted at 4 densities. Average stem weight of main stems and laterals increased with decreasing plant density. The aim of this experiment was to establish a proper spacing for this plant under the Lahg governorate conditions. Sujatht and Singh (1993) planted gladiolus at 15, 40, 60 or 80 corms/m<sup>2</sup> (with a distance of 20 cm between the rows in all cases). Growth and flowering characteristics generally decreased with increase in plant density.

### **MATERIALS AND METHODS**

The experiment was conducted during the two consequent season 1991/1992 and 1992/1993 at the nursery of horticulture department, Naser College of Agriculture, Lahg Governorate, Yemen. In both season, seeds were sown on the 27<sup>th</sup> November in boxes filled with mix consisted of 1:1 loamy soil: coarse sand (v:v). twenty days after emergence, seedling were transplanted to 3 x1 meter flower beds. Seedlings were planted at four different spacing 12x 25, 25x 30, 30x60 and 40x90 cm apart. Plants were watered as needed and were not fertilized throughout the experiment. Once a flower reached full opening state, it was picked by hand and its diameter was recorded. Four month after planting in the beds, plant height was recorded

and plants were cut at soil surface, dried in an oven for 48 hours at 70 °C, and their dry weight were measured. Each treatment (spacing) consisted of four replicates and each replicate had four flower beds (3x1 meters each). The experiment was designed in a Randomized Complete Block design. Data subjected to analysis of variance procedure to determine the magnitude of significance among treatments according to Snedecor and Cochran (1971).

## RESULTS AND DISCUSSION

Table 1 shows that increasing spaces between marigold from 12x25 to 25x30 cm resulted in significant increase when spacing between plants were larger than 25x30 cm. on the other hand each increase in the space between plants resulted in significant increase in dry weight of the plants. Growth habit of marigold plants is bushy in nature and, thus, increasing spaces between plants would result in more branching and vegetative growth and healthier plants. This was in accordance with the results obtained by Farina and Paterniani (1989) who reported that, chrysanthemum stem length increased with increasing plant density.

**Table 1: Effects of plant spacing on vegetative growth of *Tagetes erecta* L. plants**

Treatments	Plant height (cm)		Plant dry weight (g)	
	1991/1992	1992/1993	1991/1992	1992/1993
40x90 cm	53.3	46.5	134.3	128.3
30x60 cm	49.8	42.5	119	95
25x30 cm	50	41.8	84	69.2
12x25 cm	40.6	31.7	52	38.3
LSD (0.05)	9.1	6.7	7.9	5.8

Increasing plant spacing resulted in subsequent increase in flower production, diameter and weight (Table 2), which is a reflecting increase the vegetative growth and improving the health state of the plant. However, it is obvious from the data of Table that increasing spacing of the plant over 30x60 cm did not result in any significant increase in flower characteristics of the plant.

**Table 2: Effects of plant spacing on vegetative growth of *Tagetes erecta* L. plants**

Treatments	No. of flowers/plant		Flower diameter (cm)	
	1991/1992	1992/1993	1991/1992	1992/1993
40x90 cm	64	43.3	1.7	1.5
30x60 cm	42	39.2	1.5	1.5
25x30 cm	30	28	1.3	1.4
12x25 cm	17	17.2	1.2	1.3
LSD (0.05)	13.3	12	0.3	0.2

The result were increased with those obtained by Sujatha and Singh (1993) who stated that gladiolas flowering characteristics (including cut flower yields) generally decreased with in increase in plant density.

It could be concluded from previous results that, under the experiment conditions, the best and more realistic was 30x60 cm since plants were healthy and produced high number of flowers with good characteristics, and that any increase in spacing over 30x60 cm would not result in significant improve of plant height or flower characteristics.

## REFERENCES

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## تأثير كثافة الزراعه على النمو والتزهير فى القطيفه

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أجرى هذا البحث خلال موسمى ٩٢/٩١ و ٩٣/٩٢ فى مزرعه لحج باليمن وذلك لدراسه تأثير الزراعه على النمو ومواصفات الازهار للنباتات الناتجه وكانت مسافات الزراعه هى ١٢x٢٥، ٢٥x٣٠، ٣٠x٤٠، ٤٠x٦٠ سم. وقد اظهرت النتائج الآتى. زيادة مسافات الزراعه المتروكه بين النباتات عن ٢٥x١٢ سم زيادة معنويه فى ارتفاع النباتات ووزن وانتاج الازهار وجودتها. ولم يظهر اى زيادة معنويه من وزن النباتات او انتاج الازهار وجودتها عندما كانت المسافات المتروكه بين النباتات ٦٠x٣٠ سم.

أفضل مسافات بين النباتات كانت ٦٠x٣٠ سم حيث كانت النباتات قويه النمو وانتجت عدد أكبر من الازهار ومواصفات جيدة وأى زيادة عن هذه المسافات لا يؤدى الى زيادة معنويه فى تحسين ارتفاع النباتات او صفات الأزهار.

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