

# Influence of Spacing in Cut Chrysanthemum under Aeroponics system

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## ABSTRACT

Experiment on the effect of different spacing under aeroponic system for growth, yield and quality of cut chrysanthemum was conducted in Agricultural College and Research Institute, Madurai. In this study, five different varieties of chrysanthemum transplanted at spacing of 20 x 40 cm and 30 x 40 cm for evaluating the morphological and physiological characters viz., plant height, number of leaves, stem diameter, chlorophyll 'a', 'b', total chlorophyll, number of flowers per plant etc. Twenty five days old seedlings were transplanted. Significant differences was observed on all parameters.

*Keywords: Aeroponics, Chrysanthemum, Spacing, Growth, Yield and quality.*

## Introduction

Aeroponics is a method of growing plants in which the roots are hung in the air after being sprayed with a nutritional solution. These techniques are commonly utilized in the production of potatoes, tomatoes, chillies, and other vegetables, but they have not yet been used to flower crops. Commercial cutflowers include chrysanthemums, gerberas, anthuriums, and orchids, which are used to make bouquets and decorate stages. Since aeroponic system of cultivation was a new technology, there is a research needed to vary the planting distance in important flower crops. Chrysanthemum is one of the existing

top cut flower, it is necessary for conducting experiment on growing chrysanthemum in aeroponics with different planting distance.

## Materials and Methods

Chrysanthemum seedlings of five different varieties purchased from vaishnavi nursery, conoor. In an aeroponic system, five different varieties {Lorenzo [GC], Danta pink [PeC], Artiqueen [WC], Champagne yellow [YC], Dark Red [RC]} were transplanted at two different planting distance 20 x 40 cm and 30 x 40 cm.

Setup of planting board in aeroponic

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Plant shoots were inoculated in holes cut on a styrofoam sheet, and sprouting roots were dangling in the air in a normal aeroponics device. A black sheet used to line the chamber to help maintain the desired humidity and darkness. In aeroponics, plant cuttings were misted through nozzles that were evenly spaced and fastened into PVC pipes for nutrient solution supply.

**Growth and physiochemical characters analyzing**

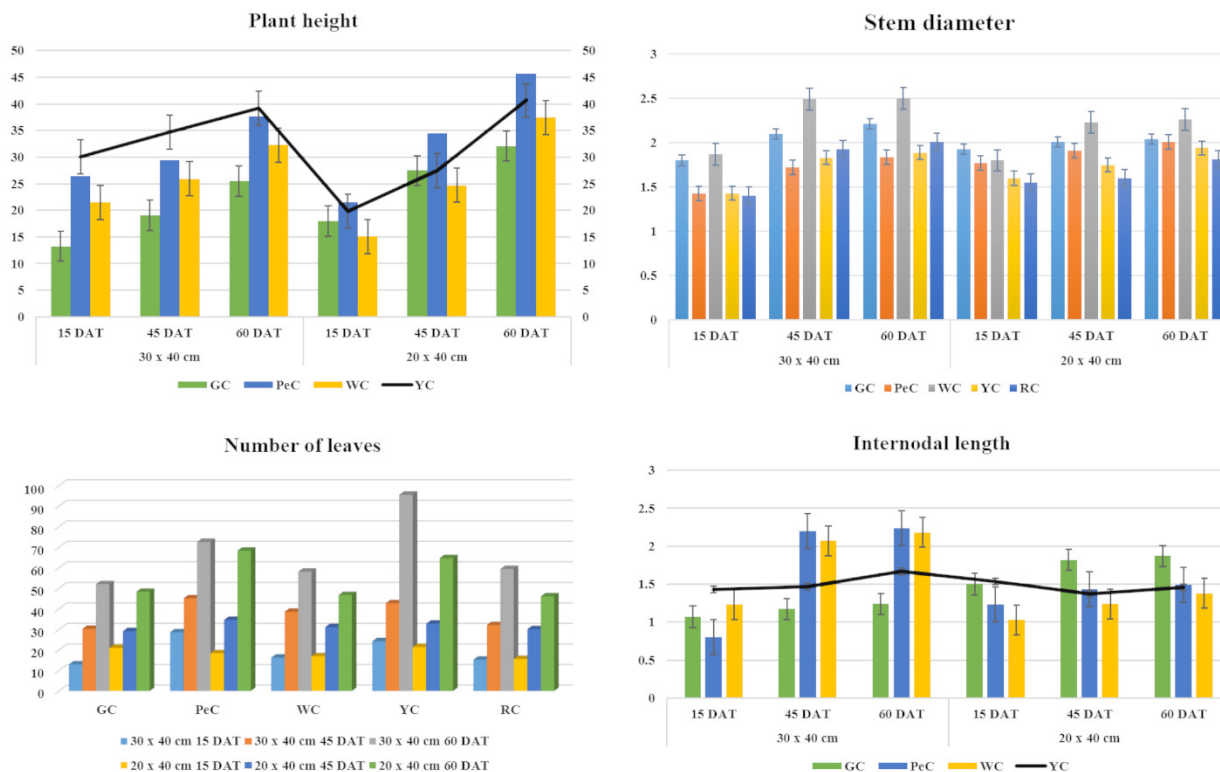
The plant height, number of leaves, stem diameter and internodal length were measured from the base of the plant to the terminal tip at the critical stages viz., peak juvenile, bud initiation and peak flowering stage. The observation was measured in each treatment and expressed in centimeter. Chlorophyll pigments were insoluble in water (hydropobic in nature) but soluble in organic solvents like acetone. 250 mg of fresh leaf sample was weighed and transferred to a pestle and mortar. The sample was macerated with 10 ml of 80% Acetone. The contents were centrifuged at 3000 rpm for 10 minutes. After centrifuge, the supernatants were collected and volume was made upto 25 ml using 80% Acetone. The

optical density (OD) was measured at 663 and 645 nm by a spectrophotometer for analyzing chlorophyll a, b and total chlorophyll by Yoshida *et al.*(1971).

**Results and Discussion**

**Growth parameters**

Observations were recorded for plant height at different intervals viz., 15 DAT, 45 DAT and 60 DAT and also plant height observed based on spacing. Among these intervals the highest plant height were recorded in YC (30, 34.67, 39.16 cm) and PeC (21.53, 34.42, 45.71 cm) at all intervals with spacing 30×40 cm and 20×40 cm as shown in Figure 1. The lowest plant height recorded in GC (13.27, 19.07, 25.43 cm) at all intervals with spacing 30×40 cm. Plants that were spaced closer together grew taller than those that were spaced farther apart. More plant height at closer spacing could be due to intense competition for light between plants, resulting in elongation of the main stem, or it could be due to the fact that plants tend to grow vertically when they were crowded due to the shadowing effect of the plants



**Fig. 1.** Differences in plant height, stem diameter, number of leaves and internodal length in spacing variation for different varieties

on one another. These results were in accordance with the findings of Karavadia and Dhaduk (2002) in annual chrysanthemum, Shivakumar (2000) in marigold. The highest stem diameter were observed in WC (1.87, 2.49, 2.5 cm) at all intervals with spacing 30×40 cm. In 20×40 cm spacing, GC (1.93 cm) has highest stem diameter at 15 DAT interval and WC (2.23, 2.26 cm) has highest stem diameter at 45 DAT and 60 DAT intervals (Figure 1).

Maximum number of leaves was recorded in PeC (28.67, 45.19 nos.) at 15 DAT, 45 DAT and YC (95.67 nos.) at 60 DAT with 30×40 cm. The minimum number of leaves was observed in GC (13.04, 30.33, 52.09 nos.) at all intervals with spacing 30×40 cm (Figure 1). Variation for number of leaves in cultivars was also observed previously in China aster by Poornima *et al.* (2006) and in gerbera by Battacharjee (1981). In *Ocimum gratissimum*, closer spacing recorded higher plant height than the wider spacing (Balyan and Sobti, 1990). The highest internodal length was observed in YC (1.43 cm) at 15 DAT and PeC (2.2, 2.24 cm) at 45 DAT and 60 DAT with spacing 30×40 cm. In 20×40 cm spacing, YC (1.53 cm) has highest internodal length at 15 DAT and GC (1.82, 1.87 cm) has highest internodal length at 45 DAT and 60 DAT intervals. The lowest internodal length was recorded in PeC (0.8 cm) at 15 DAT and GC (1.17, 1.24 cm) at 45 DAT and 60 DAT with spacing 30×40 cm as shown in Figure 1.

#### Flowering parameters, physiological and biochemical parameters

The highest and lowest number of flowers was recorded in GC (37.26, 45.68) and WC (7.34, 9.07) with both spacing 30×40 cm and 20×40 cm. The highest and lowest flower diameter was observed in WC

(6.11, 6.38) and GC (2.24, 2.07) with both spacing 30×40 cm and 20×40 cm as given in Table 1. Bhosale *et al.* (2012) recorded the average stalk length, diameter of flower and number of flowers /plant/ year were significantly superior in 30x 30 cm. PeC (2.592) and WC (2.366) has the highest chlorophyll 'a' content with spacing 30×40 cm and 20×40 cm respectively. The highest chlorophyll 'b' content was observed in GC (1.572) and PeC (2.592) with spacing 30×40 cm and 20×40 cm (3.714) and 20×40 cm (3.572) as shown in Table 1.

#### Conclusion

From this study, it showed that decreasing the spacing under aeroponic system increases morphological characters as plant height, root length, and also yield characters like number of flowers, etc. It suggests that spacing of 20 x 40 cm is better for chrysanthemum which growing under aeroponic system. Further study can be carried on influence of spacing which can also differ in uptaking of nutrients.

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**Table 1.** Effect of spacing in number of flowers/plant and flower diameter, chlorophyll 'a', 'b' and total chlorophyll content for different varieties

	No. of flowers per plant		Flower diameter		Total chlorophyll		Chlorophyll a		Chlorophyll b	
	30 x 40	20 x 40	30 x 40	20 x 40	30 x 40	20 x 40	30 x 40	20 x 40	30 x 40	20 x 40
	cm	cm	cm	cm	cm	cm	cm	cm	cm	cm
GC	22.39	25.73	2.24	2.07	3.00	2.23	1.43	1.45	1.57	1.43
PeC	37.26	45.68	3.57	2.74	3.69	3.14	2.59	2.24	1.10	2.59
WC	7.34	9.07	6.11	6.38	3.71	3.57	2.51	2.36	1.20	2.51
YC	29.49	34.51	3.85	3.28	3.17	2.96	2.22	2.11	0.94	2.23
RC	34.18	37.42	4.37	4.72	2.43	2.62	1.09	1.87	1.34	1.09
Mean	26.132	30.482	4.028	3.838	3.2	2.90	1.97	2.01	1.23	1.97
S.Ed	0.609	0.663	0.055	0.115	0.087	0.073	0.052	0.030	0.031	0.033
C.D (p=0.05)	1.375	1.497	0.125	0.260	0.196	0.164	0.118	0.067	0.070	0.074

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