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Effect of Spacing on Bio-chemical analysis of Hydrangea (*Hydrangea macrophylla* Thunb.) Cut Flower under Protected Cultivation

M. P. Yashaswini¹, S. K. Nataraj², Narayana S. Mavarkar³, P. Hemanth Kumar⁴,
N. Sudharani⁵, Yoshita Shrikrishna Shastri⁶ and V.S. Shivani⁷

^{1,2,4,7}Department of Floriculture and Landscape Architecture, College of Horticulture, Mudigere 577 132, Karnataka, India

³Department of Agronomy, College of Horticulture, Mudigere 577 132, Karnataka, India

⁵Department of Home Science, ICAR-KVK, Shivamogga 577 201, Karnataka, India

⁶Department of Vegetable Science, College of Horticulture, Mudigere 577 132, Karnataka, India

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ABSTRACT

The present investigation was conducted in the Naturally Ventilated Polyhouse at College of Horticulture, Mudigere during the year 2022-23. The experiment was laid out in Randomized Complete Block Design (RCBD) comprising of five treatments with four replications *i.e.*, treatment T₁ (30 × 30 cm), T₂ (30 × 45 cm), T₃ (30 × 60 cm), T₄ (45 × 45 cm), T₅ (45 × 60 cm). Results revealed the significant differences among different spacings, the highest amount of chlorophyll a (1.26 mg/g of fresh leaf sample), chlorophyll b (0.94 mg/g) and total chlorophyll content (2.20 mg/g) were recorded in plants spaced at 45 × 45 cm. Hence, treatment 45 × 45 cm spacing proved best in bio-chemical analysis of Hydrangea cut flower.

Key words: Hydrangea, Spacing and chlorophyll content

Introduction

Hydrangea (*Hydrangea macrophylla* Thunb.) cut flower is a novel crop. The generic name Hydrangea is derived from the two Greek words hydro means 'water' and aggeion means 'vessel'. It is regarded as pH indicator plant, belongs to family Hydrangeaceae.

It is a temperate shrub with huge inflorescence, commercially propagated by terminal cutting. In India, there is a huge potential for growing excellent quality hydrangeas particularly in cool and moist regions. These commercially grown hydrangeas under protected cultivation makes excellent cut

flowers besides pot plants. The cut flowers of hydrangea are in great demand by the florists especially for preparing the wedding bouquets.

To study the effect of different spacings on bio-chemical parameters of hydrangea an attempt was made to analyse it, as this is novel crop in India.

Materials and Methods

The present investigation was carried out in the NHM Naturally Ventilated Polyhouse of Department of Floriculture and Landscape Architecture, College of Horticulture, Mudigere, Karnataka during 2022-23.

(^{1,6,7}PG Scholar, ^{2,4}Assistant Professor, ³Dean (Hort.) and Professor, ⁵Assistant professor and Scientist)

The statistical design used was Randomized Complete Block Design (RCBD) with five number of treatments *i.e.*, T₁ (30 × 30 cm), T₂ (30 × 45 cm), T₃ (30 × 60 cm), T₄ (45 × 45 cm), T₅ (45 × 60 cm) replicated thrice. Raised bed was prepared for planting with recommended dose of fertilizers was 80:30:50 g of NPK per m².

Procedure

The total chlorophyll content in leaves was measured at grand vegetative growth stage by using DMSO as suggested by Shoaf and Lium (1976).

Fresh and fully matured fourth leaf from the top of the plant were brought to the laboratory in ice box from the research field and were cut into small pieces. A known weight of the sample (100 mg) was incubated in 7.0 ml of dimethyl sulfoxide in dark condition 24 hours.

After the incubation, the supernatant was collected by decanting and leaf tissue was discarded. Then the volume of the supernatant was made up to 10 ml using dimethyl sulfoxide (DMSO). The optical density of the extract was measured at 645 and 663 nm using dimethyl sulfoxide as blank in a spectrophotometer (UV Visiscan 167).

The total chlorophyll content was calculated by using formulae given below and expressed as mg per g fresh weight.

$$\text{Chlorophyll-a} = [12.7(A_{663}) - 2.69(A_{645})] = \frac{V}{1000 \times W \times a} \text{ (mg/g fr.wt.)}$$

$$\text{Chlorophyll-b} = [22.9(A_{645}) - 4.68(A_{663})] = \frac{V}{1000 \times W \times a} \text{ (mg/g fr.wt.)}$$

$$\text{Total Chlorophyll} = [20.2(A_{645}) + 8.20(A_{663})] = \frac{V}{1000 \times W \times a} \text{ (mg/g fr.wt.)}$$

Where,

A = absorbance at specific wavelengths (645 nm and 663 nm)

V = Volume of the extract (10 ml)

W = Fresh weight of the sample (100 mg)

a = Path length of the light in the cuvette (1 cm)

Results and Discussion

Effect of spacing on biochemical parameters of hydrangea

Chlorophyll content (mg/g of fresh weight)

The data recorded on chlorophyll content is presented in Table 1. Among the different treatments, T₄ (45×45 cm) recorded significantly higher chlorophyll a, b and total chlorophyll content (1.26, 0.94 and 2.20 mg/g respectively) which was followed by treatment T₅ (45×60 cm) *i.e.*, 1.01, 0.81 and 1.82 mg per g fresh weight, respectively. Whereas, the treatment T₁ (30×30 cm) recorded minimum level of chlorophyll content *i.e.*, 0.67, 0.37 and 1.04 mg per g fresh weight respectively.

The maximum chlorophyll content in 45×45 cm might be due to sufficient availability of nutrients and their absorption by the plants with better photosynthetic activity due to proper light and spacing between the plants which found more greener under this spacing. The total chlorophyll content was also found to be minimum under closer spacing of treatment T₁ (30×30 cm). This was due to shading effect to lower canopy of plants, causing poor transmission of the photosynthetically active radiation (PAR). These results are in conformity with Sushma *et al.* (2012) in heliconia, Naik *et al.* (2017) in ornamental sunflower, Kavya *et al.* (2022) in lupin and Banu *et al.* (2022) in tuberose.

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Table 1. Effect of different spacing on chlorophyll content of hydrangea (*Hydrangea macrophylla* Thunb.)

Tr. No.	Spacings	Chlorophyll a(mg/g)	Chlorophyll b(mg/g)	Total chlorophyll content (mg/g)
T ₁	30 × 30 cm	0.67	0.37	1.04
T ₂	30 × 45 cm	0.81	0.46	1.27
T ₃	30 × 60 cm	0.88	0.51	1.39
T ₄	45 × 45 cm	1.26	0.94	2.20
T ₅	45 × 60 cm	1.01	0.81	1.82
S. Em±	0.01	0.02	0.05	
CD @ 5%	0.03	0.08	0.09	

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Conflict of Interest

The authors have declared that no conflict of interest exists.

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