

# VALUE ADDITION OF CUT FLOWERS OF GARLAND CHRYSANTHEMUM (*GLEBIONIS CORONARIA*) BY TINTING WITH ARTIFICIAL FOOD DYES

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**Abstract**—Value addition is a method of increasing the economic value of a product. Different value addition techniques are used in horticultural products to increase its economic value, especially in floricultural products. Tinting is one of the value addition techniques used in cut flowers to increase the economic and aesthetic value of simple white and light coloured flowers with food colouring dyes in different novel colour shades. The study “Value addition of cut flowers of garland chrysanthemum (*Glebionis coronaria*) by tinting with artificial food dyes” was conducted in laboratory of Department of Horticulture, Assam Agricultural University, Jorhat, Assam during February 2022, with seven treatments. The observations like Time taken for tinting, Solution uptake, Colour intensity, Aesthetic appeal and vase life were recorded. Colour intensity of the tinted flower colour was compared using the Royal Horticultural Society (RHS) Colour Chart. Chocolate food colour dye took the earliest time for full tinting (2.43 hr) and Raspberry red took the longest time for full tinting (3.10 hr). The most aesthetically appealing colours were observed on flowers tinted with Lemon yellow, Apple green and Raspberry red. Longest vase life was observed in control (7.6 days) followed by Lemon yellow (4.3 days). Chocolate and Green observed the lowest vase life (2 days). Cut flowers dyed with Lemon yellow recorded the best vase life among the different food dyes.

## INTRODUCTION

Floriculture is one of the important income generating sector in horticulture. In floriculture value addition is gaining much importance in today's modern world due to its aesthetic and economic value. Value addition is an important technique for increasing the economic value of the horticultural products. In floriculture, value added products are like garlands, veni, gajra, bouquets, corsage, boutonnieres, etc. Value addition can increase the value of flowers up to 10 times. Tinting is one of the value addition methods in flowers. Tinting is a quick and effective method of obtaining eye catching cut flowers of various attractive novel colours to enhance the aesthetic and economic value of white and light-coloured flowers. Normally in nature pigments are responsible for the development of flower colour. The major plant pigments that are responsible for flower colour are flavonoids, anthocyanin, carotenoids, betalains and chlorophylls (Kumari *et al.*, 2017). Tinting is done in

flowers where the flowers are devoid of any coloured pigments. Tinting helps us to modify the flower colour according to our desired colour shade. The synthetic food coloured dyes are used for tinting of cut flowers. In market different certified synthetic food dyes are available in liquid and powder form and both can be used for tinting of flowers. Chemical food dyes such as tatzazine, brilliant blue, sunset yellow, carmoisine are used for tinting of flowers (Kumari and Deb, 2018). Certified synthetic food dyes are less expensive and lead to minimum health hazards by imparting an intense and uniform colour (Jain *et al.*, 2015). Flowers coloured with food dyes intensify the visual appearance as well as enhance the economic value (Kashyap *et al.*, 2022).

*Glebionis coronaria* also known as garland chrysanthemum is a herbaceous annual winter flowering plant belongs to the family Asteraceae that produces attractive single and double types of white and yellow flowers which are used as loose and cut flowers. The aesthetic appeal and economic

value of the double type white flowers of garland chrysanthemum can be enhanced by tinting with various artificial food dyes of different novel shades. Tinting of these white coloured can really enhance the value of the flowers and helps the farmer from earning more from their produce (Kumari and Deb, 2018). An experiment is carried out in garland chrysanthemum (*Glebionis coronaria*) cv. Shubhra with double white flowers to study the capacity of the flower to absorb and retain different food colour dyes and effect on quality and vase life of cut flowers.

Tinting is being done in many other flowers especially rose, tuberose, carnation, gladiolus, chrysanthemum etc. In roses and carnation, a multi coloured tinting experiment was conducted with 5% dye concentration with an objective to achieve two colours in a single flower at a time (Sowmeya *et al.*, 2017). Gladiolus tinted at tight bud stage (1-2 basal florets show colour) by food dyes showed the higher vase life (Kumar *et al.*, 2014). In tuberose many tinting experiments have been conducted (Kumari and deb, 2018; Pavan *et al.*, 2022; Kumari *et al.*, 2018; Jain *et al.*, 2015; Kashyap *et al.*, 2022). Chrysanthemum, tuberose and lilium tinted with blue, green and orange dyes for 10 hrs resulted in attractive flowers with maximum consumer preference (Pavan *et al.*, 2022). *Gypsophilla* dyed with 3% lemon yellow colour dye recorded the maximum vase life of 5 days (Jyothi *et al.*, 2022). Tinting alters the original vase life of the cut flower due to the presence of chemical compounds in the coloured dyes.

## MATERIALS AND METHODS

The investigation was conducted in the laboratory, Department of Horticulture, Assam Agricultural University, Jorhat, Assam during February, 2022. The study was conducted in Completely Randomised Design (CRD). The experiment consisted of seven treatments with three replications. The treatments were 10% concentration of synthetic food dyes viz., T<sub>1</sub>: Chocolate, T<sub>2</sub>: Apple green, T<sub>3</sub>: Green, T<sub>4</sub>: Orange red, T<sub>5</sub>: Lemon yellow, T<sub>6</sub>: Raspberry red and T<sub>7</sub>: Distilled water as control. The half bloomed cut flowers were harvested early in the morning from the Experimental Farm, Department of Horticulture, Assam Agricultural University, Jorhat and immediately brought to the laboratory. The stalks were cut at 20 cm length and the stem ends of cut flowers were kept continuously

dipped in the conical flask containing 100 ml dye solutions till it shows senescence symptoms (bent neck, wilting of petals). 2 cut flowers were dipped in each 100 ml solutions. The observations such as time taken for full tinting, colour intensity, dye uptake, aesthetic appeal and vase life were recorded. Tinted flower colour was compared using the Royal Horticultural Society Colour Chart and colour intensity was coded (Kumar *et al.*, 2014).

## RESULTS AND DISCUSSION

### Time taken for tinting

Data for the effect of food dyes on the time taken for tinting of cut flowers of *Glebionis coronaria* are given in Table 1. The treatment containing T<sub>1</sub> Chocolate colour food dye recorded the earliest time taken for tinting to start, i.e. 17 min. T<sub>6</sub> Raspberry red has taken the longest time for tinting to start, i.e. 22.33 min. T<sub>1</sub> Chocolate dye recorded the earliest time taken for full tinting, i.e. 2.43 hr followed by T<sub>3</sub> Green dye, i.e. 2.5 hr. T<sub>6</sub> Raspberry red took the longest time for full tinting, i.e. 3.1 hr. Different colours depending on the colour characteristics have taken different timings for tinting. Similar results were recorded by Kumari *et al.* (2018) in tuberose.

**Table 1.** Effect of food dyes on the time taken for tinting of cut flowers

Dyes	Tinting started within (mins)	Time for full tinting (hrs)
T <sub>1</sub> Chocolate	17.00	2.43
T <sub>2</sub> Apple green	19.33	2.60
T <sub>3</sub> Green	18.33	2.50
T <sub>4</sub> Orange red	20.66	2.90
T <sub>5</sub> Lemon yellow	21.33	2.90
T <sub>6</sub> Raspberry red	22.33	3.10
S.Ed(±)	1.18	0.15
CD (0.05)	2.61	0.33

### Solution uptake

Data for the effect of different food dyes on the solution uptake of cut flowers of *Glebionis coronaria* are given in Table 2. The solution uptake with 24hrs, 48hrs and total uptake in different treatments showed the non-significant effect.

### Vase life

Data for effect of food dyes on the vase life of cut flowers of *Glebionis coronaria* are given in Table 3. T<sub>7</sub> Distilled water (Control) recorded the maximum

**Table 2.** Effect of food dyes on the solution uptake of cut flowers.

Treatments	Solution uptake within 24 hrs (ml)	Solution uptake within 48 hrs (ml)	Total solution uptake (ml)
T <sub>1</sub> Chocolate	13.33	8.867	22.20
T <sub>2</sub> Apple green	14.00	8.83	22.83
T <sub>3</sub> Green	13.50	9.66	23.16
T <sub>4</sub> Orange red	13.83	8.66	22.50
T <sub>5</sub> Lemon yellow	14.33	9.5	23.83
T <sub>6</sub> Raspberry red	13.33	8.76	22.10
T <sub>7</sub> Distilled water (Control)	14.00	9.00	23.00
S.Ed(±)	0.71	0.34	0.81
CD (0.05)	NS	NS	NS

**Table 3.** Effect of food dyes on the vase life of cut flowers.

Treatments	Vase life(Days)
T <sub>1</sub> Chocolate	2.00
T <sub>2</sub> Apple green	2.30
T <sub>3</sub> Green	2.00
T <sub>4</sub> Orange red	3.30
T <sub>5</sub> Lemon yellow	4.30
T <sub>6</sub> Raspberry red	3.80
T <sub>7</sub> Distilled water (Control)	7.60
S.Ed(±)	0.37
CD (0.05)	0.79

vase life, i.e. 7.6 days followed by T<sub>5</sub> Lemon yellow dye, i.e. 4.3 days. T<sub>1</sub> Chocolate and T<sub>3</sub> Green dye recorded the lowest vase life, i.e. 2 days. Similar results were recorded by Jyothi *et al.* (2022) in gypsophila. Vase life of coloured food dyes was less than that of controlled treatment due to accelerated ion leakage (Singh *et al.*, 2009). Vase-life of food dye treatments is lowered than that of control due to toxic effect of artificial food dyes on the cell metabolism (Kumari and Deb, 2018).

**Fig. 1.** Top row from left to right Apple green, Green, Raspberry; Bottom row from left to right Chocolate, Lemon yellow, Orange red**Table 4.** Effect of food dyes on the colour intensity and aesthetic appeal of cut flowers

Treatments	Colour intensity	Aesthetic appeal (Score 1-10)
T <sub>1</sub> Chocolate	180C-Brown red	7.4
T <sub>2</sub> Apple green	149B-Light green	8.5
T <sub>3</sub> Green	140B-medium green	7.3
T <sub>4</sub> Orange red	30A-Orange red	7.0
T <sub>5</sub> Lemon yellow	12A-medium yellow	8.8
T <sub>6</sub> Raspberry red	51A-Red pink	8.3
T <sub>7</sub> Distilled water (Control)	155C-White	7.6
S.Ed(±)	-	0.073
CD (0.05)	-	0.15

### Colour intensity and aesthetic appeal

Data on the effect of food dyes on the colour intensity and aesthetic appeal of cut flowers of *Glebionis coronaria* are given in Table 4. The colour intensity of the tinted flowers are observed using the Royal Horticultural Society Colour Chart and based on the visual appearances of the tinted flower the score (110) was given. T<sub>5</sub> Lemon yellow scored the highest in aesthetic appeal, i.e. 8.8 followed by T<sub>2</sub> Apple green, i.e. 8.5. T<sub>7</sub> Orange red scored the lowest aesthetic appeal, i.e. 7.0.

### CONCLUSION

The results showed that the flowers dyed with Lemon yellow dye got the best vase life among the different food dyes as well as the aesthetic value. The use of artificial food dyes in tinting can enhance the value of the simple light and white coloured cut flowers. Tinting of flowers are very useful where the colourful flowers are not available are required for immediate use in some flower arrangements.

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