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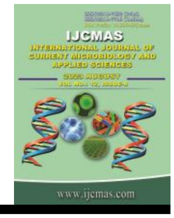

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Influence of Post-harvest Chemical Treatments on Shelf Life of Crossandra

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A B S T R A C T

The experiment was conducted at College of Horticulture, Munirabad, Koppal district Karnataka with an object to study the post harvest studies in Crossandra which was carried out under lab condition during the year 2020-21 comprising of nine treatments with three replications and design adopted was CRD. The details of chemical treatments includes T_1–Sucrose – 2 %, T_2–Sucrose – 4 %, T_3- Boric acid – 2 %, T_4- Boric acid – 4 %, T_5– Aluminium sulphate - 2 %, T_6-Aluminium sulphate – 4 %, T_7– Ascorbic acid 100 ppm, T_8- Ascorbic acid 200 ppm, T_9- Control. The results indicated that spraying of ascorbic acid @ 200 ppm directly to flowers enhanced shelf life of Crossandra.

Introduction

Crossandra is a small, evergreen ornamental shrub producing beautiful flowers throughout the year. It is a short branching perennial shrub which grows to an height of about 30 to 90 cm. Leaves are generally opposite, narrow and oval in shape having more or less wavy margins, lustrous and pointed at the end.

Flowers are showy with bright orange and salmon to scarlet in colour. The flowers are having unusual shapes with three to five asymmetrical petals. They are borne in a large densely packed spike. The spikes are 7.5 to 12.5 cm long and four-sided (Ashwath *et al.*, 2007). The inflorescence is hairy and florets grow from four-sided stalked spikes with prominent bracts. The individual flower consists of a long slender tube of about 2.5 cm which terminates in a five lobed limb.

The calyx is also five lobed and irregular with usually four stamens. The corolla is cylindrical, more or less curved, and the stamens are fringed and four in pairs. Crossandra is also known as ‘firecracker plant’ due to the cracking sound heard during splitting of the seed pods upon drying

(Gowthami *et al.,* 2017). It has a remarkable range of colours varying from orange, pink, red, yellow and double coloured blue types with a white throat. The genus crossandra comprises of 52 species and is distributed in tropical and sub-tropical regions of the world such as South Asia, South America, South Africa, Madagascar and Arabia, and in the Indian subcontinent. Some species belonging to the genus crossandra are *C. nilotica* (suitable for partial shade), *C. flava* (unbranched shrubs with bright yellow flowers) and *C. guinensis* (suitable for both partial and sunny situations).

Orange crossandra (2n=40) sets seeds profusely, breeds true and produces bright orange-coloured flowers. The cultivar Delhi crossandra (2n=30) produces more attractive flowers of bright deep orange colour. Lutea Yellow is a tetraploid (2n=40) and hardy cultivar which possesses a high degree of tolerance to nematodes (Rahul, 2017).

Even though the flowers lack fragrance, they are widely used in garlands with jasmine to produce charming colour contrasts. It requires warm humid areas for its cultivation with an average temperature ranging from 20 $^{\circ}$C to 32 $^{\circ}$C. Even though crossandra can be cultivated in a wide range of soils, loamy soil with pH 6 to 6.7 is ideal (Ashwath *et al.*, 2009).

Crossandra flowers are very delicate and tend to lose their freshness and quality during transportation and handling. The shelf life of crossandra mainly depends on the physiological loss of weight and moisture per cent during storage. High temperature and low relative humidity in the Northern dry zone of Karnataka further accelerate the senescence of flowers after harvest. Suitable postharvest treatments and packages were required to enhance the storage life of flower by retaining the freshness.

Materials and Methods

The experiment was conducted at College of Horticulture, Munirabad, Koppal district with 9 treatments, 3 Replications and design adopted was CRD. The research work was carried out under lab conditions. The details of the chemical treatments includes T_1 –Sucrose – 2 %, T_2–Sucrose – 4 %, T_3-Boric acid – 2 %, T_4- Boric acid – 4 %, T_5–Aluminium sulphate - 2 %, T_6-Aluminium sulphate – 4 %, T_7– Ascorbic acid 100 ppm,T_8- Ascorbic acid 200 ppm,T_9- Control.

The physiological loss of weight in every packing material was computed by subtracting weight of flowers from its initial weight and expressed in percentage. The initial weight for each treatment and replication was 10 grams, Visual observation was carried out to know the preference of the consumer on flowers at every twelve hours intervals. It was evaluated by rating out of five as mentioned below.

*****5- Excellent, ****4-Very good, *** 3- Good, **2-Average, *1 - Poor.

Statistical analysis includes the experiment was arranged in completely randomized design (CRD) with three replications. Analysis of variance of different variables was carried out to know the degree of variation amongst all the treatments. The data were analyzed by the methods as suggested by Panse and Sukhatme (1985).

Results and Discussion

Physiological loss of weight

Physiological loss in weight was significantly lower values (39.1 %, 41.7%, 45.6 %, 58.3 %, 60.9 % and 77.5 % at 12 hrs., 24 hrs., 36 hrs., 48 hrs., 60 hr. and 72 hrs. respectively) in flowers treated with ascorbic acid @ 200 ppm (T_8) which was lower than all other treatments, whereas the highest physiological loss of weight was recorded with (T_9) (31.8 %, 34.2 %, 44.0 %, 65.8 %, 68.2 % and 88.2 % at 12 hrs., 24 hrs., 36 hrs., 48 hrs., 60 hrs. and 72 hrs, respectively) in water sprayed control treatment. After 72 hrs of chemical treatment of ascorbic acid @ 200 ppm showed lowest loss of flower weight (77.5%) and highest loss was observed in control (88.2%) (Table 01).

Table.1 Effect of different chemical treatments during ambient storage condition on physiological loss of weight (%) and shelf life of Crossandra flowers cv. Koppal Local

Treatments	Physiological loss of weight (%)						
	12 hr	24 hr	36 hr	48 hr	60 hr	72 hr	Shelf life (hr)
T_1 – Sucrose @ 2 %,	35.5	38.2	40.0	61.8	64.5	80.5	36.00
T_2 – Sucrose @ 4 %,	35.2	37.9	39.9	62.1	64.8	81.5	38.00
T_3 - Boric acid @ 2 %	31.0	32.4	47.4	65.7	69.0	85.0	39.33
T_4 - Boric acid @ 4 %	25.3	32.5	53.0	67.23	74.7	86.0	26.33
T_5 – Aluminium sulphate @ 2 %	34.9	37.4	38.2	62.6	65.1	83.2	34.67
T_6 - Aluminium sulphate @ 4 %	36.2	38.9	45.1	61.1	63.8	80.1	30.33
T_7 – Ascorbic acid @ 100 ppm	34.8	37.5	38.0	60.5	63.2	79.2	40.33
T_8 - Ascorbic acid @ 200 ppm	39.1	41.7	45.6	58.3	60.9	77.5	42.33
T_9 – Control	31.8	34.2	44	65.8	68.2	88.2	28.67
S. Em. $\pm$	**1.45**	**1.65**	**2.22**	**1.79**	**1.77**	**1.99**	**1.94**
CD @ 5 %	**4.37**	**4.96**	**6.67**	**5.37**	**5.32**	**5.99**	**5.84**

Table.2 Influence of different chemical treatments on sensory score values for consumer acceptance of crossandra cv. Koppal Local

Treatments	At different hours interval					
	12 hours	24 hours	36 hours	48 hours	60 hours	72 hours
T_1 – Sucrose @ 2 %,	4.8	4.2	3.8	3.0	2.2	1.0
T_2 – Sucrose @ 4 %,	4.5	4.0	4.0	3.1	2.5	1.2
T_3 - Boric acid @ 2 %	4.3	4.0	3.6	2.5	1.8	1.0
T_4 - Boric acid @ 4 %	4.0	3.7	3.0	2.0	1.0	1.0
T_5 – Aluminium sulphate @ 2 %	4.0	3.8	2.8	2.5	2.0	1.0
T_6 - Aluminium sulphate @ 4 %	4.5	4.0	3.0	2.7	2.0	1.2
T_7 – Ascorbic acid @ 100 ppm	4.3	4.0	3.8	3.0	2.5	1.0
T_8 - Ascorbic acid @ 200 ppm	4.7	4.5	4.0	3.2	2.8	1.5
T_9 – Control	3.9	3.7	2.7	2.5	1.0	1.0

Shelf life

The data presented in Table 21 revealed that, the flowers treated with ascorbic acid @ 200 ppm (T_8) recorded maximum shelf life (42.33 hours) and was followed by ascorbic acid @ 100 ppm (T_7) (40.33 hours), whereas control (T_9) recorded the minimum shelf life (28.67 hours) of flowers.

Sensory scoring was done by different consumers represented for 12 hrs, 24 hrs, 36 hrs, 48 hrs, 60 hrs and 72 hrs in Table 22. The score at 12 hrs was higher in the treatment T_1 -Sucrose – 2 % (4.80), whereas T_9 - control obtained the lowest score (3.90), where as the treatment T_8 - Ascorbic acid 200 ppm obtained maximum score (4.5%) and lowest score for T_4 - Boric acid @ 4 % (3.70 %)and T_9 - Control (3.70 %) at 24 hrs.

The score at 36 hrs was highest in treatment T_8 - Ascorbic acid @ 200 ppm (4.0) and T_2 - Sucrose @ 4 % (4.0) and the lowest in T_9 - control (2.70), while at 48 hrs and 60 hrs the score was highest for the treatment T_8 - Ascorbic acid @ 200 ppm obtained maximum score (3.20 and 2.80, respectively) and lowest in T_9 -control (2.50 and 1.0, respectively) while at 72 hrs the score was highest for the treatment T_8 - Ascorbic acid 200 ppm obtained maximum score (1.50 %) followed by T_2 - Sucrose @ 4 % (1.20) and T_6 - Aluminium sulphate 4 % (1.20 %),while it was low in other treatments. The variation in shelf life has been observed across the varieties.

The low respiration infers the ability of flower to minimize water loss and maintain water content through active metabolic process. Ascorbic acid might be lowering the respiration rate and ethylene synthesis.

The low respiration infers the ability of flower to minimize water loss and maintain water content through active metabolic process. Shelf life of different chemicals was observed and Similar results were earlier observed by Krishnamoorthy (2021) in gerbera and Rakesh *et al.,* (2022) in gaillardia. Ascorbic acid might be lowering the respiration rate and ethylene synthesis. The low respiration infers the ability of flower to minimize water loss and maintain water content through active metabolic process. Spray of ascorbic acid @ 200 ppm directly to flowers enhanced shelf life of crossandra.

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