

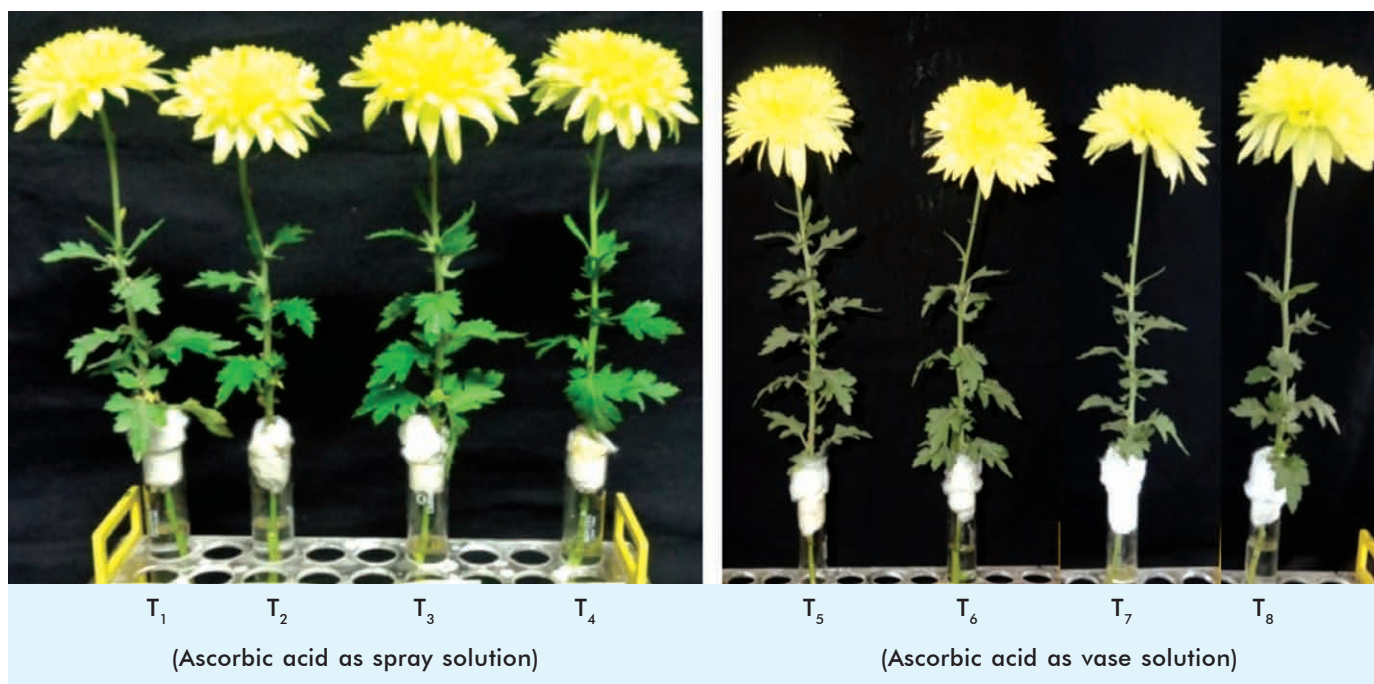
Ascorbic acid for reducing foliage discoloration in cut chrysanthemum

Owing to the steady increase in demand of flowers, floriculture has become one of the important commercial businesses in horticulture. Chrysanthemum is one of the topmost cut flowers earning high domestic as well as export value. Post-harvest management of cut flowers is very important to enhance their vase life and keep them attractive for a longer time after consumers purchase. Early wilting and yellowing of leaves are major problem resulting in loss of quality in chrysanthemum. Studies have proved the application of ascorbic acid as chemical preservative against foliage discoloration and petal wilting in liliun, red ginger, rose, carnation, etc. Yet, it is water soluble and cheaply available in market. In this regard, present study was carried out to study its influence on foliage discoloration and reported that the use of ascorbic acid as spray solution to reduce leaf yellowing and petal wilting in chrysanthemum. Ascorbic acid sprays will be helpful for consumers to keep the cut flowers fresh, turgid and attractive for longer time.

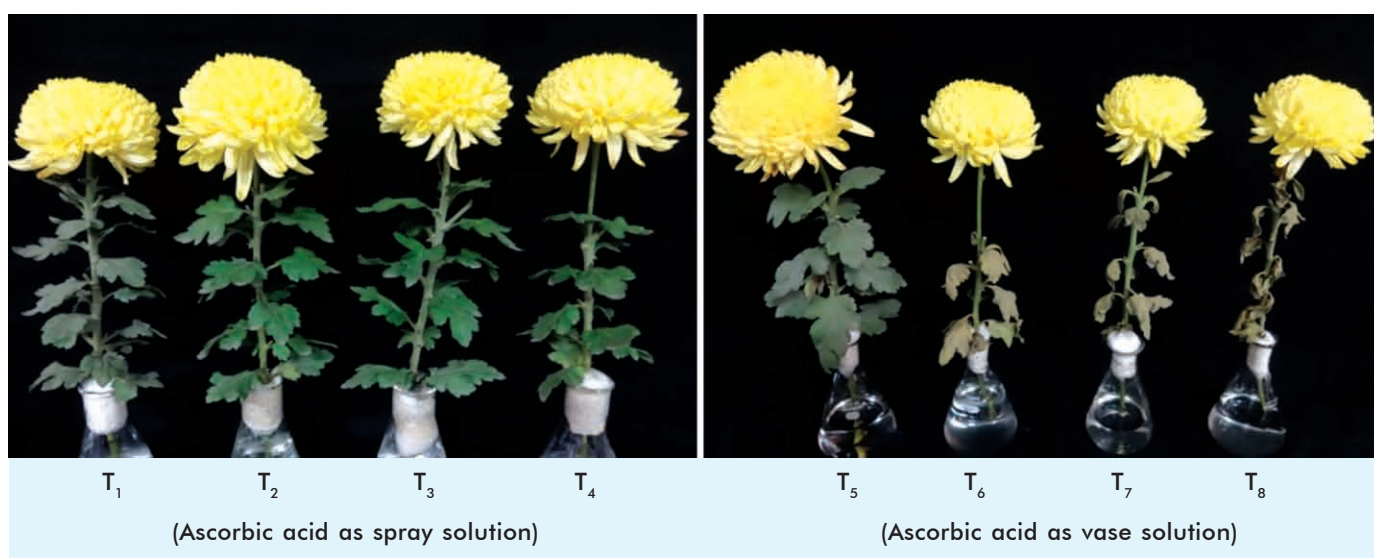
CHRYSANTHEMUM – one of the most popular flowers commercially grown for cut flower, loose flower and pot plant purpose—is the second largest cut flower cultivated and marketed all over the world. Japan is the leading producer of Chrysanthemum in the world and other top producing countries include Columbia, The Netherlands, Italy and United States. In India, it is

cultivated in an area of 16.63 thousand hectare with a production of 179.37 MT.

Post-harvest management of cut flowers is very important to enhance their vase life and keep them attractive for a longer time after consumers purchase. Although chrysanthemum flowers have relatively higher vase life than other cut flowers, early wilting



Effect of ascorbic acid on leaf and petal senescence in chrysanthemum cv. Pusa Centenary



Effect of ascorbic acid on leaf and petal senescence in chrysanthemum cv. Yellow Star

Table 1. Influence of ascorbic acid on post-harvest foliage discoloration and vase life

Treatment		Pusa Centenary				Yellow Star			
		Leaf wilting (%)	Leaf yellowing (%)	Leaf browning (%)	Vase life (days)	Leaf wilting (%)	Leaf yellowing (%)	Leaf browning (%)	Vase life (days)
<i>As spray solution</i>									
T ₁	Distilled water	18.50	32.51	4.03	17.67	14.44	5.06	4.99	19.07
T ₂	Ascorbic acid 50 ppm	17.66	26.43	7.18	19.33	0.00	6.17	15.59	22.00
T ₃	Ascorbic acid 100 ppm	6.36	27.32	22.19	20.33	0.00	9.85	20.78	19.67
T ₄	Ascorbic acid 150 ppm	3.33	30.86	19.91	19.67	0.00	7.44	20.77	20.33
<i>As vase solution</i>									
T ₅	Sucrose 4%	23.04	31.76	28.98	16.67	3.69	21.42	22.42	19.00
T ₆	Ascorbic acid 50 ppm + Sucrose 4%	53.65	25.94	40.39	17.00	37.79	0.00	49.09	22.67
T ₇	Ascorbic Acid 100ppm + Sucrose 4%	59.90	30.44	48.80	16.33	54.80	10.43	25.93	23.00
T ₈	Ascorbic acid 150ppm + Sucrose 4%	18.58	28.88	33.50	17.33	0.00	0.00	22.37	19.33

and premature yellowing of leaves are major concern resulting in loss of flower quality. Foliage yellowing is known to be cultivar specific however, it is reported to be caused by poor production practices, improper storage, impeded water movement in cut stems and excessive use of chemical preservative solutions than recommended concentrations. It occurs prior to the onset of flower senescence making the flowers unattractive and reduces its longevity. Chemical preservatives such as Thiadiazuron, Benzyl adenine, Silver thiosulfate and Methanol have been suggested by the group of researchers to manage leaf yellowing with varying degree of success. However, use of antioxidants such as carotenoids, ascorbic acid, α -tocopherol, glutathione, phenolics and flavonoids has not been reported yet in spite of their high efficacy. Apart from that, the above reported laboratory grade chemicals were found to be expensive and generally not easily dissolvable in deionised or distilled water.

Ascorbic acid is a potential antioxidant which can delay leaf and petal senescence in chrysanthemum. It is also interesting to know that the endogenous level of ascorbic acid has recently been suggested to be important in the regulation of developmental senescence and plant defense against pathogens. Its use as preservative has also been documented in Rose, Carnation, Gladiolus, Tuberose, Lilium, Red Ginger, etc. Besides functional role, ascorbic acid is cheap, easily available and can be dissolved easily in distilled water for its use in vase solutions.

Keeping these points in view, a study has been conducted at Division of Floriculture and Landscaping of ICAR-IARI, New Delhi to investigate effect of exogenous ascorbic acid on leaf and petal senescence through spray as well as vase solutions. Cut stems of standard chrysanthemum cv. Pusa Centenary and cv. Yellow Star were harvested during morning hours from the research farm at fully open stage before anthesis. Harvested stems

were immediately placed in a bucket containing clean water for rehydration and were brought to the laboratory. These stems were cut back to the uniform length of 60 cm and the leaves from the lower 1/3rd portion of the stem were removed and flowers were kept in distilled water. The basal portion of the cut stems (2 cm) was recut under water and cut stems were kept in test tubes containing distilled water or different vase solutions as per different treatments (Table 1). Freshly prepared ascorbic acid (L-ascorbic acid, lab grade chemical) solutions were uniformly sprayed alternate day onto petals and leaves of chrysanthemum cv. Pusa Centenary and cv. Yellow Star according to treatments and their effect on leaf wilting, leaf yellowing and vase life was studied (Table 1).

It was concluded from the study that the spraying of flowers of Pusa Centenary with 100 ppm and Yellow Star with 50 ppm concentration of ascorbic acid delayed foliage discoloration (leaf yellowing, wilting, browning), petal senescence and also enhanced the vase life of cut stems. These findings were also evident from

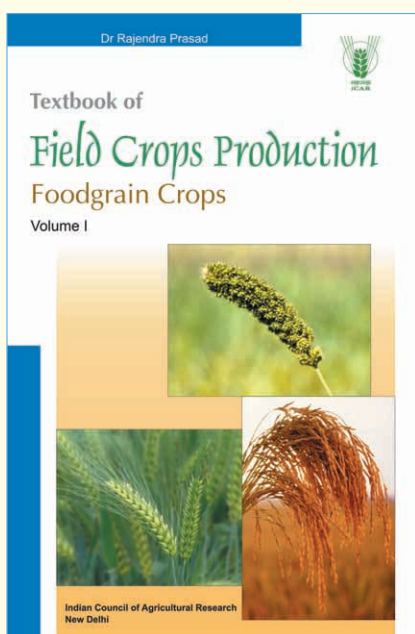
involvement of antioxidant enzymes in regulation of foliage discoloration and petal wilting after 14 days after treatment. It is attributed to the fact that the ascorbic acid is absorbed directly through the leaves, thereby preserving the chlorophyll content and also enhanced endogenous ascorbic acid level.

Ascorbic acid spray was helpful for keeping the cut flowers fresh, turgid and attractive for longer time. However, since foliage discoloration has been found cultivar specific, there is a need to standardize the ascorbic acid levels for each chrysanthemum cultivar. It is also essential to validate efficacy of ascorbic acid in other important ethylene insensitive flowers.

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TECHNICAL SPECIFICATIONS

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