RESEARCH PAPER *International Journal of Agricultural Sciences, June to December, 2009, Vol. 5 Issue 2 : 383-385*

Effect of sucrose on the vase life of gamma irradiated chrysanthemum

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ABSTRACT

An experiment was carried out in the laboratory, Department of Horticulture, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola (M.S.) during the month of January and February, 2007 to study the effect of irradiation treatments and vase solutions on the vase life of chrysanthemum. Among all the irradiation. treatments, 0 K_R gamma rays radiation (non-irradiated) was found better for most of the floral traits, whereas among vase solutions, flowers kept in sucrose 2.0 per cent solution was found suitable for enhancing the vase life.

Key words : Chrysanthemum, Vase life, Irradiation treatment, Vase solutions

INTRODUCTION

Chrysanthemum is the second largest cut flower grown all over the world (Janakiram, 2003). It belongs to family Asteraceae and is native to Europe and Asia. It is also called as 'Queen of the East' as well as 'Autumn Queen'.

In cut flower industry, the most important aspect is post harvest handling in order to maintain flower's freshness and original colour for longer period. Extended vase life of cut flowers depends on their water relation and retarding rate of senescence, which can be achieved by using right stage of cutting of flower and vase solution treatment. Various treatment combinations are reported to be useful in achieving this goal. In present investigation, an attempt has been made to assess the effect of irradiation treatments and vase solutions on vase life of chrysanthemum. The weight of flower and the water balance of the flower is a very important aspect and is the basis for its improved vase life.

MATERIALS AND METHODS

The present investigation was carried out in the laboratory, Department of Horticulture, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola. (M.S.) during the months of January and February, 2007 in factorial completely randomized block design with two factors. Factor 'A' - irradiation treatments, 0 K_R, 1 K_R, 2 K_R and 3 K_R gamma rays radiation and factor 'B' vase solutions, Control (distilled water), sucrose 1.5 per cent and sucrose 2.0 per cent. The treatments were replicated thrice.

The rooted cuttings of chrysanthemum cv. 'Akola Local' were irradiated at Bhabha Atomic Research Centre, Trombay, Mumbai with 0, 1, 2 and 3 K_R gamma rays. Then these cuttings were planted in earthen pots during June, 2006. The five potted plants were used for each treatment. The cut flowers were harvested as per the treatment in the morning hours when the central whorl of petal was opened at full bloom stage. Cut flowers were immediately kept in the bucket of water to avoid the entry of air bubble inside the stem. The flowers were then brought to the laboratory. Later on, the flowers were placed individually in glass bottles containing vase solution as per treatment. The four flowers were kept per treatment in vase solution. The observations were recorded daily at 10.00 a.m. during the course of investigation on flower diameter, weight of flower, uptake of solution and vase life of chrysanthemum.

RESULTS AND DISCUSSION

The data presented in Table 1 show significant differences among different treatments of gamma irradiation and vase solution on reduction in diameter of flower, weight loss of flower, total uptake of solution and vase life.

Effect of gamma irradiation:

The data presented in Table 1 revealed that, minimum reduction in flower diameter (0.35 cm), minimum loss in flower weight (0.85 g), maximum total uptake of vase solution (15.31 ml) and more vase life (12.75 days) were registered during the vase period with the flowers which were harvested from non-irradiated chrysanthemum plants which was significantly superior than rest of the treatments. This was followed by 1.0 K_R, 2 K_R and 3 K_R doses of gamma rays. As the doses of gamma rays were increased, the result in respect of above attributes had shown an inferior effect. These inferior results might be due to the chromosomal aberrations and disturbances in the production and distribution of auxin resulted in abnormal physiological, morphological and cytological processes caused by the gamma radiation. The results of Gaul (1970) are in the line of present study.

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Table 1 : Effect of gamma irradiation and vase solution on flower diameter, weight loss, uptake of solution and vase life at the end of vase period

Treatments	Reduction in flower diameter (cm)	Loss in wt. of flower (g)	Total uptake of solution (ml)	Vase life (days)
Factor 'A' (Irradiation)				
T_0-0 KR gamma rays	0.35	0.85	15.31	12.75
T_1-1 KR gamma rays	0.45	0.94	14.95	12.12
T_2-2 KR gamma rays	0.64	1.05	10.98	11.65
T_3-3 KR gamma rays	0.72	1.13	10.45	11.15
S.E. ±	0.004	0.007	0.229	0.039
C.D. (P=0.05)	0.012	0.02	0.653	0.11
Factor 'B' (Vase solution)				
V_0- Distilled water	0.70	1.09.	11.06	11.69
V_1-Sucrose 1.5%	0.51	0.99	10.81	11.91
V_2- Sucrose 2.0%	0.41	0.89	16.90	12.14
S.E. ±	0.003	0.006	0.199	0.034
C.D. (P=0.05)	0.008	0.017	0.564	0.096

Effect of vase solution:

From the data (Table 1), it was observed that, the flowers kept in vase solution containing sucrose 2.0 per cent solution had recorded minimum reduction in diameter of flower (0.41 cm) and found to be the significantly superior over all the treatments. Similarly, the significantly minimum loss in weight of flower (0.89 g), the maximum total uptake of solution (16.90 ml) and the maximum vase life (12.14 days) were noticed due to the flowers which were kept in 2.0 per cent sucrose solution.

The sugar in vase solution replaced the depleted endogenous carbohydrates utilized during post harvest life of flowers. Sucrose also acts as a respiratory substrate and it accumulates in the flower tissues. This accumulated sugar increases its osmotic concentration and helps to improve the flower quality to absorb more water and maintain the turgidity. Similar results were also recorded by Nagarajaiah *et al.* (1989) and Nagarajaiah and Reddy (1991) in cut roses.

Effect of gamma irradiation x vase solution:

It is revealed from the data presented in Table 2 that, the flowers harvested from non-irradiated chrysanthemum plants and kept in 2.0 per cent sucrose solution had shown the promising effect. During the vase period, this treatment combination resulted in minimum reduction of flower diameter (0.25 cm), minimum loss in flower weight (0.74 g), the maximum total uptake of vase solution (23.87 ml) and the more vase life (13.00 days) than rest of all the treatment combinations.

Thus, it is apparent that, the flower harvested from all the gamma irradiated chrysanthemum plants kept in 1.5 per cent sucrose solution or distilled water (control), had shown the higher reduction in diameter of flower, the maximum loss of flower weight, minimum uptake of vase solution and less vase life of flower. This might be due to cause that, the disturbances in auxin synthesis and chromosomal aberrations due to which the rate of respiration and ultimately the rate of utilization of reserve material was more as compare to the non-irradiated treatments. Similarly, there was appreciable decrease in vase life with low amount of sucrose or absence of sucrose in the vase solution which might have reduced the carbohydrates supply when natural carbohydrates are depleted.

Table 2 : Combined effect of gamma irradiation and vase solution on flower diameter, weight loss, uptake of solution and vase life at the end of vase period

Treatment combination	Reduction in flower diameter (cm)	Loss in wt. of flower (g)	Total uptake of solution (ml)	Vase life (days)
T_0V_0	0.45	0.98	10.83	12.41
T_0V_1	0.35	0.84	11.25	12.83
T_0V_2	0.25	0.74	23.87	13.00
T_1V_0	0.54	1.04	11.43	11.87
T_1V_1	0.46	0.95	11.08	12.08
T_1V_2	0.37	0.85	22.93	12.41
T_2V_0	0.87	1.13	11.49	11.45
T_2V_1	0.58	1.05	10.49	11.58
T_2V_2	0.48	0.94	10.97	11.91
T_3V_0	0.94	1.23	10.50	11.04
T_3V_1	0.65	1.11	10.41	11.16
T_3V_2	0.50	1.03	10.42	11.25
S.E. ±	0.007	0.01	0.398	0.068
C.D. (P=0.05)	0.020	-	1.131	-

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Received : December, 2008; Accepted : March, 2009