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Short communication

Effect of pre-harvest application of GA_3 and PP_{333} as bulb dip and foliar spray on quality and vase life of cut tulip cv. Cassini

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ABSTRACT

An experiment on effect of pre-harvest application of GA_3 and PP_{333} as bulb dip and foliar spray on quality and vase life of cut tulip cv. Cassini was carried out. Healthy scapes of uniform size were cut in a slanting manner at bud colour break stage and placed in conical flasks containing distilled water for vase life studies. Bulb dip in GA_3 (100 ppm) followed by foliar spray of GA_3 (100 ppm) significantly improved overall water uptake, prevented water loss and resulted in maximum water balance. The treatment also exhibited the maximum flower diameter (7.40 cm), scape length (16.26 cm) and vase life (9.33 days). However, the lowest water loss to water uptake ratio was recorded with bulb dip plus foliar spray with 200 ppm GA_3. Data indicated that GA_3 (100 ppm) as bulb dip plus foliar spray proved instrumental in maintaining the quality and vase life of cut tulip as compared to other treatments.

Key words: Cut tulip, quality, vase life, gibberellic acid, paclobutrazol

The tulip (*Tulipa gesneriana* L.) is excellent for cut flowers, garden display and pot culture. In India, tulips thrive well in temperate regions of Jammu & Kashmir, Himachal Pradesh, Uttranchal and other similar hilly regions. There is a good scope for growing tulips for cut flowers in temperate regions. The short vase life of tulip, however, is a major bottleneck in exploiting its utility on a wider scale and even restricts distant marketing. Therefore, post harvest handling plays an important role in enhancing keeping quality of cut flowers. Post harvest application of various growth regulators have been used in vase solutions to enhance the vase life of cut flowers (Salvi *et al*, 1999). However, pre harvest [1]Plant Physiology Section, Division of Post harvest Technology management is also equally important to improve the post harvest behavior and quality Gibbrellic acid (GA_3) and paclobutrazol (PP_{333}) have been reported to increase the yield and post harvest quality of many flowers (Harbaugh and Wilfret, 1979; Singh *et al*, 1999). Paclobutrazol results in retardation of vegetative growth and diversion of assimilates to reproductive growth, giving increased yield potential with better quality flowers. Keeping above facts in view, the present investigation was carried out to analyze the effect of pre harvest application of GA_3 and paclobutrazol on post harvest behavior and vase life of cut tulip cv. Cassini.

The present experiment was carried out at the Division of Floriculture, Medicinal and Aromatic Plants, SKUAST-K, Shalimar, Srinagar during 2003-04. Healthy and uniform sized bulbs of tulip cv. Cassini were dipped in different concentrations of GA_3 (100, 200 and 300 ppm) and PP_{333} (10, 20 and 30 ppm) for 30 minutes. The growing media prepared by mixing soil + compost + sand in the ratio of 2:1:1 was filled in clay pots measuring 20 cm in diameter. Air dried bulbs were planted in pots following the randomized block design. When plants reached 3-leaf stage, three concentrations of GA_3 (100, 200 and 300 ppm) and PP_{333} (10, 20 and 30 ppm) were applied as foliar spray to wet the leaves completely. There were a total of 19 treatments including control (distilled water). Uniform cultural practices like application of fertilizers, weeding, irrigation and plant protection measures were adopted. The healthy looking scapes of uniform size were cut in a slanting manner at bud colour break stage leaving only one leaf on each scape. After taking the initial weight, scapes were placed in conical flasks containing 250 ml of distilled water. All the treatments were replicated thrice with five flasks in

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each replication. The weight of each flask, with and without flower scape, were recorded on alternate days and per cent fresh weight gain, cumulative water uptake, water loss, water balance and water loss-water uptake ratio were calculated (Venkatarayappa *et al*, 1980). Days taken to flower, flower diameter, scape length and vase life calculated from the day of full flower to the day when petals expressed first sign of wilting, were also recorded and the method of Gomez and Gomez (1984) was applied for analysis of variance.

Perusal of the data presented in table 1 revealed that per cent fresh weight gain of scapes decreased due to the bulb dip treatments in GA_3 as well as PP_{333}. However, scapes which received foliar sprays of GA_3 and PP_{333} showed significant increase in fresh weight gain. In case of combined application of bulb dip + foliar spray, only lower doses of GA_3 (100 ppm) and PP_{333} (10 ppm) increased the fresh weight gain while higher doses of GA_3 (200 and 300 ppm) and PP_{333} (20 and 30 ppm) significantly reduced the fresh weight gain. Increased fresh weight gain of tulip scapes by foliar sprays of GA_3 could be attributed to the ability of GA_3 to maintain higher soluble sugar content in the perianth tissue and membrane properties (Sultan and Farooq, 1999). Data also showed that both cumulative water uptake and water loss increased remarkably due to various hormonal treatments, however, 100 ppm of GA_3 applied as bulb dip plus foliar spray exhibited the maximum water balance (14.17 g/scape) with minimum water loss-water uptake ratio (0.72) followed by foliar spray of 100 ppm GA_3. This may be due to the fact that GA_3 increases water uptake capacity and reduces the water loss by maintaining better water loss-water uptake ratio. These results are in agreement with the findings of Rekha *et al* (2001) in gladiolus and Emongor (2004) in lilium.

Pre harvest application of plant growth regulators significantly influenced the cut flower quality and vase life of tulip (Table 2). It is obvious from the data that days taken to flower decreased due to application of GA_3 as well as PP_{333}, GA_3 application also resulted in earliness of flowering when given as foliar spray. Similar results were also reported by Nasr and Shalabi (1996) in *Zantedeschia.* Both GA_3 and PP_{333} treatments also caused an increase in diameter of flowers although these results were insignificant. Pre harvest application of GA_3 resulted in an increased scape length whereas PP_{333} caused a decrease in scape length. The maximum scape length (16.26 cm) was recorded with (GA_3 100 ppm) as bulb dip plus foliar spray followed by GA_3 (300 ppm) as foliar spray. This rapid growth by the application of GA_3 is due to the higher number of cells formed as well as elongation of individual cell by way of more utilization of Photosynthates (Su and Kwack, 1989; Ramesh *et al*, 2001; Sharma *et al*, 2001). Shortened scape length due to the application of PP_{333} is also in accordance with the result of Kwack and Kwack (1990). Results pertaining to the vase life revealed that foliar application of GA_3 significantly increased the vase life of cut tulip while PP_{333} resulted in reduced vase life of tulip. However, the maximum vase life (9.33 day) was recorded with bulb dip plus foliar spray of 100 ppm of GA_3 followed by the foliar spray of 100 ppm GA_3 alone. Similar results were reported by Dutta *et al* (1993) in chrysanthemum, Ichimura and Goto (2000) in narcissus and Gaur *et al* (2003) in gladiolus.

It is concluded from the findings of the present experiment that longer vase life and maximum flower diameter of tulip cut flowers can be achieved by application of 100 ppm GA_3 as bulb dip and /or foliar spray to maintain high water balance through low water loss –water uptake ratio.

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