Vase life of hydrangea flowers as function of N and K as pre-harvest application

Thaneshwari*[1], B.S. Dilta[2] and Y.C. Gupta[3], Homraj Sahare[4], N. Thakur[5] and R. Sharma[6]

[1]Assistant Professor, Department of Horticulture, School of Agriculture, LPU, Punjab, India

[2]Principal Scientist, Department of Seed Science & Technology, Dr.YSP UHF Nauni, Solan, H.P., India

[3]Dean, College of Horticulture and CEHRE Thunag, 175 048, Mandi, H.P., India

Abstract

The investigations, "Vase life of hydrangea cut flowers as function of N and K as pre-harvest application" was carried out at Dr. Y. S. P. UHF, Nauni, Solan (H.P) in a RBD- factorial, with five doses of nitrogen and four doses of potassium. The treatment combinations of these different doses of N and K were replicated three times. Result from this experiment revealed that pre-harvest application of 40 g N/m^2 recorded maximum vase life of 21.50 days. With respect to effect of potassium, the maximum vase life of 19.33 days was recorded with the pre-harvest application of K @ 50 g /m^2. In general vase life of *hydrangea macrophylla* flower was recorded to be maximum, when crop was fertilized with pre-harvest combined application of N @ 40 g /m^2, P @ 30 g /m^2 and K @ 50 g /m^2.

Introduction

Hydrangea macrophylla sub sp. *macrophylla*, a member of family Hydrangeaceae, is originated from Japanese Island, Honshu and distributed widely in Mexico (Bailey and Bailey, 1976; Duran, 1999). *Hydrangea macrophylla* plant bears pink, blue or white colour big size inflorescence. Diameter of the inflorescence varies from 15 – 25 cm. Colour of *Hydrangea macrophylla* flower varies with pH of the growing media or soil. It is a deciduous flowering shrub and used for landscaping as flowering hedge, avenue planting or as focal point. This shrub is mostly suitable for moist and cool climate (Juhanoja *et al.*, 1998). They are being grown as flowering pot plants. This species is suitable for cut flower trade for fresh or dried flower arrangements.

Hydrangeas macrophylla grown outdoors make vegetative growth in July - August with initiation of flower buds in September – October. After which the flower buds become dormant and resume growth after dormancy in spring season. Over wintered flower buds come in flowering by late May - June. It can be made to flower year-round through forcing. Growers normally force hydrangeas to flower during last week of January and Valentine's Day sales. In Europe, these flowers are produced mainly for Mother's day (May) and Easter (March-April).

In India, there is a great potential for growing good quality hydrangeas particularly in places having cool climate. In Dr. Y.S.P. UHF, Nauni, Solan, H.P. the experiment was carried out over nutritional aspect of this crop. It has been reported that application of N,P,K @ 80:30:50 g/m^2 resulted in better growth, flowering and yield of cut

flowers of hydrangea (Thaneshwari *et al*., 2017). In case of cut flower production, vase life of flower is most important because it affect the storage, transportation, marketing as well as costumer believe and love to flower. As the pre-harvest application of fertilizer also affects the post harvest life of flowers, so the result of this experiment can be helpful to the grower in order to improve the post harvest life of hydrangea flowers.

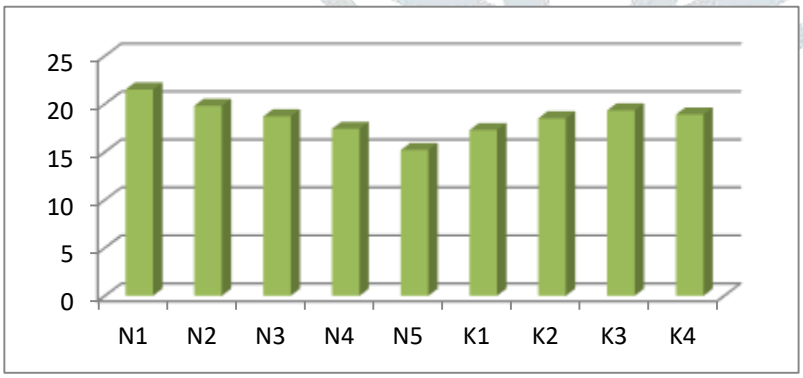
Material and Methods

The experiment was carried out at Dr. Y. S. P. UHF, Nauni, Solan (H.P). The rooted cuttings of hydrangea were planted in the shade net house at a spacing of 50 x 50 cm during spring 2013. There were 20 treatment combinations of nitrogen and potassium application, each having five nitrogen doses N_1(40g), N_2(50g), N_3(60g), N_4(70g), N_5(80g) per sq.m. and four potassium doses K_1(30g), K_2(40g), K_3(50g), K_4(60g) per sq.m. These treatments are replicated thrice in a randomized block design (Factorial). Basal application of nitrogen (1/4 dose) and potassium (full dose) were made as per the experimental details. Basal application of phosphorus @ 30g per sq.m. was also done uniformly to all the beds. The remaining dose of nitrogen was top dressed during growing period. All the cultural practices were followed to raise a hydrangea crop for cut flower production. Observations were recorded on post harvest parameters like weight of cut stem and vase life of flowers.

Result and discussion

Vase life (days)

The result from this experiment revealed the significant effects of application of nitrogen and potassium on vase life of hydrangea flowers (Fig. 1).

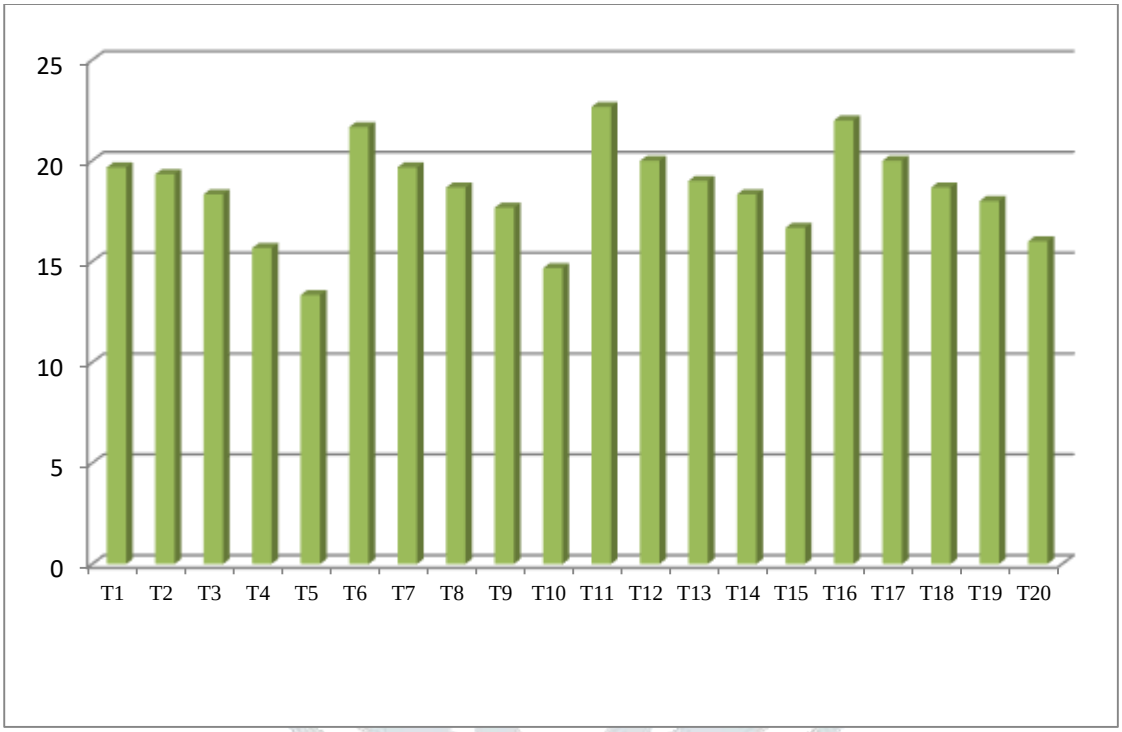


N_1(40g), N_2(50g), N_3(60g), N_4(70g), N_5(80g) Nitrogen per square meter
K_1(30g), K_2(40g), K_3(50g), K_4(60g) Potassium per square meter

Fig. 1. Pre-harvest application of nitrogen and potassium affect vase life of hydrangea flower

Maximum vase life (21.50 days) of hydrangea flowers was recorded with the application of 40 g N/m^2 and found to be significantly superior over all other nitrogen level. However, least vase life (15.17 days) was found with

the application of nitrogen @80g/m^2. Maximum vase life of 19.33 days was recorded with the application of potassium @ 50g/m^2 and found to be statistically at par with K_2 and K_4. Minimum vase life (17.27 days) was reported with the application of potassium @ 30 g/m^2. The interaction or combined effect of nitrogen and potassium exhibited non- significant effects on vase life of hydrangea flowers (Fig. 2, 3). The interaction *i.e.* $N_1 \times K_3$ (T_{11}), resulted in maximum vase life of 22.67 days. However, minimum vase life of 13.33 days was reported in treatment T_5.



T_1 (40gN and 30gK), T_2 (50gN and 30gK), T_3 (60gN and 30gK), T_4 (70gN and 30gK), T_5 (80gN and 30gK), T_6 (40gN and 40gK), T_7 (50gN and 40gK), T_8 (60gN and 40gK), T_9 (70gN and 40gK), T_{10} (80gN and 40gK), T_{11} (40gN and 50gK), T_{12} (50gN and 50gK), T_{13} (60gN and 50gK), T_{14} (70gN and 50gK), T_{15} (80gN and 50gK), T_{16} (40gN and 60gK), T_{17} (50gN and 60g K), T_{18} (60gN and 60gK), T_{19} (70gN and 60gK), T_{20} (80gN and 60gK) per square meter

Fig 2. Pre-harvest application of nitrogen and potassium affect vase life of hydrangea flower

Maximum vase life of cut flowers was recorded with the application of lower level of nitrogen fertilizer. This may be due to the reason that application of lower doses of nitrogen leads to comparatively smaller size inflorescence (cymes) and maintain sturdiness of cut stems. Lower dose of nitrogen fertilizer also leads to less succulent in tissue. The cut stem sturdiness was also as a result of more photosynthate accumulation in stem tissues due to application of lower dose of nitrogen predominantly in combination with potash. Related findings were also reported in chrysanthemum cv. 'Snow Ball' by Verma *et al*. (2007). However, minimum vase life of 15.17 days was found with the application of nitrogen @ 80 g/m^2 (N_5) and 17.27 days with the application of 30 g K/m^2 (K_1).

Doses of Nitrogen (N)		Doses of Potassium (K)	
N_1	40 g N/m^2	K_1	30 g K/m^2
N_2	50 g N/m^2	K_2	40 g K/m^2
N_3	60 g N/m^2	K_3	50 g K/m^2
N_4	70 g N/m^2	K_4	60 g K/m^2
N_5	80 g N/m^2		

Fig 3. Effect of pre-harvest application of different doses of nitrogen and potassium on vase life of hydrangea

This may be due to the production of larger size inflorescences having reasonably more weight and more succulency in tissue. As a result of this the stems produced exhibited less sturdiness and could not withstand the heavy weight of inflorescence and resulted in toppling of the cymes. Thus, exhibited less vase life with the application of high doses of nitrogen. Similar findings have also been obtained by Paull *et al*. (1992) in anthurium

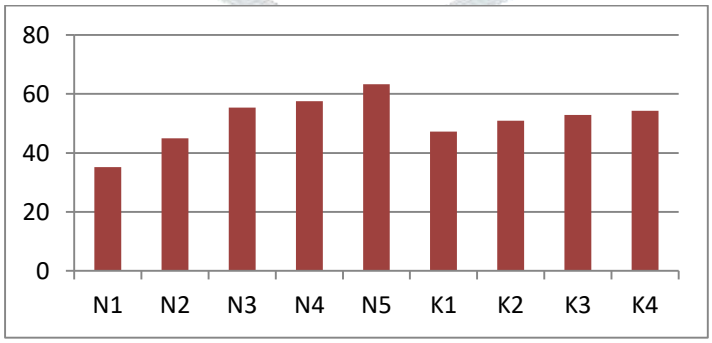
cut flowers, Broschat (1995) in *Tapeinochilus ananassae* cut flowers, Verma *et al*. (2007) in chrysanthemum cv. 'Snow Ball' and Joshi *et al*. (2013) in chrysanthemum varieties *viz*., 'IIHR-6' and 'Shyamal'.

Weight of cut flower stem (g)

Data on effect of pre-harvest application of Nitrogen and potassium on post harvest life of hydrangea cut flower is presented in Fig 4. Maximum weight (63.34 g) of cut flower stem was recorded with application of 80g nitrogen per sq. m. and found to be significantly superior over all other treatment. However, minimum weight (35.23 g) of cut flower stem was found with the application of nitrogen @ 40 g per sq. m. It is reported that application of potassium contributed significant role for the weight of flower stem. Maximum weight (54.27 g) of cut flower stem was recorded with the application of 60 g K per sq.m. and found statistically at par with application of 50 g K per sq. m. Whereas the minimum weight (47.23 g) of fresh cut flower stem of hydrangea was obtained with the pre-harvest application of potassium @ 30 g per sq. m.

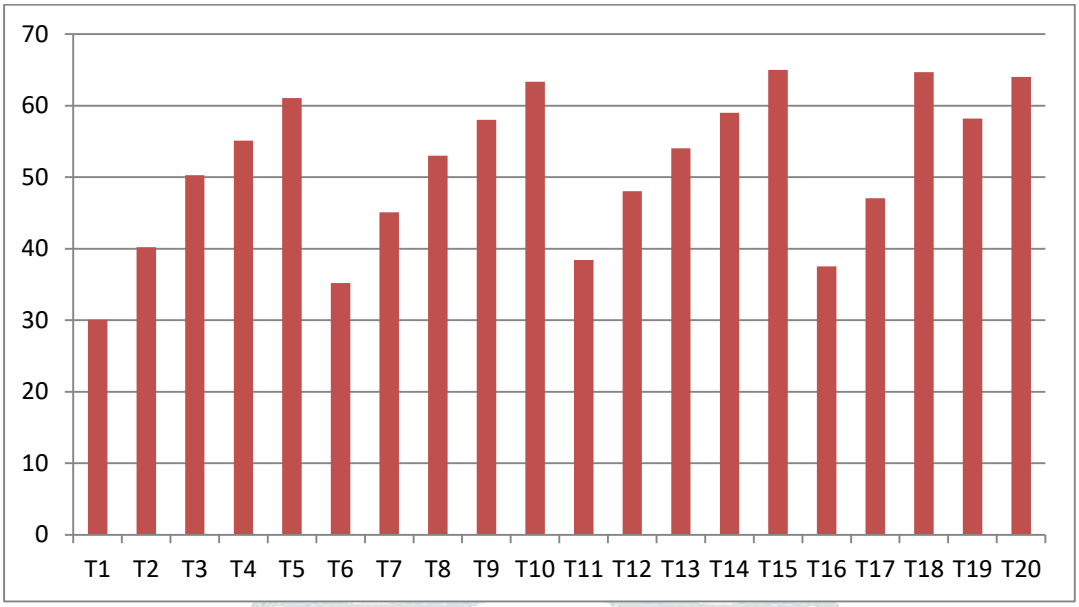
Data on combined effect of pre-harvest application of Nitrogen and potassium on post harvest life of hydrangea cut flower is presented in Fig 5. Combined application of 80 g N per sq. m. and 50 g K per sq. m. (T_{15}) recorded maximum weight (65.00 g) of flower stem. Minimum weight of cut flower stem (30.07 g) was found with the application of 40 g N per sq. m. and 30 g K per sq. m. (T_1).

The higher weight of flower stem could be credited to the bigger size of the inflorescence mainly with the higher dose of nitrogen. Whereas, smaller size inflorescences were produced with the application of lower doses of nitrogen. Therefore, contributing for lesser cut flower stem weight. Grantzau and Schroaf (1986) reported an increase in the cut- flower weight with the increased dose of nitrogen in chrysanthamums. Simial effects of nitrogen for cut flower weight have also been reported by other workers *viz*., Mishra *et al*. (2002), Sable and Kale (1994), in tuberose and rose respectively.



N_1(40g), N_2(50g), N_3(60g), N_4(70g), N_5(80g) Nitrogen per square meter
K_1(30g), K_2(40g), K_3(50g), K_4(60g) Potassium per square meter

Fig 4. Pre-harvest application of nitrogen and potassium affect weight of cut flower stem (g) of hydrangea flower



T_1 (40gN and 30gK), T_2 (50gN and 30gK), T_3 (60gN and 30gK), T_4 (70gN and 30gK), T_5 (80gN and 30gK), T_6 (40gN and 40gK), T_7 (50gN and 40gK), T_8 (60gN and 40gK), T_9 (70gN and 40gK), T_{10} (80gN and 40gK), T_{11} (40gN and 50gK), T_{12} (50gN and 50gK), T_{13} (60gN and 50gK), T_{14} (70gN and 50gK), T_{15} (80gN and 50gK), T_{16} (40gN and 60gK), T_{17} (50gN and 60g K), T_{18} (60gN and 60gK), T_{19} (70gN and 60gK), T_{20} (80gN and 60gK) per square meter

Fig 5. Pre-harvest application of nitrogen and potassium affect weight of cut flower stem (g) of hydrangea flower

The higher weight of cut flower stem with the increased dose of potassium could be due to the production of heavy inflorescences and sturdier stems with the application of higher dose of potassium.

Wang (2007) reported in Phalaenopsis cut flower that, flower stems became thicker with increasing potassium dose. Grantzau and Schroaf (1986) have also reported increase in the cut flower weight with higher dose of K in chrysanthemum cvs. 'Foxy' and 'Yellow Snowdown'. Hwang *et al*. (1992) have also observed the maximum weight of cut flowers in chrysanthemum cv. 'Cheon Soo' with the higher application of K.

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