Journal of AgriSearch **5**(2):100-104
An Open Access International Peer Reviewed Quarterly

ISSN : 2348-8808 (Print), 2348-8867 (Online)
https://doi.org/10.21921/jas.5.2.4

Growth, Yield and Vase Life of Rose as influenced by different Cultivars under protected condition of Eastern Himalayas

K LILY RANGNAMEI*, CH MAITI[1], MANOJ KUMAR[2], L PUNGDING[3]

[1]*Associate professor (Horticulture) SASRD, Nagaland University, Nagaland*

ARTICLE INFO

Received on	:	13-03-2018
Accepted on	:	11-05-2018
Published online	:	07-06-2018

ABSTRACT

An investigation was carried out to evaluate the performance of four exotic rose cultivars (Sphinix Gold, Upper Class, Bordeaux andAvalanche) under protected condition in sub-tropical hills of Nagaland. High coefficient of variation both at genotypic and phenotypic level couple with high heritability and genetic advance for thorn density per inch. The genotypic correlation coefficient studies reveal that plant height at first flower flush was positively and significantly correlated with plant spread EW/NS direction, thorn density per inch and diameter of flower bud.Significant positive association of total number of petals per flower was revealed with plant spread EW/NS direction. Length of the sprouted bud was similarly a significant positive correlation with diameter of flower bud and thorn density per inch, length of the sprouted bud and days taken to bud sprouting. Phenotypic correlations of plant height at first flower flush with number of branches per plant, thorn density per inch. Similarly a significant positive correlation was observed between diameter of flower and length of the sprouted bud. Significant positive correlation also existed between number of flower per plant and number of petal per flower. Since there is a highly positive association among this component character, the selection of this particular character for improvement of any cultivars shall automatically influence other character in desirable direction. Among the cultivars studied the Sphinix Gold,Upper Class and Bordeaux are suitable for commercial cultivation under Nagaland condition.

Keywords: Rose Cultivars, Protected Condition, Growth, Yield, Vase Life

INTRODUCTION

Floriculture is one among the promising ventures which has emerged in the recent past as flowers and flowering plants and have been a fascinating part of our life. Cut flowers like Rose, Carnation, Gerbera, Lillium and Gladiolus always have steady demand in Indian and International cut flower trade (Lemper, 1976). Among cut flowers, Rose (*Rosa spp.*) has occupied a unique position both in beauty and trade. It can be exploited for growing in beds, borders, walls, arches and screens (Khan, 1978).Rose (*Rosa spp.*) belongs to the family Rosaceae and genus *Rosa*, an ancient word accepted from the Greek word 'Rhedon' it was so called because of its excellent fragrance. Rose contains over 200 species out of which 11 of them contribute to the origin of modern cultivars. Rose grow and flourish in the widest range of conditions of soil and climate.

Owing to the diversified growth habit, exquisite shape, variation in size and form, attractive colours, delightful fragrance and innumerable varieties, roses gained wide acceptability. Rose is the single largest flower sold in the world market among the cut flower, accounting for 60-70% of the total cut flower trade in the global market and ranked first among the cut flowers (Bala *et al.* 2008). In India, total area under flower cultivation is about 2,43000 hectares and production of 22,36000 MT (2015-16). Total area under North East India of flower is 4800 ha with production 22100 tonnes (loose) and 6323600(cut).

The character in rose dependent on a single dominant gene are glossy leaves, double flower, mildew resistant, while the characteristics dependent on an interaction of many genes are vigour, fragrance, thorniness, strength of neck, width of leaf, length of cutting stem and shape of bud and open flower. Growth, flowering and yield varied significantly due to the variation of variety and it was previously found in gerbera (Singh and Ramachandran, 2002; Sankar*et al.*, 2003; Mahanta *et al.*, 2003 and Reddy *et al.* 2003), and tomato (Gautam *et al.*, 2013; Olaniyi *et al.*, 2010) due to their genetic variation (Hammad, 2009). Varietal performance was also studied in rose by Ranchana *et al.*(2014) and significant variations were observed in each cultivar for length and number of petals per flower, number of prickles, fragrance, flower persistence life and color, bush shape and overall performance with respect to climatic conditions (Nadeem *et al.*, 2011). Morphological variables of a set of germplasm or cultivars were determined to provide information for breeders (Mehraj *et al.*, 2014).

High heritability was accompanied with high genetic advance for the number of branches, spikes, flower bud and petals for average flower weight showing additional gene effect. High heritability and lower genetic advance was obtained for diameter and plant spread with high heritability with moderate values of genetic advance was obtained for plant

[2]*SMS (Horticulture) KVK, Longleng ICAR Research Complex for NEH Region, Nagaland, India*
[3]*Assistant professor (PESS) Manipur University*
*Corresponding Author Email : lrangnamei@gmail.com

height. Wide difference in the post-harvest life and quality of roses has been observed among different species of flowers (Bhattacharjee and Saxsena, 1998) and among cultivars of the same species (Bhattacharjee, 1994). Variation in vase life, weight loss, flower diameter among different cultivars may be due to differences in senescence behaviour by producing higher amount of ACC, ethylene forming enzyme and ethylene (Wu *et al.* 1991) and due to genetic make up of the cultivars.

In Nagaland, area under cut flower production is almost nil and demand of the state is more due to use in social activities and personal interest for decoration and beautification purpose. The requirement of cut flower was fulfilled from other states. Varieties are not notified for the Nagaland for commercial production. The basic concept of evaluation of rose variety is to reveal the characters of the particular cultivars which have a tremendous potential of performance in agro climatic condition of Nagaland. Therefore, keeping in view the present investigation was carried out to study the growth, yield, yield attributes and vase life of rose cultivars in hill eastern India

MATERIALS AND METHODS

The experiment was conducted at the Central Institute of Horticulture (CIH) farm, Medziphema, Dimapur, Nagaland, India during the year 2011-12.(25° 45′ 45″ N latitude and 95° 53′ 04″ E longitude, 305.8 m above mean sea level. Soil of the experimental field was sandy loam and acidic in reaction (pH 4.65), high in soil organic carbon (1.58 kg/ha), low in available N (385 kg/ha) and medium in available P (148 kg/ha) and K (285.3 kg/ha).

The climatic condition of Medziphema is sub-tropical with high humidity and moderate temperature, having medium to high rainfall. The average mean temperature ranges between 12°C during winter to 32°C during summer. The mean annual rainfall ranged from 200 cm to 270 cm spread over 6 months i.e. from April to September, while the remaining period from October to March in virtually dry. The temperature and relative humidity during the crop growing period was presented in the fig. 1.

Treatment consist of four (4) exotic cultivars i.e., Sphinix Gold, Upper Class, Bordeaux and Avalanche tested in randomized block design (RBD) with five replication .Important characters of these varieties are presented in the Table 1.

The experimental plot was deep ploughed by power tiller and soil was well pulverized and kept the plot weed free. The raised beds in a 15 cm height were prepared with size 2 m (length) x 2 m (breadth) under protected condition. Well decomposed Farm Yard Manures (FYM) was applied @ 20 kg/plot before the 10 days of planting of rose. The healthy saplings were planted in each plot treatment wise with a distance of 60 cm (row to row) and 40 cm between the plants. In order to protect the plants from fungal infection Diathene M-45 were sprayed and to control the insects Pyrithrum @1.5ml/l were sprayed 3 times at 15 daysinterval. Four (4) plants in each plot were randomly selected and observations were recorded in growth parameters like plant height at first flower flush, days taken to bud sprouting, length of shoot after two weeks of bud sprouting, length of shoot after 4 weeks of bud sprouting, plant spread EW/NS direction, leaf area, thorn density per inch, yield and yield attributes such as diameter of flower, plant height at second flower flush and number of petals per flower. It appears that great variability exists with regard to vase life performance such as per cent increase/decrease in bud size at 4 days, 8 days, 12 days and 16 days after vase life, total solution absorb after 4 days, 8 days, 12 days and 16 days after vase life. Per cent increase/decrease in bud size was calculated using the following formula

$$\text{Per cent increase/ decrease in bud size} = \frac{\text{Final diameter - Initial diameter}}{\text{Initial diameter}} \times 100$$

Vase life of rose was recorded with the following standard procedure. The harvested cut stalk of flower are placed in a conical flask containing 250ml of water with 2 % of sucrose solution and kept for 4,8,12 and 16 days for vase life estimation.

Volume of solution absorbed by the stem during the vase life studies was work out in ml by deducting the final volume (ml) from the initial volume (ml) of the solution. Final stage of bud opening was recorded base on numerical score number (1-4) and expressed in per cent with the following score details:< 25% opening bud -1, > 25% opening bud - 2,> 50% opening bud - 3, > 75% opening bud - 4.The diameter of flower bud was measured with the help of a varniercalliper after the harvest and mean value (cm)was calculated. The length of the flower bud was measured from the neck of the bud to the tip of the flower bud with the help of linear scale (in cm) and mean value was calculated.

Analysis of variance (Panse and Sukhatme, 1978) was used to statistically analyse data. The significance of differences was tested by error mean square of Fisher Snedecor's 'F' test at probability level (P=0.05). In the summary tables of the results, critical difference to compare the difference between the treatment means is provided. The different character was further statistically analysed to study the Genetic variability concerning with genotypic and phenotypic variance (Burton, 1952),heritability (Allard, 1960), genetic advance (Lush, 1949 and Johnson *et al.*, 1955), genotypic and phenotypic correlation coefficient of different pairs of characters (Johnson *et al.* 1955 and Jibouri *et al.*, 1958).

RESULTS AND DISCUSSION

Growth attributes

Growth parameter such as plant height at first flower flush, number of branches, length of shoot after two weeks of bud sprouting and thorn density were recorded maximum with cultivar Upper Classas compared to other rose cultivars (Table 2). Plant heightat first flower flush(cm), number of branches, length of shoot after two weeks of bud sprouting (cm) and thorn density were recorded 51.0, 3.0,60.28 and 5.9 respectively with Upper Class cultivar followed by Sphinix

Gold (49,2.95,59.91 and 3.05) and minimum in Avalancecultivar.

Maximum days was recorded to bud sprouting with Avalanche (71.10 days) followed by Bordeaux (64.25 days), Sphinix Gold (58.75 days)and minimum days under Upper Class cultivar(56.15 days). Maximum length of shoot was found with Sphinix Gold after 4 weeks of bud sprouting(64.72 cm)as compared to other cultivars and minimum (Table 2) in Avalanche (52.61cm). Differences in plant height, length of the sprouted bud, length of shoot after 2 weeks of bud sprouting, length of shoot after 4 weeks of bud sprouting and thorn density significantly differed among the cultivars. Stem length being an important attributes for cut flower production and more market value. Longest stem length was found in Upper Class cultivar as compared to other cultivars. Similarly, Khattak *et al.*(2011) also indicated that days to bud sprouting, petals/flower, flowers/plant were varied among the different rose cultivars.

Plant spread EW/NS directing and Leaf area were found maximum with Bordeaux(25.46 cm, 53.82 cm) as compared to other cultivars (Table2). Whereas, thorn density per inch was recorded highest with Upper Class followed by Sphinix Gold and minimum in Avalanche Variation in thorn in different cultivar was also reported by Manjula, (2005). Large sized and higher number of leaves gives higher leaf area. Maximum leaf area increased the photosynthetic efficiency of leaf surface leading to increase in production of flower. Variation in leaf area was also observed previously in rose Ahmad *et al.*(2011),Manjula,(2005).

Yield and yield attributes

The performance of rose cultivars on yield and yield attributes found to differ widely among the cultivars. The average maximum size or diameter of flower and also attractive flowers which was good as cut flower. The depth of the flower depend upon with the number of petals per flower, cultivar Bordeaux (54.25) showed maximum number of petals which further enhanced the beauty of flower. This is in conformity with observation of Bhattacharjee *et al.* (1993), Singh *et al.* (2000), Palai *et al.* (2000), Manjula and Patil (2005) and Verma *et al.* (2008b). The result indicating that variation in the cultivars was observed but they did not have significant effects on the growth character bearing a few exceptions by the growing environment. This might be due to the similar climatic condition available during the major part of the growing season. However in the cultivars which responded differently with environment for plant height, length of shoot, thorn density, plant height at 2nd flower flush etc., this was probably due to better environment for the development of plant growth which ultimately influenced number of flower, diameter of flower and number of petal per flower.

Plant height at second flower flush was varying significantly and it was recorded maximum in Sphinix Gold(57.13 cm) and minimum in Avalanche(29.14 cm), Number of petal/flower were significantly recorded maximum (54.25) in Bordeaux cultivars.Paramagoudar, (2010) also reported that number of shoot/plant, leaf area, flower/plant, petals/flower and time take for bud initiation were also varied among the rose cultivars.Variation in number of petals/flower was also observed previously in Rose Tabassum *et al*., (2002)Khattak *et al*., (2011)Ranchana *et al*., (2014), Manjula, (2005) and Paramagoudar, (2010).

Vase life

Vase life is the most important parameter for marketing point of view. Vase life was significantly recorded variation among the four cultivars of initial bud size (Table 4). The final stage of bud opening (1-4 scale) showed significant variation among the cultivars. Highest final stage of bud opening was recorded with Avalanche (3.55), followed by Sphinix Gold (3.25)and lowest in Bordeaux(2.15).

Per cent increase/decrease in bud size at 4 days was found maximum in Avalanche(81.25) followed by Upper Class (78.25) and minimum in Bordeaux(66.20). Whereas, Per cent increase/decrease in bud size at 8 days was noted maximum in cv. Sphinix Gold(22.45) and minimum in cv. Upper Class(15.08).Among all the cultivars, highest percentage increase in bud size at 12 days was recorded 15.80 with Sphinix Gold as compared to other and minimum in Bordeaux (6.00). Whereas, percentage increase in bud size at 16 days was found under Upper Class cultivar(3.05) followed by Avalanche (2.05), Sphinix (1.0) and minimum with Bordeaux (0.60). Percent increase in bud size showed that Bordeaux cultivars gives full blooming early followed by Sphinix Gold, Avalanche and upper class later. That means cultivars Bordeaux harvest early as compared to others.

Vase life of all the cultivars was not significantly difference, but maximum vase life was found 12.45 days with Upper Class cultivars followed by Sphinix Gold (11.20 days), Bordeaux (10.40 days) and minimum in cv. Avalanche(10.05). This might be due to all the cultivars having same genotypic characteristics.

The total solution absorbs during vase life study after 4,8,12 and 16 days were found statistically not significantly among the cultivars (Table3). Highest solutions absorb at 4 days and 8 days were recorded 26.05 ml,20 .80 ml respectively with Sphinix Gold cultivars and minimum 23.80 ml and 14.05 ml respectively, under Avalanche cultivar. Where as, total solution absorb at 12 and 16 days were recorded 11.95 ml and 4.50 ml respectively, with Upper Class cultivars and minimum 4.85 ml and 1.20 ml under Bordeaux cultivar.

Variability studies

Mean, range, phenotypic coefficient of variation and genotypic coefficient of variation, heritability, genetic advance as percentage of mean for different characters varied significantly (Table 5). The PCV was higher than GCV for all the characters consistently indicating that all the characters were influenced by the environment. High PCV indicates maximum variability present in the cultivars for these characters. High PCV along with high GCV in leaf area, plant height at 2nd flower flush (24.47,7.64), (30.17, 24.69) indicates

maximum variability existing in the cultivars for these characters and offers good scope for improvement by simple selection through these characters. High PCV and larger differences between PCV and GCV were recorded in per cent increase/decrease in bud size at 12 days(95.47,21.61), total solution absorbed at 12 days of vase life(77.72,27.59), diameter of flower bud(10.63, 3.74) and diameter of flower(18.29,13.40) indicating that these characters are influence by environment. According to Lal*et al.* (1982) the differences between the rose cultivars were highly significant for all the characters studied. They considered that the characters like flower bud(10.63, 12.29), number of petals(81.45, 40.47) showing additional gene effect and which had high heritability combined with high genetic advance and these traits should be considered for crop improvement through selection. According to Falconer (1981), high heritability is a good index to understand the transmission of any characters from parents to their offspring in the next generation.

High heritability accompanied by low genetic advance was found for all the characters except thorn density per inch(84.39, 84.86), total solution absorbed at 12 days(12.60, 20.17) and 16 days vase life(4.81, 13.35), per cent increase/decrease in bud size at 12 days (5.12, 10.08)and 16 days(5.51, 15.11) that traits are more likely under the control of non-additive gene action and selection for these characters could be less effective. Hence heterosis breeding is advocated for the improvement of these characters as Johnson *et al.* (1955) indicating that high value of heritability is not always an indication of high genetic advance. Similar results were reported by Nair and Medhi (2002), Palai *et al.* (2003) and Verma *et al.* (2008a).

Genotypic and phenotypic Correlation coefficient

The value of correlations at the phenotypic level were lower than genotypic correlation this indicates an inherent association among various traits but phenotypic expression of which was however, lessened under the influence of environment (Table 6 and Table 7). Number of branches per plant, thorn density per inch had positive and highly significant correlation with plant height at first flower flush(0.581, 0.607), similarly, a significant positive correlation was observed between diameter of flower and length of the sprouted bud(0.649).

Significant positive correlation existed between flower per plant and diameter of the flower, thorn density and length of the sprouted bud at genotypic level and number of branches per plant, thorn density, and number of petals per plant at phenotypic level. Since there is a highly positive association among these component characters, the selection of these particular characters for improvement of these cultivars shall automatically influence other characters in undesirable direction, whereas negative correlation among the component will not be helpful as selection for particular characters shall have adverse effect on the other traits for crop improvement. Similar finding are reported for cut flower yield in Gerbera by Sujatha Nair and Shiva (2003) and Singh *et al.* (2001).

The value of correlation at the genotypic levels was greater than the corresponding phenotypic correlation indicating the preponderance of genetic variation in the expression of most of the characters. From the study it was also revealed that there was a significant positive correlation existed between number of flower/plants and number of petals/flower. The selection of these particular characters for improvement of any variety shall influence other characters in desirable direction. Verma *et al.* (2008a) also found that higher degree of genotypic and phenotypic coefficient of variation was obtained from thorn density followed by length of shoot after one month of bud sprouting, number of flower per plant, length of sprouted bud, plant spread and length of shoot.

CONCLUSION

From the findings it may be concluded that great variability exists with regard to many desirable characters among the cultivars and found that cultivars Sphinix Gold, Upper Class and Bordeaux were suitable for cut flower production under agro-climate condition in the foot hill of Nagaland

REFERENCES

Allard, RW. 1960. Principle of plant breeding. Jon Wiley and Sons. Inc. New York.

Ahmad I, Khalid MS, Khan MA, Saleem M. 2011.Morpho-Physiologicalcomparasion of Cut Rose Cultivars Grown In Two Production Systems. *Pak. J. Bot.* **43**(6): 2885-2890.

Burton, GW. 1952. Quantitative inheritance in grasses. Proc.: Sixth Int. Grassland Congr.,**1** : 273 – 283.

Bhattacharjee SK and Saxsena NK. 1998. Studies on growth, flowering, post-harvest life and quality of *Rosa* species. *Indian Rose Annual.***14** : 97-103

Bhattacharjee SK. 1994. Post-harvest life of cut roses as affected by varietal difference. *South Ind. Hort.***42**: 331 – 334

Bhattacharjee SK and De LC. 2010. Advanced commercial floriculture. 2nd Revised and enlarged edition. Aavishkar Publishers, pp. 3 – 4, xii – xiii

Bhattacharjee SK, Singh UC, Saxsena NK.1993. Studies on vegetative growth flowering, flower quality and vase life of roses. *Singapore J. Pri. Indus.*, **21**: 67-71.

Bala M, Kumar R, Singh K. 2008. Effect of pulsing and holding solutions on keeping quality of cut flower of rose (*Rosa spp.*).*Journal of Ornamental Horticulture* **11**: 54-57.

Fazli Rabbi Kalid H, Muhammad R.2004. Evaluation of different rose cultivars under the Agro-climatic condition of Hattar, Haripur (NWFP). *Pakistan Sarhad J. Agri.* **20**:43- 45.

Falconer DS. 1981. Introduction to quantitative genetics. 2nd Edn., Longman, New York.

Jonshon HW, Robinson FH and Comstack RE. 1955a. Estimates of genetic and environmental variability in soybean. *Agron. J.***47** : 314-318.

Jonshon HW, Robinson FH. and Comstack RE. 1955b.Genotypic and phenotypic correlation in soybean and their implication in selection. *Agron. J.* **47** : 477-483.

Jibouri HW. Miller PA, Robinson H.F. 1958. Genotypic and environmental variance and covariance in upland cotton cross of inter specific origin. *Agron. J.***50**:633-634.

Khattak, AM, Dawar SH, M. Khan, MA, Razaq A.2011. Effect of Summer Pruning on the Quality and Performance of Rose Cultivars. *Sarhad J. Agric.* **27**(1): 27-31.

Lush JL. 1949. Animal breeding plans. The Collegiate Press, Amer. Iowa, 34th Edition.

Lal SD, Seth JN, Yadav JP, Danu NS. 1982 .Genetic variability and correlation studies on Rosa. I. Phenotypic variability, heritability and genetic advance. *Prog. Hort.,* **14**:234-236.

Martins JL, Fagnani MA, Piedade SMD.2009. Production and quality of floral buds for rose cv. Vega (*Rosa* sp.) cultivated under plastic with different years of use. *Ciencia-e-Agrotechnologia.* **33**:2011-2018.

Manjula G and Patil AA.2005. Performance of rose cultivars under naturally ventilated polyhouse. *J. Maha. Agri. Uni.* **26** : 217-220.

Nair SA, Medhi RP. 2002. Performance of gerbera cultivars in the Bay Island. *Indian. J. Hort.* **59**:322-325.

Paramagoudar P. 2010.Performance of Dutch Roses under Polyhouse. University of Agricultural Sciences, Dharwad. India. pp. 27-33.

Palai SK, Bhuyan S, Mohapatra A, Mishra HN, Patnaik AK, Das P. 2000. Evaluation of different rose cultivar under Bhubaneswar conditions. Orissa J. Hort. **28** : 12 – 21.

Palai SK, Mishra M,Bhayan S, Mishra HN.2003.Genetic variability in hybrid tea roses. *J. Orn. Hort.***6** : 29-33.

Panse VG and Sukhatme PV1989. Statistical methods for agricultural workers, ICAR, New Delhi.

Singh SP and Kayiyar RS 2001. Correlation and path coefficient analysis for flower yield in *Rosa damascene* Mill. J. Herbs, Spices, Med. Plant **8**: 43 – 49

Singh SP, Katiyar RS, Rai SK 2000.Correlated response for increased flower yield in 'damask rose'.*Nat. Aca. Sci. Letr.* **23** : 95-97.

Sujatha Nair A and Shiva KN. 2003.Genetic variability, correlation and path coefficient analysis in gerbera. *J. Ornt. Hort*.**6** (3):180-187.

Tabassum R, Ghaffoor A,Waseem K, Nadeem MA 2002. Evaluationof Rose Cultivars as Cut Flower Production. *Asian Journal of plant science***1**(6):668-669.

Verma S, Kumar S, Singh D.2008a.Studies on variability of various quantitative traits in *Rosa spp. J. Orn. Hort.* **11**: 62-65.

Verma S, Kumar S, Singh D.2008b. Correlation studies in rose (*Rosa spp.*). *J. Orn. Hort.***11**:98-103.

Wu MJ, Van Doorn WG, Ried MS.1991. Variation in senescence of carnation (*Diantnuscaryophyllus*) cultivars. I Comparison of flower life, respiration and ethylene giosynthesis. *Scientia Horticulturae* **48**:99-109.

Citation:

Rangnamei KL, Maiti CH, Kumar M and Pungding L.2018. Growth, yield and vase life of rose as influenced by different cultivars under protected condition of Eastern Himalayas. *Journal of AgriSearch* **5** (2): 100-104