EFFECT OF FOLIAR APPLICATION OF BIO-REGULATORS AND NUTRIENTS ON PHYSICO-CHEMICAL PROPERTIES OF LEMON (CITRUS LIMON BURMA.) CV. PANT LEMON-1 UNDER SUBTROPICAL CONDITION OF GARHWAL REGION

Bharat Bhusan Bhatt*, S.S. Rawat and Dinesh Kumar

Department of Horticulture, H.N.B. Garhwal University, Srinagar (Garhwal)-246174, Uttarakhand, India

Received-01.11.2016, Revised-17.11.2016

Abstract: The present investigation was carried out at Horticultural Research Centre and Department of Horticulture, Chauras campus, H.N.B. Garhwal University, Srinagar Garhwal, Uttarakhand, India during 2008-09 growing seasons to study the effect of foliar application of bio-regulators and nutrients on quality of lemon (*Citrus limon* Burma.) cv. Pant Lemon-1. On the basis of overall performance of treatments on quality characters of fruits, it can be concluded that the values for fruit set, days to maturity, yield of fruits per plant, fruit length, fruit juice, total soluble solids, total sugars, shelf-life of fruits, have been obtained maximum under GA₃ (20 ppm) treatment, while the minimum fruit cracking and the maximum fruit weight, fruit volume, acidity were recorded with NAA (50 ppm). However, the maximum vitamin C was recorded under NAA (10 ppm) foliar application.

Keywords: Foliar application, Nutrients, Bio-regulators, Lemon

REFERENCES

Ahlawat, V.P., Daulta, B.S. and Singh, J.P. (1984). Effect of pre-harvest application of GA₃ and captan on storage behaviour of Kinnow, a mandarin hybrid. *Haryana J. Hort. Sci.*, **13 (1-2):** 4-8.

Ahmed, F.F., Sayed, M.A. and Maatouk, M.A. (1988). Effect of nitrogen, potassium and phosphorus fertilization on yield and quality of Egyptian Balady lime trees (*Citrus aurantifolia*). *Ann. Agric. Sci.*, **33** (2): 1249-1268.

Arslanov, M.A. (1979). Application of NAA for regulating cropping of lemon trees grown under cover. *Ref. Zhurnal.*, **11:** 636.

Babu, G.H.V.R. and Lavania, M. L. (1985). Effect of plant growth regulators on fruit set and fruit drop of Pant Lemon-1. *Indian J. Hort.*, **42** (2): 237-240.

Babu, R.S.H., Rajput, C.B.S. and Rath, S. (1982). Effects of zinc, 2,4-D and GA₃ in Kagzi lime (*Citrus aurantifolia* Swingle) in fruit quality. *Haryana J. Hort. Sci.*, **11** (1-2): 59-65.

Bhat, A., Kher, R. and Gupta, S.P. (2006). Effect of growth regulators and nutrients on fruit cracking and fruit quality in lemon. *Haryana J. Hort. Sci.*, **35** (**3-4**): 267.

Brahmachari, V.S., Kumar, R. and Rani, R. (1999). Effect of pre-harvest application of different chemical on shelf-life of litchi fruits. *Haryana J. Hort. Sci.*, **28** (**3-4**): 182-185.

Choudhary, M.R. and Dhaka, R.S. (2005). Effect of different post-harvest treatments on quality of kinnow mandarin fruits during storage. *Haryana J. Hort. Sci.*, **34** (**1-2**): 39-41

Chundawat, B.S. and Randhawa, C.S. (1973). Effect of plant growth regulators on fruit set, fruit drop and quality of Grape fruit (*Citrus paradisi* Macf.). *Haryana J. Hort. Sci.*, **2 (1-2):** 6-13.

*Corresponding Author

Chundawat, B.S., Gupta, O.P. and Arora, R.K. (1975). Studies on fruit drop in Kinnow- A mandarin hybrid cultivar. *Haryana J. Hort. Sci.*, **4** (3-4): 11-15.

Coggins, C.W. Jr., Lewis, L.N. and Hield, H.Z. (1963). Gibberellins spray on lemons in Ventura country. *Calif. Citrogr.*, **49** (3): 12.

Deidda, P. (1971). The effect of gibberellic acid on fruit set, productivity and fruit characterstics of Washington Navel oranges. *Studi Sassaresi.*, **19**: 264-275

Deshraj, S. (1989). Effect of various levels of N, P and K on growth, yield and quality of Sweet lime (*Citrus limettioides* Tanaka.). M. Sc. Agriculture (Horticulture) Thesis. Submitted to, G.B. Pant University of Agriculture and Technology, Pantnagar. Uttarakhand.

Dilipbabu, (1984). Effect of Different Doses of N, P and K on Growth, Yield and Quality of Pant Lemon-1. M. Sc. Agriculture (Horticulture) Thesis. Submitted to, G.B. Pant University of Agriculture and Technology, Pantnagar. Uttarakhand.

Dixit, C.K., Yamdagni, R. and Jindal, P.C. (1977). A note on the effect of micronutrients spray on quality of Kinnow- A mandarin hybrid. *Haryana J. Hort. Sci.*, **6** (3-4): 153-154.

Ghosh, S.N., Bera, B., Roy, S., Kundu, A. and Dutta Roy, S.K. (2009). Effect of nutrients and plant growth regulators on fruit retention, yield and physicochemical characteristics in aonla cv. NA-10. *J. Hort. Sci.*, **4** (2): 164-166.

Hafeez, R., Ali, N. and Rafique, M. (1999). Effect of foliar applied zinc, manganese and boron on Sweet orange quality. *Pakistan J. Soil Sci.*, **17** (3-4): 113-116.

Hirose, K., Koremura, M., Daito, H. and Suzuki, K. (1974). Studies on thinning citrus fruits by

- applying chemicals. VI. The effects of NAA on the concentrations of tree amino acids, sugar and citric acid in Satsuma juice. *Bull. Fruit tree Res.*, **1:** 7-23.
- **Jackson, D.I.** (1968). Gibberellic acid delays lemon maturity. *Orchard, N.Z.*, **41:** 259-260.
- **Josan, J.S. and Sandhu, A.S.** (1999). Studies on the causes and periodical incidence of fruit cracking in lemon (*Citrus limon* (L.) Burm.). *Haryana J. Hort. Sci.*, **28** (3-4): 158-160.
- **Josan, J.S., Sandhu, A.S., Singh, R. and Dhillon,** (1995). Effect of plant growth regulators and nutrients on fruit cracking in lemon. *Indian J. Hort.*, **52 (2):** 121-124.
- **Keleg, F.A. and Minessy, F.A.** (1965). Effect of 2,4-D on June drop, pre-harvest drop, fruit quality and alternate bearing in Balady mandarin and Washington Navel orange. *Alex. J. Agric. Res.*, **12** (2): 47-72.
- **Krezdorn, A.H. and Cohen, M.** (1963). The influence of chemical fruit set, sprays on yield and quality of citrus. *Citrus. Ind.*, **44** (1): 16-20.
- **Kumar, R. and Nagpal, R.** (1996). Effect of postharvest treatments of the storage behaviour of mango cv. Dashehari. *Haryana J. Hort. Sci.*, **25** (3): 101-108
- Kumar, R., Singh, J.P. and Gupta, O.P. (1975). Effect of growth regulators on fruit set, fruit drop and quality of Sweet lime (*Citrus lamettioides* Tanaka.). *Haryana J. Hort. Sci.*, **4 (3-4):** 123-129.
- Langthasa, S. and Bhattacharya, R.K. (1991). Foliar application of zinc on fruit quality of 'Assam lemon' (*Citrus limon Burm*). *South Indian Hort.*, **39** (3): 153-155.
- Malik, R.P., Ahlawat, V.P. and Nain, A.S. (2000). Effect of foliar spray of urea and zinc sulphate on yield and fruit quality of Kinnow- A mandarin hybrid. *Haryana J. Hort. Sci.*, **29** (1-2): 37-38.
- Nakajima, T., Wanago, M. and Ogaki, C. (1969). Practical studies on the use of naphthalene acetic acid for thinning the fruits of Unshiu orange trees. *Bull. Kangawa. Hort. Exp. Sta.*, **17:** 9-17.
- **Phillips, R.L. and Meagher, W.R.** (1967). Physiological effect and chemical residues resulting from 2,4-D and 2,4,5-T sprays used for control of pre-harvest fruit drop in Pineapple oranges. *Proc.Fla.St.Hort. Soc.*, **79:** 75-79.
- **Ram, R.M. and Bose, T.K.** (1994). Effect of foliar spray on fruit and zinc on growth and yields of Mandarin orange (*Citrus reticulata* Blanco.). *Haryana J. Hort. Sci.*, **51** (3): 266-271.

- **Rawat, V., Tomar, Y.K., and Rawat, J.M.S.** (2010). Influence of foliar application of micronutrients on the fruit quality of guava cv. Lucknow-49. *J. Hill Agri.*, **1** (1): 63-66.
- Rawat, V., Tomar, Y.K., and Rawat, J.M.S. (2011). Influence of foliar application of micronutrients on the quantitative characters of guava cv. Lucknow-49. *Green farming*, **2** (1): 47-49
- **Reddy, P.A. and Prasad, D.M.** (2012). Effect of plant growth regulators on fruit characters and yield of pomegranate (*Punica granatum* L.). cv. Ganesh. *International J.Plant, Animal Environ. Sci.*, **2** (2): 91-93.
- **Rodrigues, J. and Subramanyam, H.** (1966). Effect of pre-harvest spray of plant growth regulators on size, composition and storage behaviour of Coorg mandarin (*C. reticulata* Blanco.). *J. Sci. Fd. Agric.*, **17:** 425-427.
- **Sharma, A.K., Singh, K. and Mishra, S.P.** (2003). Effect of foliar spray of zinc sulphate, 2,4,5-T and GA₃ on quality of Kagzi lime (*Citrus aurantifolia* Swingle.). *Orissa J. Hort.*, **31** (2): 29-32.
- Singh, A.R., Maurya, V.N., Pande, N.C. and Rajput, R.S. (1989). Role of potash and zinc on the biochemical parameters of Kagzi lime (*Citrus aurantifolia* Swingle.). *Haryana J. Hort. Sci.*, **18** (1-2): 46-50.
- **Singh, B. and Singh, R.V.** (1984). Effect of various levels of nitrogen on growth, yield and yield contributory characters of lemon (*Citrus limon* Burm.). *Prog. Hort.*, **16** (2): 37-40.
- Singh, J.K., Prasad, J. and Singh, H.K. (2007). Effect of micronutrients and plant growth regulators on yield and physico-chemical characteristics of aonla fruits in NA-10. *Indian. J. Hort.*, **64 (2):** 216-218.
- **Singh, J.P. and Randhawa, S.S.** (1961). Effect of plant growth regulators on fruit drop, size and quality in mandarin (*Citrus reticulata* blanco). var. Nagpuri and Lahor local, *Indian J. Hort.*, **18** (1): 285-294.
- **Singh, R. and Singh, R.** (1981). Effect of GA_3 Planofix (NAA) and Ethral on granulation and fruit quality in Kaula mandarin. *Scientia Hort.*, **14** (4): 315-321.
- **Zidan, Z., Mahmoud, S. and Shawky, I.** (1965). Effect of 2,4-D and urea sprays on yield and fruit quality of Balady oranges. *Annals Agric. sci.*, **10**: 297-313.