Biological Forum – An International Journal **10**(1): 96-100(2018)

ISSN No. (Print): 0975-1130
ISSN No. (Online): 2249-3239

Effects of Triacontanol on some Qualitative and Quantitative traits in Kiwifruit

Mostafyi Akram
Ms student in Pomology, University of Tabriz, Iran

(Corresponding author: Mostafyi Akram)
(Received 15 March 2018, Accepted 12 April, 2018)
(Published by Research Trend, Website: www.researchtrend.net)

ABSTRACT: Kiwifruit is one of the most important subtropical fruits enjoying high nutritional value. Considering the importance of this fruit, it's lower calorie and positive effects of triacontanol (TRIA) on the plant growth stimulation and increased cellular division in them, the present research study aims to investigate effects of TRIA on qualitative and quantitative properties of Kiwifruit (Abubakar, Ashraf, & Ashraf, 2013). Hence, Kiwifruit treatment was conducted at different levels of the compound in the form of an entirelyrandomised design with four repetitions. Then, quantitative properties of the fruit including length to width ratio, volumetric mass and the fruit weight were studied along with qualitative properties such as stiffness rate, solids percent in solution (TSS), acidity (TA), Ascorbic acid rate and phenolic compounds amount. Finally, investigation of all treatments indicated that TRIA, which is a natural compound couldbe used as a promising compound in the improvement of properties of Kiwifruit.

Key words: Kiwifruit, triacontanol, ascorbic acid, phenolic compound

INTRODUCTION

Kiwifruit is among dandelion blooming plants from Actinides family. The plant is local in Southeast Asia, and China is considered as the biggest producer of the item with yearly production of more than two million and three hundred ninety (2390000) tons. Kiwifruit is a subtropical natural product, which is, likewise, planted broadly in North part of Iran. The plant has a crawling stem, which discovers rising structure developing to 5m-7m in tallness, if there should be an occurrence of having a defender. The stems develop quickly. Youthful stems are green having fleeces on them. Be that as it may, they change into grayish dark colored step by step, losing their fleeces. Kiwifruit is a bipod plant and stem develops quickly in this plant.

Considering rapid fruiting time of the plant (three years) and advantages of the plant fruit, it is necessary to pave the way for quality improvement of the product. Triacontanol (TRIA) is a natural compound and one type of fatty alcohol, which is obtained from plants cuticles wax and beeswax (Ries, Wert, Sweeley, & Leavitt, 1977). Different roles have been identified till now to this compound, among which is stimulation of the plant growth, increased vegetative growth, an increase of chlorophyll contents and the plant's dry weight. Use of such compound at the initial stages of fruit growth results in cell division and increased fruit quality in the products such as Kiwifruit and strawberry (Baba, Ali, Kumar, & Husain, 2017; Kapitsimadi & Vioryl, 1993). Even TRIA-treated plants indicated an increase of root growth resulting in increased uptake, bearing positive effects on vegetative growth, product amount and its quality (Kumra *et al.,* 2018; Ries, Wert, Sweeley, & Leavitt, 1977). Extensive beneficial outcomes of the compound has been appeared in changed cases in adapting to different burdens particularly saltiness stress (Krishnan and Kumari, 2008).

Thinking about impacts of the compound on expanded cell division and on the grounds that the plant natural products dependably have cell division, so in this examination, we continued on the examination of impacts of triacontanol (TRIA) on expanded weight, mass, subjective and quantitative qualities of the fruit (Abubakar *et al.,* 2013).

Length to width proportion was estimated by coulis, and volumetric mass was estimated by adjust and comparable water uprooting. In addition, the organic product weight was estimated under wet and dry states. The organic product sharpness was estimated by titration. Phenolic mixes were estimated by Folin Ciocaltu with the standard Galic corrosive strategy. The outcomes were acquired in a proportion of mg to Galic corrosive equal per 100gr FW(Singleton and Rossi, 1965).

Dynamic stage incorporated a blend of 80 mM Acetate support sodium with PH=4.8 including 1mmul of n-octylamin and methanol 15% and meta-phosphoric corrosive 0.015% and last pH of kineticphase was 4.6 andkinetic stage stream speed was 0.9ml/min (Behrens and Madère, 1987).

MATERIAL AND METHODS

The study samples were grafted from 15-year Kiwifruit shrub of Highward variety on seed base of Kiwifruit. The plants were grafted near Chaboksar city; then they were planted in the research project site one year after grafting. Effects of TRIA on qualitative and quantitative properties of Kiwifruit and Highward numbers were studied in Chaboksar city of Gilan province. The geographical position of the city is 50° 34′ longitude and 36°, 57′ latitude and the project site is 80m above sea level.

The TRIA treatments were studied in the form of spraying treatment 50 days after flowering. The treatments considered for spraying on the stem and leaveswere classified in four concentrations of 0 (control group), 10^{-5}, 5.5×10^{-5} and 10^{-4} M. The experiment was conducted in four repetitions and the form of completely randomised design. The fruits harvesting from the treated bases was conducted at the ordinary harvesting time (November) based on the research project plan. Physical properties of the fruit including length to width ratio, volumetric mass, dry and wet weight along with qualitative features such as firmness, total suspended solids (TSS), acidity (TA), ascorbic acid amount and phenolic compounds amount were evaluated in the ratio of each repetition and treatment. Different aspects of the Kiwifruits have been worked out like Ethylene reaction factors (ERFs) assume imperative parts in natural product maturing and abiotic push reaction. After collect, natural product, for example, kiwifruit are liable to a scope of stresses related with postharvest dealing with and capacity medications. There have been few endeavors to assess organic product ERF reactions in connection to such abiotic push. Stress medications including low temperature (0°C), high temperature (35°C), high CO_2 (5%) and high water misfortune (~10% RH air) were connected to newly gathered develop kiwifruit. Articulation examples of 13 AdERF qualities were taken after. In light of the abiotic stresses, AdERF3, AdERF4, AdERF11, AdERF12 and AdERF14 were constitutively up-directed, and AdERF1 was by and large down-managed, while the other AdERF qualities demonstrated no consistent articulation designs (Yan *et al.*, 2012). However, less literature is available on effects of Triacontanol on some qualitative and quantitative traits in Kiwifruit. Hence this study will fill a gap.

RESULTS AND DISCUTIONS

Regarding effects of Triacontanol (TRIA) on qualitative features of Kiwifruit, results of variance analysis for the fruit length (Fig. 1) indicated that the fruit length with highest treatment level was increased with TRIA and in the field of the fruit width it was influential at third and fourth levels of treatment showing an increase at the fruit width. In fact, the compound can increase the length to width ratio in Kiwifruit. Mahaveer *et al.* (2017) reached similar results in their study of effects of plant regulators, proposing effectiveness of TRIA on the fruit size (Suman, Sangma, Meghawal, & Sahu, 2017).

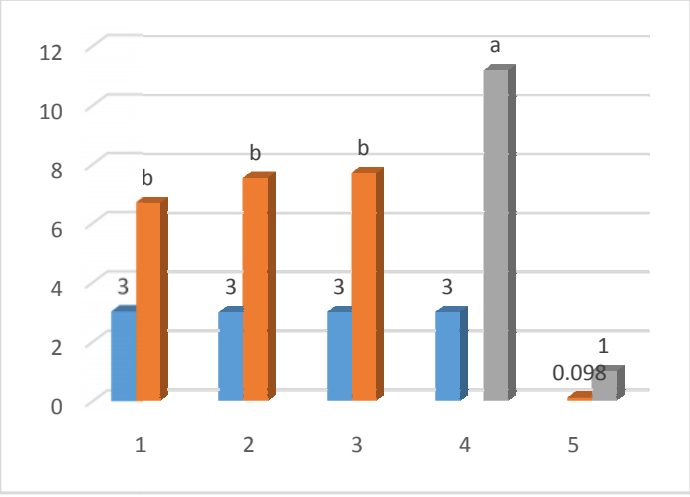

Fig. 1. Increment in the Fruit length due to Triacontanol.

Investigation of results related to effects of Triacontanol (TRIA) indicated that the compound has not a significant effect on the volumetric fruit mass. However, investigation of one of the leading factors of the fruit (i.e. its weight) indicated that TRIA-treatment resulted in increased weight at the third and fourth levels. This investigation was, also, conducted by Khunte *et al*. indicating that implementation of 100 ppm Triacontanol (TRIA) in spraying method on strawberry had the most effect on the fruit weight (Khunte, Kumar, Kumar, Singh, & Saravanan, 2014).

Regarding qualitative features of the product, results obtained from variance analysis for product stiffness (Fig. 2) indicated that stiffness level of the fruit was increased in all treatments compared to control treatment at the level of 1% and treatment four with concentration $5/5\times10^{-5}$Mg/L had the most effect in its increased stiffness. These findings are in balance with results of Naeem *et al.* (2012) study (Naeem, Khan, & Moinuddin, 2012). Statistical investigations of the fruit's total suspended solids (Fig. 3) indicated that TSS rate of Kiwifruit was increased in all TRIA-treated samples and TSS rate was increased with the increase of TRIA. In this case, results obtained in this experiment are unlike results of TRIA treatment on strawberry, being conducted by Hajam *et al.* (2017).

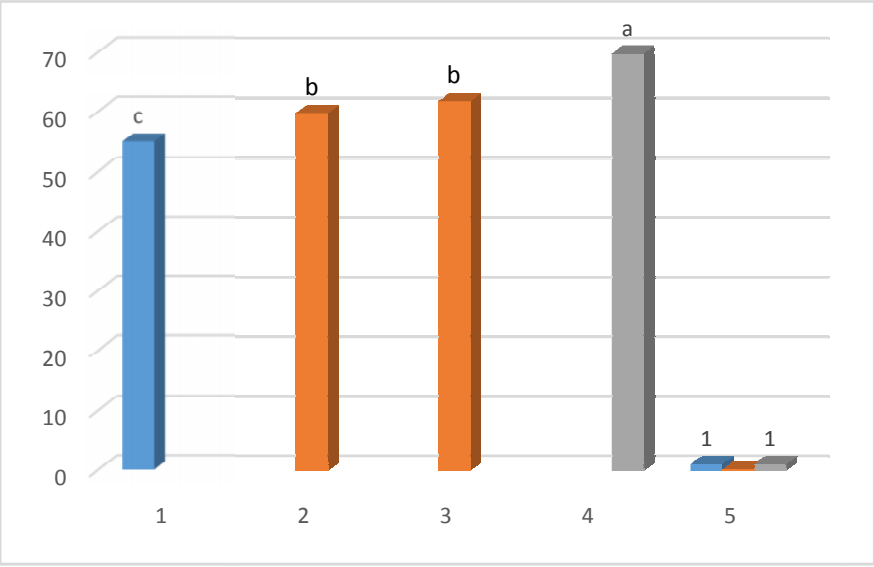

Fig. 2. Increment in the stiffness due to Triacontanol.

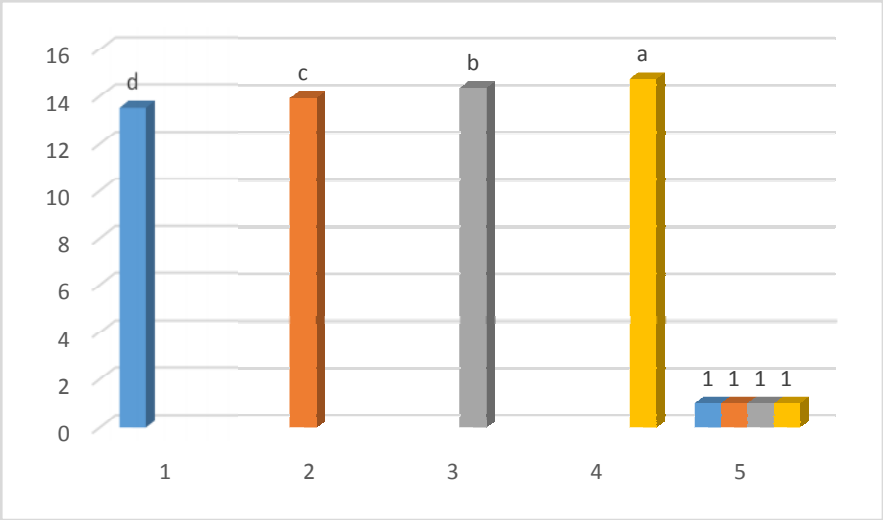

Fig. 3. Increment in the TSS due to Triacontanol.

In the studies conducted on strawberry, it was observed that TSS of the fruit was decreased with the increase of the level of TRIA (Hajam *et al.*, 2018). The fruit acidity (TA) evaluations indicated that TRIA implementation at second level had no difference with the control group. This is while levels three and four indicated an increased level of acidity in the fruit. In a study carried out by Tiwari *et al.* (2017) it was shown that increase of TRIA level of treatments results in an insignificant increase of acidity in strawberry (Tiwari, Saravanan, & Lall). This is in accordance with findings of the present study to some extent. Findings of variance analysis for ascorbic acid (Fig. 4) indicated the increasing effect of the second level of treatment. It also shows the incremental effect of third and fourth levels on ascorbic acid rate equally. In the study conducted by Tiwari *et al.* (2017) implementation of 150 ppm (TRIA) had the most effect on increased ascorbic acid of strawberry.

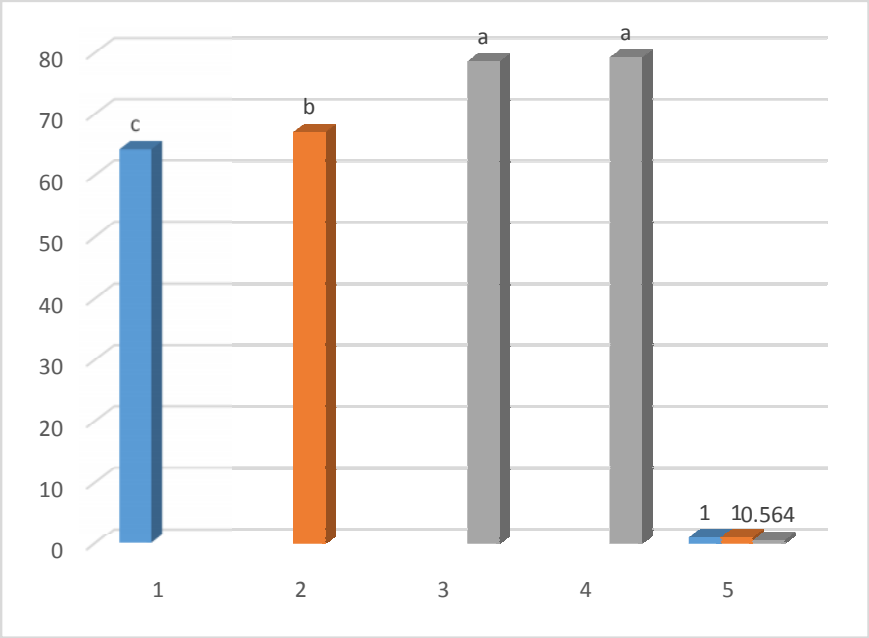

Fig. 4. Increment in the ascorbic acid due to Triacontanol.

Studying phenolic compounds results indicated that levels three and four treatment result in increased phenolic compounds in Kiwifruit. Similar results can be found in the study conducted by Das et al., which confirms the issue (Das *et al.*, 2014). This study has observed various positive effects of Triacontanol on Kiwifruits that is an indication that it will increase the quality of fruit both qualitatively and quantitatively.

CONCLUSION

Investigation of the results of current study indicates that Triacontanol (TRIA) has positive effects on qualitative and quantitative features of Kiwifruit, which can be used as a natural compound in the improvement of features of Kiwifruit. However our study is limited in its scope, Triacontanol effects during post-harvest storage under both room and low temperatures. Need to be investigated. Low temperature storage could enhance anthocyanin accumulation, and induce the expression of several structural and regulatory genes related to biosynthesis and molecular mechanisms need to be further addressed.

REFERENCE

Abubakar, A. R., Ashraf, N., & Ashraf, M. (2013). Effect of plant biostimulants on fruit cracking and quality attributes of pomegranate cv. Kandhari kabuli. *Scientific Research and Essays*, **8**(44), 2171-2175.

Baba, T. R., Ali, A., Kumar, A., & Husain, M. (2017). Effect of exogenous application of salicylic acid and triacontanol on growth characters and yield of strawberry.

Behrens, W. A., & Madère, R. (1987). A highly sensitive high-performance liquid chromatography method for the estimation of ascorbic and dehydroascorbic acid in tissues, biological fluids, and foods. *Analytical biochemistry*, **165**(1), 102-107.

Das, N., Islam, M.E., Jahan, N., Islam, M.S., Khan, A., Islam, M.R., & Parvin, M.S. (2014). Antioxidant activities of ethanol extracts and fractions of Crescentia cujete leaves and stem bark and the involvement of phenolic compounds. *BMC complementary and alternative medicine*, **14**(1), 45.

Hajam, M. A., Hassan, G., Parray, E. A., Wani, M., Shabir, A., Khan, I.F., Masoodi, L. (2018). Transforming fruit production by plant growth regulators. *Journal of Pharmacognosy and Phytochemistry*, **7**(1): 1613-1617.

Kapitsimadi, C., & Vioryl, S. (1993). Effect of a long chain aliphatic alcohol (triacontanol) on growth and yield of different horticultural crops. Paper presented at the International Symposium on Quality of Fruit and Vegetables: Influence of Pre-and Post-Harvest Factors and Technology 379.

Khunte, S. D., Kumar, A., Kumar, V., Singh, S., & Saravanan, S. (2014). Effect of Plant Growth Regulators and Organic Manure on Physico-chemical Properties of Strawberry (Fragaria x ananassa Duch.) cv. Chandler. *International Journal of Scientific Research And Education*, **7**(2), 1424-1435.

Krishnan, R. R., & Kumari, B. (2008). Effect of N-triacontanol on the growth of salt stressed soybean plants. *Journal of Bioscience*, **19**(2), 53-62.

Kumra, R., Reena, S. S., Bakshi, P., Kumar, A., Singh, M., & Kumar, V. (2018). Influence of plant growth regulators on strawberry: A review. *IJCS*, **6**(1), 1236-1239.

Naeem, M., Khan, M. M. A., & Moinuddin. (2012). Triacontanol: a potent plant growth regulator in agriculture. *Journal of Plant Interactions*, **7**(2), 129-142.

Ries, S. K., & Stutte, C. A. (1985). Regulation of plant growth with triacontanol. *Critical Reviews in Plant Sciences*, **2**(3), 239-285.

Ries, S. K., Wert, V., Sweeley, C. C., & Leavitt, R. A. (1977). Triacontanol: a new naturally occurring plant growth regulator. *Science*, **195**(4284), 1339-1341.

Singleton, V. L., & Rossi, J. A. (1965). Colorimetry of total phenolics with phosphomolybdic-phosphotungstic acid reagents. *American journal of Enology and Viticulture*, **16**(3), 144-158.

Suman, M., Sangma, P. D., Meghawal, D. R., & Sahu, O. P. (2017). Effect of plant growth regulators on fruit crops. *Journal of Pharmacognosy and Photochemistry*, **6**(2), 331-337.

Tiwari, A. K., Saravanan, S., & Lall, D. influence of different plant growth regulators on vegetative growth and physico-chemical properties of strawberry (fragaria X ananassaduch.) cv. chandler.

Yan X, Allan A, Quian X, Fregson I. Differential expression of kiwifruit ERF genes in response to postharvest abiotic stress. *Postharvest Biology and Technology* **66**: 1–7 · April 2012.