European Journal of Research Development and Sustainability (EJRDS)
Available Online at: https://www.scholarzest.com
Vol. 3 No. 2 February 2022
ISSN: 2660-5570

GROWTH REGULATOR'S ROLE ON THE GROWTH AND YIELD OF GRAPES (*VITIS VINIFERA* L.): A REVIEW

Suzan Ali Hussein[1] Huda Sami Kanber[2] Mohammed Abdul Aziz Lateef[1]
[1]Department of Horticulture and Landscape Design, College of Agriculture, University of Kirkuk, Kirkuk, Iraq.
[2]Department of Medical and Industrial Plant, College of Agriculture-Hawija, University of Kirkuk, Iraq

Article history:
Received: 7th December 2021
Accepted: 6th January 2022
Published: 13th February 2022

Abstract:
Growth regulators are non-nutritive organic compounds produced either naturally by plants or synthetic compounds produced industrially in laboratories or factories and where they can influence the growth and development of plants at certain concentrations. Encouraging growth within certain physiological concentrations, as it can be added as a spray to the vegetative system in the form of liquid solutions and in concentrations that are not harmful to the plant, as adding nutrients through the leaves is no less efficient than absorbing them through the roots.

Keywords: GA3, Salicylic acid, cytokinins, *Vitis vinifera* L.

INTRODUCTION

The commercial grape belongs to the genus Vitis, and it is one of the 14 genera of the Vitaceae family, which is a family that includes more than 1000 species widely distributed in the tropics and temperate regions (Jules and Moore, 1996) and (Al-Saeedi, 2000). The genus Vitis was found in 1700 by the researcher Tournefort, and the word Vitis comes from the Latin word (to attach) Viere, as the plants of this genus are characterized by the phenomenon of climbing (Galet, 1980). Grapes are of great economic importance and are cultivated on a large scale. They are considered among the most important and most widespread fruit trees in Iraq and the world, where they can be grown in various types of lands, including sandy lands, fertile lands, and lands of little depth. In addition to its importance in medical uses in the treatment of many diseases (Hassan and Salman, 1989) and its spread and gaining importance may be attributed to the high nutritional value of its fruits, as its fruits contain a high percentage of monosaccharides and organic acids in which tartaric and malic acid prevail. A small percentage of protein and some vitamins and minerals such as potassium, magnesium, and calcium (Hulme, 1970). The original homeland of the grape is the area located, In Central Asia, between the south of the Black Sea and the Caspian Sea, and from the European grapes all arose other grape cultivars before the discovery of the North American continent (Hassan and Salman, 1989). The area planted with grapes in the world is estimated at about 7,379,000 hectares, with a production of about 6, 1892,000 tons (FAO, 2003). The cultivation of grapes in Iraq is as old as the civilization of Mesopotamia, and grape trees were known to the ancient Iraqis before Christ (Al-Saidi, 1982). The area cultivated with grapes in Iraq is about 48000 hectares and its production is about 265000 tons (FAO, 2003). Al-Saidi (2000) mentioned that grapes are distinguished by the multiplicity of their varieties, which exceed 10,000 varieties spread in different countries of the world. In Iraq, there are currently about 75Varieties of grapes, most of which are seedless, and a few varieties are seedless, and their cultivation has not spread commercially (Al-Malak, 2001). One of the agricultural techniques is the possibility of using different concentrations of different plant growth regulators, which are non-food organic compounds that have the ability to stimulate, inhibit or modify physiological processes in the plant when used with small concentrations. These compounds can be natural or manufactured and include many types, including auxins, cytokinins, gibberellins, abscisic acid (ABA), and ethylene, in addition to other types to encourage or modify physiological processes in plant growth if they are used in appropriate concentrations and times (1987, Davies) and (Salman, 1988).

LITERATURE REVIEW:

The effect of gibberellic acid GA3 on the growth and yield of grapevines:

Gibberellins are one of the most important plant hormones, phytohormones, naturally formed within plant tissues, endogenous, which play a major role in the growth and development of plants during their life cycle. Elongation for its effect in increasing longitudinal growth by increasing cell division and elongation is one of the most widely used types of gibberellins in order to bring about a number of physiological changes in plants, as it participates with light, carbon dioxide, and heat together in accelerating the growth of seedlings in size and good physiological condition (Wood and Hanover, 1981), (Descriptive, 1995) and (Hans and Jan 1997). Al-Imam and Al-Baytie (a2016) found that spraying grapevines (Bea-dank) at a concentration of 50 mg.L-1 of gibberellic acid led to a significant increase in cluster weight and vine yield for both seasons of the study, which reached (305.44), 332.37 g. cluster-1 and 17.77, 27.17 kg. vine-1,

respectively, compared with the control treatment, as well as the effect of spraying at a concentration of 50 mg.L-1 to a significant increase in the percentage and phosphorous in the leaf petioles of both seasons of the study, which amounted to (0.059 In the study of Al-Imam and Al-Baytie, (b2016), when spraying the grapevines of Sultana Thompson variety at a concentration of 50 mg.L-1 of gibberellic acid led to a significant increase in cluster weight and vine yield And the percentage of macronutrients in the petioles of the leaves compared to the control treatment, while Al-Baytie and Aljabary, (2010) found in their study spraying grapevines of Bea-denk variety at a concentration of 50 mg.L-1 of gibberellic acid that the content of the leaves was not affected by the macronutrients. NPK, iron, and zinc were significant compared with the control treatment.

Effect of salicylic acid on the growth and yield of grapevines:

Salicylic acid (SA) is a plant hormone of a phenolic nature that regulates many physiological processes including flower induction, regulation of ion uptake, hormonal balance, stomata movement, and photosynthesis. In addition to its role in regulating the response of plants to environmental stress conditions, it turned out that this compound provides protection against types of environmental stress such as salt stress and drought stress as well as thermal stress and stress caused by heavy metals (Popova et al, 1997). During the last ten years, research has shown that the external preparation of this plant hormone reduces the harmful effects of salt stress in many plants, and also has a role in the thermoregulation process in some plants as well as controlling the absorption of ions by roots, in addition to the conductivity of CO2 gas stomata. (Rosaleen, 1992b) (El-Tayeb, 2005; Khodary, 2004), and salicylic acid may be a regulator of the phenomenon of gravitropism as it inhibits the ripening of fruits (Srivastava and Dwived, 2000). In this regard, Al-Hamidawi and Al-Shamry (2012) found in their study spraying Halawani grape vines at a concentration of 100 mg.L-1 of salicylic acid to a significant increase in the leaf area of the vine and cluster and the content of leaves from the total chlorophyll for both seasons of the study, which amounted to (21.01 and 21.68 m2. Vitis -1, 39433.0 and 3906.75 cm2. Vinea-1, 185.0 and 183.62 mg.100 gm-1 fresh weight) respectively compared to spraying at concentrations of 75 and 50 mg.l-1 and the comparison treatment, in addition to an increase in Significant percentage of total carbohydrates and nitrogen in the bronchi were (16.23, 1.24)%, respectively, compared with the rest of the treatments. And among the brothers, (2016) that spraying grape vines cultivar Kamali with salicylic acid at a concentration of 100 and 125 mg.l-1 led to a significant increase in the leaf area of the vine, the number, weight, and degree of clustering, total yield and percentage of total soluble solids, which reached (21.91 and 22.95). m2, 56.15, and 56.87 clusters. vine-1, 3.00 and 3.63, 551.2 and 589.5 g, 38.14 and 39.23 kg, 15.62 and 15.89%) respectively compared with the control treatment while spraying with salicylic acid reduced the total acidity in the fruits Where the comparison treatment outperformed the rest of the treatments amounted to 2.60%.

Effect of cytokinin KT-30 on the growth and yield of grapevines:

Cytokinins are endogenous organic compounds that encourage cell division and elongation and are found in most plant organs. The plant growth regulator CPPU [N-(2-chloro-4-pyridyl)-N-phenylurea], also called KT-30 or Forchlorfenuron, is one of the highly effective synthetic cytokinins that The effectiveness of benzyl adenine (BA) is 10-100 times greater (Greenplantchem, 2002), as it is characterized by its resistance to rapid metabolism, so it has a long effect period that contributes to its high activity, and its physiological activity is to stimulate cell division and increase its expansion (Yu et al., 2001). It also works to break the apical dominance and stimulate the growth of lateral shoots, as well as improve the quality and quantity of many horticultural crops (Greenplantchem, 2002 and Nesmith, 2002). In particular, cytokinins stimulate the building of proteins and participate in the regulation of the cell cycle. Perhaps, for this reason, they stimulate the maturation of chloroplasts and delay the aging of leaves. The addition of cytokinins to one site in the plant, such as a single leaf, makes this treated plant organ an effective place for the collection of amino acids that are transmitted to it. From the surrounding sites (George et al., 2008). The growth regulator KT-30 was used on table grape cultivars in the United States of America in 2005 and then used on wine grapes in subsequent years. Reynolds et al., (1992) reported that spraying four cultivars of seedless grapes with CPPU led to an increase in yield, size, and weight of berries. While Rhonda Smith, (2009) showed that spraying seedless and seedless vines with cytokinin led to an increase in the percentage of knots. Hadi, (2010) explained in his study that spraying Kamali grapevines with growth regulator KT-30 at a concentration of 0.25 ml.l-1 led to a significant increase in leaf area, grain weight, and yield, reaching (6162.67 cm2, 9.02 g, 11.42 kg) on respectively, compared with the rest of the treatments, while spraying with a concentration of 1 ml.l-1 significantly outperformed the rest of the treatments in the percentage of chlorophyll and total soluble solids, which amounted to (31.57, 15.27)%, respectively. Al. Bayati, (2020) found in his study spraying Olivette Noir grapevines with the growth regulator CPPU at a concentration of 5 mg.L-1, which led to a significant increase in the characteristics of vegetative growth, the number of leaves, and their content of chlorophyll and the percentage of dry matter in the leaves, which reached (651.3) and 536.8 leaves. NK for both seasons of the study, which amounted to (2.038, 2.042, 2.769 and 2.811)%, respectively, and the yield characteristics were significantly affected when spraying with a concentration of 5 mg.L-1 of the growth regulator CPPU, where the weight of the kernels, the number and weight of clusters and the amount of the total yield in both seasons increased. Where it reached (468.8 and 474.6 g, 60.22 and 65.96 clusters, 461.8 and 465.3 g, 27.72 and 30.63 kg) respectively compared with the rest of the treatments.

CONCLUSIONS:

From the above studies, it was found that the use of growth regulators (gibberellin, salicylic, and cytokinin) in certain concentrations and quantities as a spray on the vegetative totaled to an improvement of the vegetative growth

characteristics in addition to the quantitative and qualitative yield characteristics of grapevines of different varieties during the stages of plant growth.

REFERENCE:

1. **Al- Baytie, Merie R. S. and Ali M. O. Aljabary (2010).** Physiological role of Pruning, Fertilization with Humic Acid and Spraying with Gibberellic Acid in Mineral Content of Grapevine Bea-denk cultivars *Vitis vinifera* L. Journal of kirkuk University for Agricultural Sciences .Vol (10) No. (2):48-57.
2. **Al-Bayati, Jihan N.AQ (2020).** Effect of bud Load levels, CPPU and organic fertilizer on growth and yield of Olivette Noier Cv. PhD thesis. university of Baghdad. College of Agricultural.
3. **Al-Hamidawi, Abbas Mohsen Salman and Zain Al-Abidin Abdul-Hussein Handal Al-Shamry (2012).** Effect of spraying nutrient solution and Salicylic acid on vegetative growth characteristics of Halawani Grape variety (*Vitis vinifera* L.). University of Kufa Journal of Agricultural Sciences. Vol (24) No. (8):2245-2239 .
4. **Al-Imam, Nabil M. A. Abdullah and Marie R. Sameen Al- Baytie (2016a).** Effect of measuring levels pruning , humic acid and gibberellic acid (GA3) on yield and mineral content of grapevine (Bea-dank) *Vitis vinifera* L. Journal of kirkuk University for Agricultural Sciences .Vol (7) No. (2) :1-16.
5. **Al-Imam, Nabil M. A. Abdullah and Marie R. Sameen Al- Baytie (2016b).** Effect of measuring levels pruning , humic acid and gibberellic acid (GA3) onyield and mineral content of grapevine (Sultana Thompson) Vitis vinifera L. Journal of kirkuk University for Agricultural Sciences .Vol (7) No. (4) :70-83.
6. **Al-Saeedi, Ibrahim Hassan Muhammad. (1982).** Cultivation and production of vineyards. Ministry of Higher Education and Scientific Research. University of Al Mosul. Dar Al-Kutub Establishment for Printing and Publishing - Iraq 608 pages.
7. **Al-Saeedi, Ibrahim Hassan Muhammad.(2000)**. Grape production. Part One, Ministry of Higher Education and Scientific Research - University of Mosul.
8. **Angel, Abdul Razzaq Abdul Aziz Abdul Razzaq. (2001).** Study of the specifications of some seedless grape cultivars in the central region of Iraq. Master Thesis. faculty of Agriculture. Baghdad University. Iraq.
9. **Brothers, Sanaa Hassan Abd (2016).** Effect of spraying salicylic acid and nitrogen on the growth and yield of the grape Kamali Vitis vinifera L.. Journal of Babylon University for Pure and Applied Sciences, Volume (24) Issue (8): 2239-2245.
10. **Davies,P.J.,(1987**).Plant Hormones and Their Role in Plant Growth and Development . Martinus Nijhsff Publisher.Drdrecht.
11. **El-Tayeb ,M.A.(2005).** Response of barley grains to the interactive effect of salinity and salicylic acid . Plant Growth Regular. 45:215-224.
12. **FAO.(2003).** Bulletin of statistics Vol. 4 No. 2
13. **Galet, P. (1980).** A practical Ampelography grapevine identification Geneva, Cornell Univ. Press U.S.A.
14. **George, Edwin F., M. A. Hall and G. D. Klerk.(2008).** Plant Propagation by Tissue Culture. 3rd Edition. Published by Springer. P.O. Box 17, 3300 AA Dordrecht, The Netherlands. Available from www.springer.com.
15. **Greenplantchem Co., Ltd.(2002).** Forchlorfenuron. CPPU. Available from http://www.gplantchem.com/forchlorfenuron.htm.
16. **Hadi, Basima S .(2010).** Effect of foliar application with growth regulator KT-30 and chelated-iron on quantitative and qualitative and qualitative characteristics of the grape (*Vitis vinifera*. L) . Diyala Journal of Agricultural Sciences,(2)2:123-137.
17. **Hans, K. & A. D. Jan (1997).** The five classical plant hormones. The Plant Cell. (9): 1197-1210.
18. **Hassan, Jabbar Abbas and Muhammad Abbas Salman. (1989).** Grape production. Ministry of Higher Education and Scientific Research. Baghdad University. House of wisdom.
19. **Hulme, A. C.(1970).** The biochemistry of fruit and their products, Vol. 1. Academic press, N.Y., USA.
20. **Jules, J. and J. N. Moore.(1996).** Fruit Breeding volume II: Vine and small fruit crops. Is BN 0-471-12670-3 John wiley & Sons. Inc.
21. **Khodary. S.E.A.(2004).** Effects of salicylic acid on the growth photosynthesis and carbohydrate metabolism in salt stressed maize plant . International J. of Agric. And Biol. 6:5-8.
22. **Nesmith, D. S.(2002**). Response of rabbiteye blueberry *(Vaccinium achei* Reade) to the growth regulators CPPU and gibberellic acid. Hort. sci. 37, 666 -668.
23. **Noori, A. M., Lateef, M. A. A., & Muhsin, M. H. (2018).** Effect of phosphorus and gibberellic acid on growth and yield of grape (Vitis vinifera L.). *Research on Crops*, *19*(4), 643-648.
24. **Popova, L.; Pancheva, T. and Uzunova, A. (1997).** Salicylic acid : Properties, Biosynthesis and physiological role. Bulg. J. Plant Physiol. 23:85-93.
25. **Reynolds, A.G , D.A .Wardle ,C . Zurowski and V. E. Looney.)1992).** Phenylureas CPPU and thiadiazuron effects on yield component, fruit composition and storage potential of four seedless grape Selections . Journal American Society Horticultural Science 117 (1): 85 – 89 .

26. **Rhonde smith(2009).** Effect of CPPU on fruit set in merlot . Sonoma Country Grape Day February 17 , 2009 , UC cooperative Extension , Sonoma country .
27. **Rosalein, I .(1992b)** .Salicylate a new plant hormone .plant physiol . 99:799-803.
28. **Salman, Muhammad Abbas. (1988)** . More horticultural plants. Ministry of Higher Education and Scientific Research. Baghdad University. Iraq.
29. **Srivastava,M.K.Dwived,U.N. (2000).**Delayed ripening of banana fruit by salicylic acid .Plant Sci.158:87-96.
30. **Wasfi, Imad El-Din (1995).** Growth regulators and flowers and their use in agriculture. Academic Library, Arab Republic of Egypt.
31. **Wood, B. W. & J. W. Hanover (1981).** Accelerating the growth of black walnut seedlings. Tree Planters' Notes (32)2:35-38.
32. **Yu, J., Y. Li, Y. Qian and Z. Zhu. (2001).** Cell division and cell enlargement in fruit of *Lagenaria leucantha* as influenced by pollinayion and plant growth substances. Plant Growth Regulation. 33, 117 - 122.