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FRUIT SET AND QUALITY OF 'CANINO' APRICOT FRUITS AS AFFECTED BY SPRAYING WITH YEAST, GROWTH REGULATORS AND MICRONUTRIENTS

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ABSTRACT

This experiment was carried out during 2014 and 2015 seasons on 'Canino' apricot trees grown in sandy soil under drip irrigation system in a private farm at El-Bostan region in Behera governorate, Egypt to study the effect of foliar spraying with Yeast (0.1 and 0.2%), Benzyladenine (50 and 100 ppm), GA_3 (50 and 100 ppm), Boric acid (25 and 50 ppm) and flower power (2 and 4%) at full bloom stage on fruit set and fruit quality. Results showed that spraying 'Canino' trees with BA at 100 ppm followed by Boric acid (25 ppm) as well as GA_3 (50 ppm) gave the highest significant fruit set in comparison to control. Fruit weight, volume, length, width and fruit flush weight were significantly increased as result of GA_3 at 50 ppm, Flower power (4%) and GA_3 (100 ppm) treatments respectively. Moreover, firmness of fruits obtained from BA at 50 ppm and Flower power at 4% treatments were significantly higher than control. The data also reveal that applied treatments had no significant effect on fruit shape index (L/W). Concerning the results of fruit kernel properties, it was noticed that, GA_3 at 50 ppm, boric acid (25 ppm) and flower power (2%) treatments were more effective to enhance 'Canion' kernel properties. Treatments of BA at 100 ppm and Yeast at 0.1 % as well as Flower power at 4% increased SSC (%) and SSC/acid ratio. However, all treatments significantly decreased acidity percentage comparing with control fruits. It can be concluded that, most of the studied parameters were enhanced with foliar applications of GA3 at 50 ppm, BA at 100 ppm and Flower power at 4% at full bloom stage of 'Canino' apricot trees in comparison with control treatment.

Keywords: *Canino apricot, Yeast, Growth regulators, Micronutrients, Fruit set, Fruits attributes, Kernel properties*.

INTRODUCTION

Apricot (*Prunus armeniaca* L.) is one of the most delicious and commercially traded fruits in the world, and it is rich in mono- and polysaccharides, polyphenols, fatty acids and carotenoids, glucosides, volatile components and the plants displayed a high antioxidant effects. Apricot fruits are consumed fresh and also produce dried apricot, jam and jelly. Furthermore, kernels of apricot are used in production of oil, benzaldehyde, cosmetics and aroma perfume (Yildiz, 1994 and Erdogan-Orhan and Kartal, 2011). Several investigators have made trials to enhance production and quality of apricot trees. In this respect, active dry yeast is a natural safety biofertilizers and had a positive effect on fruit plants attributed to its content of different nutrients, proteins, large amount of vitamin B and natural plant growth hormones namely cytokinins, which simulates cell division and enlargement (Fathy and Farid, 1996). It had a role in releasing CO2 which directly improves photosynthesis (Ferguson *et al.*, 1995) and it

has a role in increasing auxin and cytokinin contents (Abou El-Yazied and ady, 2012). In addition, its effectiveness in improving growth, nutrition status, yield and fruit quality (Hafez, 2001; Fayed, 2010). Growth regulators had a positive effect on tree fruiting. Since, gibberellins are essential endogenous regulators of plant growth and development, including seed germination, trichome development, stem and leaf elongation, flower induction, anther development, developing pollen after anthesis, fruit and seed development (Kamiya and Garcia- Martinez, 1999; Hedden and Phillips, 2000 and Singh *et al.*, 2002). BA (Benzyladenine) was used to promote pollen tube growth (Voiatzis, 1993), stimulated cell division (Yuan and Greene, 2000) and increase fruit volume and shape (Stern and Flaishman, 2004).

Micronutrients such as boron has effect on many functions of the plant such as hormone movement, transport of sugars and carbohydrate metabolism, protein synthesis, flowering, fruit set and pollen germination specially its influences on the directionality of pollen tube growth (Khayyat *et al.*, 2007 and Hansch and Mendel, 2009). Furthermore, zinc (Zn) is an essential trace element for plants, being involved in many enzymatic reactions and is necessary for their vigorous growth and development, regulating the protein and carbohydrate metabolism (Swietlik, 1999 and Baghdady *et al.*, 2014). Also, one of the reasons of low fruit set can be deficiency of zinc, copper (Gursoz *et al.*, 2010) and some other elements. Like zinc, copper is a component of many enzymes in the plant and plays a role in energy metabolism (Beede *et al.*, 2005).

Thereupon, this study aimed to evaluate the effect of spraying Canino apricot trees with dry yeast, plant growth regulators such as, BA and GA_3 and some of micronutrients such as, Boric acid as a source of boron and Flower power (as a source of Zn, B, Cu and Mo) at full bloom on fruit set and fruit quality of Canino apricot fruits.

MATERIALS AND METHODS

The present investigation was carried out during two successive seasons at 2014 and 2015 on Canino apricot trees budded on seedling rootstocks, at a private orchard located at El-Bostan region, Behera Governorate, Egypt. Trees were about 8 years old planted 5 x 6 meter apart in sandy soil. The selected trees were healthy, uniform in shape and size. Orchard was under drip irrigation system, and the trees received their normal cultural practices which usually applied in commercial orchards. The experiment consisted of the following treatments: Canino trees were sprayed at full bloom stage when 50% of flowers reach full opening (Pérez Pastor, et al., 2004) with yeast at 0.1 and 0.2%, BA at 50 and 100 ppm, GA_3 at 50 and 100 ppm, boric acid at 25 and 50 ppm, flower power at 2 and 4% and water only (control trees). Production of flower power consists of 4%Zn, 3%boron, 0.1% Cu and 0.002% Molybdenum (exported by Agriculture Katamy Company from Kuwait). Treatments were arranged in complete randomized block design and each treatment was replicated three times, since one tree per each replication. The following parameters were recorded through the two

seasons under the study: No of fruit set/m of shoot length, fruit physical parameters such as weight (g), volume (cm^3), firmness ($lb/inch^2$), length (cm), width (cm), shape index (cm) and flush weight (gm), fruit bio-chemical constituents like SCC (%), total acidity (%) and SCC/ acid ratio and weight (cm), length (cm), width (cm) and shape index (cm) of kernel. Data over the 2 years were pooled for analysis. The two seasons were statistically homogenized. The experiment was laid out as one factor randomized complete block design combined over years. Significant differences among treatments means were separated using LSD at 0.05 using M-Stat-C (ver. 2.10) according to Snedecor and Cochran (1989).

RESULTS AND DISCUSSION

Fruit set:

Data from Table (1, 2) reveal that all treatments increased average fruit set (number/m of shoot length) compared with control, and spraying BA at 100 ppm followed by boric acid (25ppm) as well as GA_3 (50 ppm) gave the higher significant fruit set 17.55, 14.27 and 13.62/m, respectively than control (i.e., 8.26/m). The results are agreement with findings of Yehia and Hassan (2005) and Hegazi (2011) on 'Le Conte' Pears. Since concluded that BA treatments (50,100 and 200 ppm) increased fruit set compared with control trees.

The present results indicated increasing fruit set with boric acid treatment compared with control trees may attribute to role of boron in maintaining high pollen viability, germination and pollen tube cellulose elongation (Hassan, 2000 and Garcia and Martinez, 2003). Fruit set was increased by increasing concentrations of different treatments except treatments of GA_3 and boric acid. This result is in line with obtained by Bolat *et al.* (1999) and Zhao *et al.* (2011) on apricot, Tosun and Koyuncu (2007) on sweet cheery and Acar *et al.* (2010) on pistachio. They disclosed that lower concentrations of GA_3 stimulated pollen germination and tube growth than higher concentrations.

The positive effects of active dry yeast to increase fruit set compared with control trees could be explained as a result it is considered as a natural source of cytokinins and improving net photosynthesis (Hashem *et al.*, 2008). In addition, micronutrients (mixture of Fe, Zn and Mn at 200ppm) treatment exhibited highly significant increments in fruit set of Canino apricot trees when compared with untreated trees (El-Badawy, 2013). Moreover, highest fruit set % significantly was observed in foliar application of 6 g/l Zn compared with control treatment (Etehadnejad and Aboutalebi, 2014).

Fruit physical properties:

It clear from Tables (1, 2) fruit weight, volume, length, width and fruit flush weight of Canino was significantly increased due to applications of GA_3 at 50 ppm, flower power (4%) and GA_3 (100 ppm), respectively compared with that of control. These increaments may be to the role of GA_3 and Boron

in increasing cell division and cell enlargement as well as faster movement of simple sugar into fruit and the biosynthesis of carbohydrates and proteins (Abd-El-Motty *et al.*, 2006 and Abd El-Moneim *et al.*, 2007).

Table 1. Effect of spraying yeast, BA, GA3, boric and flower power at full bloom on fruit set, weight, volume and firmness of Canino apricot variety (combined data of 2014 and 2015 seasons).

Treatments	No. fruit set/m of shoot length	Fruit weight (gm)	Fruit volume (cm^3)	Firmness ($lb/inch^2$)
Yeast 0.1%	12.33 abc	25.93 f	23.33 de	8.07 bcd
Yeast 0.2%	12.49 abc	27.26 ef	28.83 bc	9.30 ab
BA 50 ppm	12.74 abc	28.00 def	29.83 bc	10.08 a
BA 100 ppm	17.55 a	30.82 bcd	27.17 cd	9.67 ab
GA3 50 ppm	13.62 ab	35.32 a	35.67 a	7.03 cd
GA3 100 ppm	10.98 bc	32.63 abc	31.83 ab	8.53 abc
Boric 25 ppm	14.27 ab	28.60 def	25.83 cde	4.97 e
Boric 50 ppm	13.36 abc	27.33 ef	22.17 e	6.63 de
Flower Power 2%	11.24 bc	30.00 cde	29.33 bc	9.52 ab
Flower Power 4%	12.01 bc	33.76 ab	32.17 ab	9.97 a
Control	8.26 c	28.24 def	26.33 cde	6.83 cd

Any two means not sharing a common letter are significantly different (L.S.D at 5%).

Table 2. Effect of spraying yeast, BA, GA3, boric and flower power at full bloom on fruit length, diameter, shape index and flush weight of Canino apricot variety (combined data of 2014 and 2015 seasons).

Treatments	Fruit length (cm)	Fruit width (cm)	Fruit shape index (cm)	Fruit flesh weight (gm)
Yeast 0.1%	3.58 bcd	3.60 cd	0.99 b	23.82 f
Yeast 0.2%	3.56 cd	3.54 d	1.00 ab	25.18 ef
BA 50 ppm	3.62 a-d	3.63 bcd	1.00 ab	25.90 def
BA 100 ppm	3.80 ab	3.84 ab	0.99 b	28.66 bcd
GA3 50 ppm	3.81 a	3.88 a	0.98 b	32.92 a
GA3 100 ppm	3.73 abc	3.52 d	1.07 a	30.40 abc
Boric 25 ppm	3.63 a-d	3.63 bcd	1.00 ab	26.21 def
Boric 50 ppm	3.48 d	3.45 d	1.01 ab	25.22 ef
Flower Power 2%	3.65 a-d	3.79 abc	0.96 b	27.90 cde
Flower Power 4%	3.80 ab	3.86 a	0.98 b	31.51 ab
Control	3.52 cd	3.58 cd	0.98 b	25.89 def

Any two means not sharing a common letter are significantly different (L.S.D at 5%).

The obtained results are in accordance with the finding of Qin et *al.* (2008) on Katy apricot variety. They showed that, fruit growth was promoted after applied with 50 mg/L GA_3 and 50 mg/L 6-BA: fruit length, diameter, fresh

weight and fruit volume were all higher than control's, especially with GA_3.The cytological research indicated the reason promoting fruit size was an increase of the number of fruit cells. Similar positive effects of GA_3 and boric acid treatments on fruit weight, volume, dimensions, shape and flesh weight was obtained on pear and pomegranate fruits (Yehia and Hassan, 2005 and Abou Rawash *et al.*, 2010). Furthermore, foliar spray by GA_3 blus BA recorded maximum pear fruit growth (length and width) and volume (Kundu *et al.*, 2013). Moreover, highest fruit length and diameter of apple significantly was observed in foliar application of 6 g/l Zn compared with control treatment (Etehadnejad andAboutalebi, 2014).

As regard to fruit firmness, fruits obtained from BA at 50 ppm and flower power at 4% treatments are significantly firmer than those of control. This result is in compatibility with those mentioned by Hegazi (2011) on 'Le Conte' pears. Who stated that treatment with BA at 100 ppm result in the highest fruit firmness. Flower power substance which contains Zn, B, Cu and Mo may be responsible for building and moving carbohydrates from leaves to fruits and encourage the biosynthesis of cellulose which positively strengthens the cell wall.

Concerning on fruit shape index (L/D), there were no significant differences among treatments including the control except GA_3 at 100 ppm and boric acid at 50 ppm which produced a significant elongated apricot fruits (1.07 and 1.01 cm, respectively) compared with flatted control ones (0.98). While, treatments of yeast at 0.2%, BA (50 ppm) as well as boric acid at 25 ppm produced a rounded fruits (i.e., 1.00 cm) and remained treatments produced flatted ones (0.96, 0.98 and 0.99 cm). The explanation of elongated apricot due to that the role of GA_3 and Boron in increasing cell enlargement (Abd El-Moneim *et al.*, 2007) and active dry yeast considered as a natural source of cytokinins which simulates cell division (Hashem *et al.*, 2008). In generally, increasing fruit physical characters may be attributed to the improvement of fruit growth and uptake both Ca and B nutrients that accelerate metabolic processes (Harhash and Abdel-Nasser, 2010).

Kernel physical properties:

With regard to the effects these treatments on kernel weight, length, width and shape index (L/W) of Canino fruits, the data presented in Table (3) indicated that, spraying with GA_3 at 50 ppm was more effective to produce the highest values of Canino apricot kernel weight (i.e., 2.40 gm), length (i.e., 2.25 cm), width (i.e., 1.53 cm) followed by boric acid at 25 ppm. While kernel shape index was increased by treated with flower power at 2% (1.62 cm) followed by GA_3 at 100 ppm as well as control fruits (i.e., 1.61 cm).

Generally, it is also noticed that treatments of GA_3 and control followed by boric acid and BA as well as flower power treatments enhanced kernel physical properties. The increasing in kernel length, width might be attributed to the increase in cell division and cell elongation caused by auxins and GA_3 (Cleland, 1995 and Ranjan *et al.*, 2003). These results are in agreement with those reported by Arafat and El-Sayed (2014) on Picual olive. They

concluded that, kernel weight and size was enhanced by foliar boron sprays compared to the control fruits. Our findings are in line with which obtained by Abd El-Motty *et al.* (2010) on Keitte mango, mentioned that spraying trees with yeast (0.2%) at full bloom reduced seed weight comparing with the control.

Table 3. Effect of spraying yeast, BA, GA3, boric and flower power at full bloom on kernel weight, length, and width and shape index of Canino apricot variety (combined data of 2014 and 2015 seasons).

Treatments	Kernel weight (gm)	Kernel length (cm)	Kernel width (cm)	Kernel shape index (cm)
Yeast 0.1%	1.99 d	2.02 cd	1.38 cd	1.57 a
Yeast 0.2%	2.05 d	2.08 bcd	1.41 cd	1.57 a
BA 50 ppm	2.11 bcd	2.14 abc	1.46 abc	1.54 a
BA 100 ppm	2.16 a-d	2.12 a-d	1.45 a-d	1.56 a
GA3 50 ppm	2.40 a	2.25 a	1.53 a	1.56 a
GA3 100 ppm	2.21 a-d	2.21 ab	1.45 a-d	1.61 a
Boric 25 ppm	2.39 ab	2.19 ab	1.51 ab	1.59 a
Boric 50 ppm	2.09 cd	2.00 d	1.37 d	1.53 a
Flower Power 2%	2.08 cd	2.13 abc	1.41 cd	1.62 a
Flower Power 4%	2.22 a-d	2.18 ab	1.44 bcd	1.58 a
Control	2.35 abcd	2.16 abc	1.45 cd	1.61 a

Any two means not sharing a common letter are significantly different (L.S.D at 5%).

Fruit chemical properties:

Soluble solids content SSC (%), total acidity (%) and SSC/acidity ratio are tabulated in Table (4). In this respect, SSC (%) differ among all treatments including control, and treatments of BA at 100 ppm and yeast at 0.1 and 0.2% increased SSC (%) to maximum value (15.45, 14.52 and 14.27, respectively). In this study, all treatments significantly decreased acidity (%) comparing with control which had higher content of acidity. Treatments of BA at 100 and Flower power at 4% as well as yeast at 0.1% significantly increased TSS/acidity ratio compared with control.

The increment in SCC might be due to conversion of carbohydrate into simple sugars (Rub *et al.*, 2010) and SCC/acidity ratio might be due to increase in SCC and decrease in acid. The enhancing effect of yeast application might be due to secretion of cytokinins enhancing the accumulation of soluble metabolites (Entian and Fröhlich, 1984) and it has been reported to be rich source of vitamins and increased endogenous phytohormones (Auxins and cytokinins) (El-Desoukey *et al.*, 1998 and Mady, 2009).

Table 4. Effect of spraying yeast, BA, GA3, boric and flower power at full bloom on SCC, acidity and SCC/acidity ratio of Canino apricot variety (combined data of 2014 and 2015 seasons).

Treatments	TSS (%)	Acidity (%)	Tss/acidity ratio
Yeast 0.1%	14.52 ab	1.72 cd	8.47 ab
Yeast 0.2%	14.27 b	1.73 c	8.31 bc
BA 50 ppm	14.20 bc	1.73 c	8.22 bcd
BA 100 ppm	15.45 a	1.71 cd	9.06 a
GA3 50 ppm	13.52 bcd	1.77 ab	7.64 de
GA3 100 ppm	14.23 bc	1.74 bc	8.18 bcd
Boric 25 ppm	13.90 bcd	1.73 cd	8.08 bcd
Boric 50 ppm	12.93 d	1.74 bc	7.47 e
Flower Power 2%	13.20 cd	1.69 de	7.85 cde
Flower Power 4%	14.10 bc	1.67 e	8.50 ab
Control	14.03 bc	1.80 a	7.79 cde

Any two means not sharing a common letter are significantly different (L.S.D at 5%).

CONCLUSION

From this study, It may be concluded that most of measured characteristics were improved with foliar application of GA_3 at 50 ppm, BA at 100 ppm and Flower power at 4% at full bloom stage of 'Canino' apricot trees in comparison with control treatment.

REFERENCES

Abd El Moneim, A.; A. Eman; M.M.M. Abd El Migeed and M.M.I. Omayma (2007). GA_3 and zinc sprays for improving yield and fruit quality of Washington navel orange trees grown under sandy conditions. Res. J. of Agr. And Bio. Sci., 3(5): 498-503.

Abd El-Motty, E.; M.F.M. Shahin; M.H. El-Shiekh and M. M. Abd-El-Migeed (2010). Effect of algae extract and yeast application on growth, nutritional status, yield and fruit quality of Keitte mango trees. Agriculture And Biology J. of North America. 1(3): 421-429.

Abd-El-Motty, E.; F.M.S. Mohamed and L.F. Hagagg (2006). Response of Valencia orange trees budded on Troyer Citrange and Soure Orange to foliar application of some macro and micro nutrients. J. Appl. Sci. Res., 2: 952-965.

Abou El-Yazied, A. and M.A. Mady (2012). Effect of boron and yeast extract foliar application on growth, pod setting and both green pod and seed yield of broad bean (*Vicia faba* L.). J. Appl. Sci. Res., 8(2): 1240-1251.

Abou Rawash, A. A. M.; B. Rawheya; A.A. Abdel-Hafeez and F. Korany. (2010). Effect of some preharvest treatments on yield, splitting percentage and storability of Manfaloty pomegranates. J. Biol. Chem. Environ. Sci., 5(2), 463-487.

Acar. I; B.E. Ak; and K. Sarpkaya (2010). Effects of boron and gibberellic acid on in vitro pollen germination of pistachio (*Pistacia vera* L.). African Journal of Biotechnology Vol. 9(32), pp. 5126-5130.

Arafat, S. M. and M.E. El-Sayed (2014). Maximizing the productivity of olives by using some materials and its impacts on the quality indices of picual olive oil. Journal of Food Technology Research, 1(3): 96-110.

Baghdady, G. A.; A.M. Abdelrazik; G.A. Abdrabboh and A.A. Aboelghit (2014). Effect of foliar application of GA3 and some nutrients on yield and fruit quality of Valencia orange trees. Nature and Science. 12 (4): 93-100.

Beede, R.H.; P.H. Brown; C. Kallsen; S.A. Weinbaum (2005). Diagnosing and correcting nutrient deficiencies. In: L. Ferguson (ed), Pistachio production manual. 4th edition.Division of Agriculture and Natural Resources. University of California: Oakland. Pp: 147-157.

Bolat, I.; L. Pirlak and I. Karayannis (1999). Effects of some chemical substances on pollen germination and tube growth in apricot. Acta Hort. 488(1): 341-344.

Chechi, R.; C.A. Steffens; C.V.T. Amarante; J.P.G Silveira, J. P. G.; B.P. Espindola and A. Sasso (2007). Preharvest Spraying of 'Laetitia' plum trees with AVG and GA_3 Improves postharvest fruit quality. VIII International Symposium of Temperate Zone Fruits in the Tropics and Subtropics. Abstract: Lectures, Oral and Poster presentations. pp. 106.

Cleland, C. F. (1995). Plant hormones phisiology, biochemistry and molecular biology. P. J. Davies, (Ed). 2nd Edition, Kluwer Academic Publishers,The Netherlands.

El-Badawy, H.E.M. (2013). Effect of some antioxidants and micronutrients on growth, leaf mineral content,yield and fruit quality of Canino apricot trees. J. of Applied Sciences Research, 9(2): 1228-1237.

El-Desouky, S. A.; A.L. Wans and Z.M. Khedr (1998). Utlization of some natural plant extracts (of garlic and yeast) as seed – soaked materials to squash (*Cucurbatia pepo* L). I- Effect on growth, sex expression and fruit yield and quality. J. Agric. Sci. Moshtohor, Zagazig. Univ., 35 (2): 839-854.

Entian, K.D. and K.U. Fröhlich (1984). Saccharomyces cerevisiae mutants provide evidence of hexokinase PII as a bifunctional enzyme with catalytic and regulatory domains for triggering carbon catabolite repression. J. Bacteriol, 158(1): 29-35.

Erdogan-Orhan, I. and M. Kartal (2011). Insights into research on phytochemistry and biological activities of *Prunus armeniaca* L. (apricot). Food Research International, 2011, 44(5), 1238.

Etehadnejad, F. and A. Aboutalebi (2014). Evaluating the effects of foliar application of nitrogen and zinc on yield increasing and quality improvement of apple cv. 'Golab Kohanz'. Indian Journal of Fundamental and Applied Life Sciences 4:(2) 125-129.

Fayed, T. A. (2010). Optimizing yield, fruit quality and nutrition status of roghiani olives grown in Libya using some organic extracts. J. Hort. Sci. and Ornam. 28. Maksoud, M.A., 2000. Response of growth and Plants, 2(2): 63-78.

Ferguson, J. J.; W.T. Avigne; L.H. Allen and K.E. Kock (1995). Growth of CO_2 enriched Sour orange seedlings treated with gibberellic and cytokinins. Proc. Florida State Hort. Soc., 99: 37-39.

Garcia-Papi, M. A. and J. L. Garcia-Martinez (2003). Endogenous plant growth substances content in young fruits of seeded 'Clementine' mandarin as related to fruit set and development. HortScience 22:265–274.

Gross, J.; H. Bazak; A. Blumenfeld and R. Ben-Arie (1984). Changes in chlorophyll and carotenoid pigments in the peel of Triumph persimmon (*Diospyros kaki* L.) induced by pre-harvest gibberel- lin GA3 treatment. Sci. Hortic. 24: 305-314.

Gursoz, S; S. Gokoglu and B.N Ak (2010). Determination of mineral nutrition contents of grape and pistachio cultivars grown as inter planted orchard. Options Mediterraneennes. 94: 25-30.

Hafez, O. M. (2001). Effect of some nutrients, paclobutrazol and active dry yeast on growth, flowering, productivity and storage behavior of Anna apple. Ph.D. Thesis, Fac. Agric. Cairo Univ.

Hashem, M.; Y.M. Omran and S.M. Nashwa (2008). Efficacy of yeasts in the management of root-knot nematode (*Meloidogyne incognita*) in Flame Seedless grape vines and the consequent on the productivity of the vines. Biocontrol Science and Technology 18(4): 357-375.

Hansch, R. and R.R. Mendel (2009). Physiological of mineral micro-nutrients (Cu, Zn, Mn, Fe, Ni, Mo, B, Cl). Current opinion in plant Biol., 12: 259-266.

Harhash, M.M. and G. Abdl-Nasser (2010). Improving of fruit set, yield and fruit quality of Khalas tissue culture derived date palm through bunches spraying with potassium and/or boron. Australian J. Basic and Applied Sci., 4(9): 4164-4172.

Hassan, H. S. A. (2000). Morphological and Physiological studies on flowering, pollination and fruiting of Picual olive trees. PhD Thesis, Fac. Of Agric., Cairo Univ., Egypt, pp: 111.

Hedden, P. and A.L. Phillips (2000). Manipulation of hormone biosynthetic genes in transgenic plants. Curr. Opin. Biotechnol. 11: 130-137.

Hegazi, A. A. (2011). Effects of spraying some chemical compounds on fruit set and fruit characteristics of 'Le Conte' pear cultivar. Journal of Horticultural Science & Ornamental Plants 3 (1): 55-64.

Kamiya, Y. and J.L. Garcia-Martinez (1999). Regulation of gibberellin biosynthesis by light. Curr. Opin. Plant Biol. 2: 398-403.

Khafagy, S. A. A.; N.S. Zaied; M.M. Nageib; M.A. Saleh and A.A. Fouad (2010). The beneficial effects of yeast and zinc sulphate on yield and fruit quality of Navel orange Trees. World J. Agric. Sci., 6 (6), 635–638.

Khayyat, M.; E. Tafazoli; S. Eshghi and S. Rajaee (2007). Effect of nitrogen, boron, potassium and zinc on yield and fruit quality of date palm. American-Eurasian J. Agric. And Environ. Sci., 2(3): 289-296.

Kundu, M.; P.N. Ritu Joshi and L.D. Bist (2013). Effect of plant bio-regulators on fruit growth, quality and productivity of pear [Pyrus pyrifolia (Brum.) Nakai] cv Gola under tarai condition. Journal of Applied Horticulture,15(2).,106-109.

Mady, M. A. (2009). Effect of foliar application with yeast extract and zinc on fruit setting and yield of faba bean (V*icia faba* L). J. Biol. Chem. Environ. Sci., 4(2), 109-127

Pérez Pastor, A.; M.C. Ruiz Sánchez; R. Domingo Miguel and A. Torrecillas Melendreras (2004). Growth and phenological stages of Búlida apricot trees in south-east Spain.

Pharis, R. P. and R.W. King (1985). Gibberellins and reproductive development in seed plants. Annu. Rev. Plant Physiol. 36: 517-568.

Qin, D.; J.Z. Wang; A.N. Zhang and H. zhai (2008). Effects of plant growth regulators on fruit growth and development of Katy apricot in greenhouse. acta agriculturae boreali-sinica, 23 (s2): 55-59

Ranjan, R.; S.S. Purohit and V. Prasad (2003). Plant hormones: Action and application. Agrobios, India, pp. 183–189.

Ross, J.J.; I. C. Murfet and J.B. Reid (1997). Gibberellin mutants. Physiol. Plant, 100: 550-560.

Rub, A.; S. Haq; S.A. Khalil and S.G. Ali (2010). Fruit quality and senescence related changes in sweet orange cultivar Blood red uni- packed in different packing materials. Sarhad J. Agric., 26: 221–227

Sayyad-amin, P.; A.R. Shahsavar and E. Aslmoshtaghi (2015). Study on foliar application nitrogen, boron and zinc on olive tree. Trakia Journal of Sciences, No 2, pp 131-136.

Singh, D. P.; A.M. Jermakow and S.M. Swain (2002). Gibberellins are required for seed development and pollen tube growth in Arabidopsis. Plant Cell, 14: 3133-3147.

Snedecor, G. W. and W.G. Cochran (1989). Statistical Methods. 8th ed., Iowa Stat. Univ. Press. Amer. Iowa, U.S.A.

Stern, R.A. and M. A. Flaishman (2004). Benzyl adenine effects on fruit size, fruit thinning and return yield of of 'Spadona' and 'Costia' pear.

Sudhavani, V. and C. R. Sankar (2002). Effect of pre-harvest sprays on shelf life and quality of Baneshan mango fruit under cold stor- age. South Indian Hortic. 50: 173-77.

Swietlik, D. (1999). Zinc nutrition in horticultural crops. Horticultural Reviews. John Wiley & Sons, Inc. New York, 23: 109-180.

Tosun, F. and F. Koyuncu (2007). Effects of some chemical treatments on pollen germination and pollen tube growth in sweet cherries (*Prunus avium* L.). Akdeniz Un. Ziraat Fak. Dergisi, 20(2): 219-224.

Voiatzis, D. D. (1993). Overcoming self-incompatibility and increasing fruit set in olive trees with Benzyladenine. Acta. Hort., 329: 194-196

Yehia, T. A. and H.S.A. Hassan (2005). Effect of some chemical treatments on fruiting of 'Le Conte' Pears. Journal of Applied Sciences Research 1(1): 35-42.

Yildiz, F. (1994). New technology in apricot processing. J. Standard Apricot Special Issue Ankara, pp: 67-69.

Youssef, W.S., 1997. Effect of spraying mepiquate chloride and some macro and micro nutrients on growth, yield and quality of Red Roomy grapevines *(Vitis vinifera, L.)* Ph.D Thesis Fac. of Agric., El-Minia Univ., Egypt.

Yuan, R. and D.W. Greene (2000). McIntosh apple fruit thinning by benzyl adenine in relation to seed number and endogenous cytokinin level in fruits and leaves. Sci. Hort. 86:127-134.

Zhao, H. K.; M. Ji; Y.J. De; B.L. Xu; J.Q. Li and P.F. Han (2011). The research of two medicaments prevention mountain apricot blossom time freeze injury effect [j]. Journal of Inner Mongolia Agricultural University (Natural Science Edition), 2, 064.

العقد وصفات الجودة لثمار المشمش الكانينو وتأثرها بالرش الورقى بالخميرة ، منظمات النمو والمغذيات الصغرى

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أجريت هذه التجربة خلال موسمى ٢٠١٤ و ٢٠١٥ على أشجار المشمش صنف كانينو منزرعة فى أرض رملية تحت نظام الرى بالتنقيط في مزرعة خاصة في منطقة البستان بمحافظة البحيرة-مصر لدراسة تأثير الرش الورقى للأشجار بالخميرة (٠,١ ، ٠,٢%) ، البنزيل ادنين (٥٠ و ١٠٠ جزء في المليون) ، الجبريللين (٥٠ و ١٠٠ جزء في المليون) ، حامض البوريك (٢٥ و ٥٠ جزء في المليون) والفلوربور (٢ و ٤٪) في مرحلة التزهير الكامل على عدد الثمار العاقدة و جودة الثمار. أظهرت النتائج أن رش أشجار المشمش الكانينو بالبنزيل ادنين (١٠٠جزء في المليون) يليها حمض البوريك (٢٥ جزء في المليون) وكذلك الجبريللين بتركيز ٥٠ جزء في المليون أعطت زيادة معنوية فى عدد الثمار العاقدة/م من طول الفرع بالمقارنة بالكنترول. علاوة على ما سبق فأن وزن الثمرة، الحجم ، الطول ، العرض و وزن اللحم زادت نتيجة المعاملة بالجبريللين بتركيز ٥٠ جزء في المليون ، الفلوربور (٤٪) و الجبريللين بتركيز ١٠٠ جزء في المليون على التوالى. بالإضافة إلى ذلك فأن صلابة الثمار الناتجة من المعاملة بالبنزيل ادنين (٥٠ جزء في المليون) و الفلوربور بتركيز ٤٪ كانت أعلى معنويا من صلابة الثمار الغير معاملة. ولقد اظهرت جميع المعاملات انه ليس لها تأثير معنوى على دليل شكل الثمرة (طول/العرض).

اما فيما يتعلق بنتائج خصائص نواة الثمرة ، اظهرت النتائج ان الرش بالجبريللين بتركيز ٥٠ جزء في المليون ، حامض البوريك (٢٥ جزء فى المليون) و الفلوربور (٢٪) كانت أكثر فعالية فى تحسين خصائص نواة ثمرة المشمش الكانينو. المعاملة بالبنزيل ادنين بتركيز١٠٠ جزء في المليون و الخميرة بتركيز ٠,١% مثلما المعاملة بالفلوربور (٢٪) زادت من نسبة المواد الصلبة الذائبة (%) و نسبة المواد الصلبة الذائبة/الحموضة. بينما جميع المعاملات المستخدمة خفضت من نسبة الحموضة معنويا بالمقارنة بثمار الكنترول. هذا ويمكن تلخيص النتائج بأن معظم القياسيات تحت الدراسة تحسنت بمعاملات الرش الورقى بالجبريللين بتركيز ٥٠ جزء في المليون ، بنزيل ادنين بتركيز ١٠٠ جزء في المليون و الفلوربور (٤٪) أثناء التزهير الكامل لأشجار مشمش الكانينو بالمقارنة مع معاملة الكنترول.

الكلمات الدالة: مشمش كانينو ، الخميرة ، منظمات النمو ، المغذيات الصغرى ، العقد ، الصفات الثمرية ، خصائص النواة