CZU: 634.11: 631.559.2

THE BENEFITS OF CERTAIN VITAMINS ON ANNA APPLE ORCHARDS

MANSOUR, A. E. M.[1] AND AHMED, F. F [2]
ABDELAAL, A. M. K.[2]; G., CIMPOIES[3]; SHAABAN, E. A.[1]
[1]Pomology Dept., National Res., Centre, Cairo, Egypt
[2]Hort. Dept., Fac. of Agric. Minia Univ. Egypt
[3]Agrarian State University of Moldova

Abstract: Pe parcursul anilor 2010, 2011 pomii de măr din soiul Anna au fost stropiţi cu o soluţie de vitamine K, E, D şi A în concentraţie de 100 ppm, atît în mod separate, cît şi în diferite combinaţii între ele.

S-a stabilit că vitaminele au contribuit la îmbunătăţirea calităţilor organoleptice a fructelor. Cele mai bune rezultate în ceea ce priveşte recolta şi calitatea fructelor au fost obţinute cînd pomii au fost stropiţi cu soluţia din patru vitamine, fiecare fiind în concentraţie de 100 ppm.

Key words: Apple, Vitamin.

INTRODUCTION

Recently, it was suggested that all vitamins participate in plant growth and development. Most studies have indicated that various physiological processes such as nutrient uptake, photosynthesis, plant pigments and protein synthesis depended more or less on the availability of vitamins (F.A.Robinson, 1973). Vitamins, due to their antioxidative properties, play an important role in plant protection against oxidative stress induced by pesticides. The beneficial effects of vitamins were attributed to their positive action on enhancing cell division and various growth factors such as cytokinins and GA_3 (J.J. Oertili, 1987, S.A. Samiullah *et al*., 1988). For over two decades, the study of vitamins role in plants has attracted a sporadic attention. Previous studies showed that the application of vitamins was essential for improving the yield and fruits quality in different fruit crops (L.Bertschinger, W.Stadler, 1997; A.Numair-Safaa, 2011; Y.Z.Abd El-Aziz, 2001; I.A.M. Farahat, 2008; H.M.M. Allam, 2008; F.F.Ahmed, M.Seleem-Basma, 2008; M.A.M. Abada, H.M. Abd El-Hameed, 2009; A.M. Abd El-Kariem, 2009; M.M. Refaai, 2011, Kz. Uwakiem, 2011). The purpose of this study was to elucidate the effect of certain vitamins on the yield and fruit quality of Anna apple trees.

MATERIALS AND METHODS

This work was carried out during 2010 and 2011 seasons on 48 uniform in vigour 12- years old Anna apple trees budded on MM 106 rootstock and grown in a private apple orchard located at West Samalout, Minia Governorate where the texture of the soil is sandy (EC, 2500 ppm). Dorset Golden and Ein Shemir apple tree varieties were additionally distributed among Anna apple trees at a proportion of four rows of Anna apple trees per one-row of the two previous pollenizers to secure cross pollination with the assistance of two hives of honey bees per fed. The chosen trees were planted at a distance of 3.5×3.5 meters. The irrigation system followed the same surface.

The present investigation included the following 16 treatments:

1- Control (unsprayed trees with vitamins and sprayed with water).
2- Spraying of K- vitamin at 100 ppm (0.1 g/ LW).
3- Spraying of E- vitamin at 100 ppm (0.1 g/ LW).
4- Spraying of D- vitamin at 100 ppm (0.1 g/ LW).
5- Spraying of A- vitamin at 100 ppm (0.1 g/ LW).
6- Spraying of K + E vitamins each at 100 ppm.
7- Spraying of K + D vitamins each at 100 ppm.
8- Spraying of K + A vitamins each at 100 ppm.
9- Spraying of E + D vitamins each at 100 ppm.
10- Spraying of E + A vitamins each at 100 ppm.
11- Spraying of D + A vitamins each at 100 ppm.

12- Spraying of K + E + D vitamins each at 100 ppm.
13- Spraying of K + E + A vitamins each at 100 ppm.
14- Spraying of K + D + A vitamins each at 100 ppm.
15- Spraying of E + D + A vitamins each at 100 ppm.
16- Spraying all vitamins each at 100 ppm.

Each treatment was replicated three times, one tree per each. All vitamins were sprayed four times: at growth start, just after fruit setting and at two weeks intervals. The concentration of each vitamin, i.e 100 ppm, was prepared by weighing 1.0 g per one liter. The assigned amount of each vitamin was dissolved in ethyl alcohol as a suitable solvent before use. Triton B as a wetting agent was added to all vitamin solutions before spraying. All the selected trees were sprayed until runoff (10 L tree). Other horticultural practices were carried out as usual. A complete randomized block design was followed. The yield of each tree was recorded at the harvesting time (last week of June) and weighted in kg. Samples consisting of ten fruits were randomly taken from each tree in order to determine the fruit weight (g.), total soluble solids %, total and reducing sugars (according to Lane and Eynon volumetric method, 1965, A.O.A.C, 1995) and total acidity % (expressed as g of malic acid/ 100 g pulp) (according to the procedure outlined in A.O.A.C, 1995). All the obtained data were tabulated and statistically analyzed according to R. Mead *et al*., (1993). The differences between various treatment means were tested by using the new L.S.D parameter.

RESULTS AND DISCUSSIONS

1- The effect of spraying certain vitamins on the yield.

According to data presented in Table 1, it is obviously that single or combined application of the four vitamins, namely K, E, D and A, significantly improved the yield comparing with the checked treatment. The increase of vitamins number in the sprayed solutions caused a gradual promotion of the yield. The promotion of yield was associated with the use of K, E, D and A, in a descending order. The use of four vitamins together, each at 100 ppm, resulted in the maximum yield (52.5 and 53.2 kg/ tree during both seasons, respectively). Untreated trees gave the lowest values (31.0 and 31.2 kg/ tree during both seasons, respectively). These results were true during both seasons. The stimulating effect of vitamins on the growth characters and nutritional status of trees surely resulted in an increase of the yield. These results are in harmony with those obtained by M.A. Abada, H.M. Abd El- Hameed (2009); A.M. Abd El- Kariem (2009); M. M. Refaai (2011), M.Kh. Uwakiem (2011).

2- The effect of spraying certain vitamins on fruit quality.

According to received data, it is obviously that the use of the four vitamins, namely K, E, D& A, either singly or in all possible combinations, was followed by an improved fruit quality in terms of increasing fruit weight and total soluble solids, reducing sugars and decreasing total acidity % comparing with the non-application variant. The increase of vitamins number in the sprayed solutions caused a gradual promotion of fruit quality. The superiority of these vitamins in enhancing fruit quality could be arranged as follows in a descending order: K, E, D and A vitamins. Treating the trees four times with a mixture of vitamins containing K, E, D and A vitamins, each at 100 ppm, gave the best results regarding fruit quality. The similar trend was observed during both seasons. The beneficial effect of the four vitamins, on the quality of fruits, was mainly attributed to their positive action on enhancing the biosynthesis of plant pigments and total carbohydrates (J.J. Oertili, 1987). These results are in harmony with those obtained by I.A.M. Farahat (2008); M.M. Allam (2008); M.M. Refaai (2011), M.Kh. Uwakiem (2011).

CONCLUSIONS

As a conclusion, we can mention that in order to improve the quantity and quality of yield it is advisable to treat the apple trees four times with a mixture of vitamins containing K, E, D and A vitamins.

REFERENCES

1. Abada, M. A. M. and Abd El- Hameed, H. M. (2009): Response of Thompson seedless grapevines to spraying some vitamins. Minia J. of Agric. Res. & Develop. Vol. (29) No.3 pp. 371- 389.

Table 1

Effect of spraying certain vitamins on the yield, as well as some physical and chemical characteristics of the fruits of Anna apple trees during 2010 and 2011 seasons.

Treatments	Yield/tree (kg.)		Fruit weight (g.)		T.S.S %		Total sugars %		Reducing sugars %		Total acidity %	
	2010	2011	2010	2011	2010	2011	2010	2011	2010	2011	2010	2011
Control.	31.0	31.2	66.1	65.9	13.0	13.0	10.0	10.1	7.1	7.0	0.680	0.679
V. K.	36.1	36.3	73.7	73.5	13.5	13.3	10.3	10.5	8.2	8.3	0.593	0.592
V. E.	35.0	34.7	71.8	71.5	13.5	13.3	10.3	10.5	8.0	8.1	0.617	0.616
V. D.	33.7	33.5	70.0	70.2	13.3	13.3	10.3	10.4	7.7	7.8	0.639	0.638
V. A.	32.4	32.3	68.3	68.0	13.2	13.3	10.2	10.3	7.4	7.5	0.660	0.660
V. K + E.	42.5	43.1	85.2	85.3	14.2	14.0	11.0	10.8	9.6	9.7	0.440	0.439
V. K + D.	41.1	42.0	83.4	83.5	14.1	14.0	10.9	10.7	9.6	9.6	0.470	0.469
V. K + A.	41.0	40.6	81.6	81.7	14.0	13.8	10.7	10.7	9.3	9.3	0.500	0.502
V. E + D.	39.8	40.2	79.5	79.4	14.0	13.8	10.6	10.7	9.0	9.0	0.531	0.529
V. E + A.	38.6	39.0	77.6	77.5	14.0	13.6	10.5	10.6	8.8	8.8	0.551	0.549
V. D + A.	37.4	37.5	75.7	75.2	13.8	13.5	10.5	10.6	8.5	8.5	0.573	0.572
V. K + E + D.	48.3	48.6	92.8	92.9	14.4	14.2	11.6	11.4	10.0	10.0	0.390	0.382
V. K + E + A.	46.1	46.8	91.0	91.1	14.4	14.2	11.5	11.2	10.0	10.0	0.400	0.393
V. K + D + A.	44.9	45.6	89.0	89.3	14.4	14.2	11.5	11.2	9.9	9.9	0.405	0.400
V. E + D + A.	43.6	44.5	87.0	87.5	14.4	14.2	11.2	11.1	9.7	9.7	0.410	0.405
All vitamins	52.5	53.2	95.0	94.8	14.6	14.4	11.9	11.8	10.2	10.2	0.372	0.367
New L.S.D at 5 %	**1.1**	**1.0**	**1.7**	**1.6**	**0.2**	**0.2**	**0.2**	**0.2**	**0.2**	**0.2**	**0.017**	**0.019**

Ştiinţa agricolă, nr. 2/2011. ISSN 1857-0003

2. Abd El- Aziz, Y. Z. (2001): Effect of some micro and macro nutrients as well as vitamin C on productivity of Anna apple trees (*Malus domestica* Borkh). M. Sc. Thesis Fac. of Agric. Minia Univ., Egypt.

3. Abd El- Kariem, A.M. (2009): Relation of fruiting in Crimson seedless grapevines to spraying antioxidants. M. Sc. Thesis Fac. of Agric. Minia Univ. Egypt.

4. Ahmed, F. F. and Seleem- Basma, M. (2008): Trials for improving yield and quality of Thompson seedless grapes by using some antioxidants. Minia J. of Agric. Res. & Develop Vol. (28) No. 1 pp. 1-11.

5. Allam, H. M. M. (2008): Response of Kelsy plum trees to application of some antioxidants. M. Sc. Thesis Fac. of Agric. Minia Univ. Egypt.

6. Association of Official Agricultural Chemists (1995): Official Methods of Analysis (A.O.A.C). 14th Ed. A.O.A.C Benjamin Franklin Station Washington, D.C, U.S.A. pp 490 – 550.

7. Bertschinger, L. and Stadler, W. (1997): Vitamin E, first results from field trial in Switzerland, Obst and Weinbau 133(6): 150-151.

8. Farahat, I. A. M. (2008): Effect of some antioxidant and boron treatments on growth and fruiting of Red Globe grapevines. M. Sc. Thesis Fac. of Agric. Minia Univ., Egypt.

9. Lane, J. H. and Eynon, L. (1965): Determination of reducing sugars by means of Fehling's solution with methylene blue as indicator A.O.AC. Washington D.C., U.S.A. pp. 490 – 510.

10. Mead, R.; Currow, R. N. and Harted, A. M. (1993): Statistical Methods in Agricultural. Biology. 2nd Ed. Chapman & Hall, London. pp. 54 – 60.

11. Numair- Safaa, A. (2001): Effect of some GA_3, vitamins and active dry yeast treatments on vegetative growth, yield and fruit quality of Thompson seedless grapevines. Zagazig Univ. Fac. of Agric., 1 (6): 634 – 644.

12. Oertili, J. J. (1987): Exogenous application of vitamins as regulators for growth and development of plants. Pflanzene-rnaher Badenk, 150: 375- 391.

13. Refaai, M. M. (2011): Productive capacity of Thompson seedless grapevines in relation to some inorganic, organic and bio-fertilization as well as citric acid treatments. Ph. D. Thesis Fac. of Agric. Minia Univ. Egypt.

14. Robinson, F. A. (1973): Vitamins phytochemistry Vol. III: 195 -198 Lawrence P. Miller (Ed.) Van Nostrand Rinhold. Comp. New York pp 50 – 60.

15. Samiullah, S. A.; Ansari, M. M. and Afridi, R. K. (1988): B- vitamins in relation to crop productivity. Ind. Re. Life, Sci. 8: 151- 174.

16. Uwakiem, M. Kh. (2011): Effect of some organic, bio and slow release N fertilizers as well as some antioxidants on vegetative growth, yield and berries quality of Thompson seedless grapevines Ph. D, Thesis. Fac. of Agric. Minia Univ. Egypt.

Data prezentării – ***01.11.2011***