Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 6, 2021, Pages. 10196 - 10202
Received 25 April 2021; Accepted 08 May 2021.

Response of Apricot Transplants to Organic Fertilizers Application

Bilal M.K. Almashhadani[1,*], Shamil M. Abbood[2] and Mohammed S. Hameed[1]

[1]Dep. Biology, Al-Rasheed University College, Iraq.

[2]Middle Technical University – Technical Institute – Suwaira, Iraq

*Email: bilal_mka@yahoo.com

ABSTRACT

This study was conducted in private orchard in Baghdad province, during 2020 growing season to investigate the influence of organic fertilizers on growth and leaf mineral content of three year's old trees of "Qaisi" apricot transplants. This study included two factors: three levels of poultry manure, 0 (P_0), 125g.tree^{-1} (P_{125}) and 250g.tree^{-1} (P_{250}) and four levels of liquid organic fertilizer (Vit –org), without adding (V_0) , 20 ml.tree^{-1} (V_{20}) , 40 ml.tree^{-1} (V_{40}) and 60 ml.tree^{-1} (V_{60}) and their interaction. Treatments were replicated three times (three transplants in experimental unit) at factorial experiment in a RCBD. The number of transplants used was 108 transplants. The results showed that, poultry manure at 250 gm.Transplant^{-1}(P_{250}) significantly increased in transplant height of 12.86 cm and highest leaves number of 396.00 leaf.plant^{-1} and highest leaf chlorophyll content of 67.71 SPAD unit and leaf nitrogen content of 1.218 % and leaf potassium content of 1.638 %. Results also showed that liquid organic fertilizer (Vit –org) at 60 ml.tree^{-1} (V_{60}) gave the highest increased in transplant height of 13.37 cm and highest leaf dry weight of 31.11 % and highest leaf nitrogen content of 1.186 % and highest leaf zinc content of 14.18 mg.kg^{-1}.

Keywords: apricot transplants, organic fertilizers application

INTRODUCTION

Apricot trees belong to Rosacea and its scientific name is *Prunus armeniaca* L. It may also be called *Armeniaca vulgaris* (Al-Issa and Batha, 2012). The history of the apricot tree goes back 5,000 years in China during the reign of Emperor Yu (Janick, 2005). Other sources indicate that its homeland is northern China, where it was planted 4000 years ago (Alwan, 2017). There are wild types of apricot whose cultivation extends from Japan to Afghanistan. The Romans called it the Armenian apple. For this reason, some scholars believe that the origin of apricots is from Armenia, and that is why it was called by this name (Alwan, 2017).In 2018, the acreage of apricot in the world reached about 548730 hectare, with production of 3838523 tons. The main producing countries are Turkey then Uzbekistan, Iran, Algeria and Italy (FAO, 2018). In 2019, the estimated number of apricot fruit trees in Iraq, including nearly 1066429 tree produces up to 34728 tons, and the average production per tree about 32.56 kg (PCBS, 2019).It is difficult to deny that organic farming is one of most important modern practices in fruit production, since organic

Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 6, 2021, Pages. 10196 - 10202
Received 25 April 2021; Accepted 08 May 2021.

fertilization is one of the important ways to supply plants with the needs of nutrients without any negative impact on environment, and the increase in it does not lead to plants damage that occur when fertilizing with mineral fertilizers in large quantities. It is also not hidden from those working in the agricultural sector that organic matter plays a role in plant growth and yield, whether it is added to the soil or sprayed on vegetative growth (Nardi et al., 2016 and Pylak et al., 2019).

Poultry manure is more concentrated in its nutrient content than other animal waste, and therefore it is widely used and in more quantities compared to other animal waste, and it is a source of macro and micro nutrients (Ali, 2012). It facilitates the decomposition of insoluble nitrogen, making it a continuous source of supplying trees with this element during the growing season.The content of poultry waste of organic matter is high and therefore it will work when added to increase soil ability to retain water and fertilizer elements and reduce its loss by washing, and increase availability of some micro and macro elements in soil extract and thus increase plants growth, which is reflected positively in plant yield of the plant (Chen and Jiang, 2014 ;Muslat and Musleh, 2015).Poultry manures affect the growth of fruit trees, Al-Hadethi (2019) mentioned that the poultry manure applied with 250 and 500 g.tree^{-1} caused a significant increase in leaves number, shoot diameter, shoot length, leaves dry weight and leaves mineral and hormonal content compared to the control treatment from his study on 2 year's old trees of hawthorn. AL Obaidy (2020) found that poultry manure at 250 and 500 g.tree^{-1} caused significant increases in leaves dry weight, chlorophyll content, leaves area and leaves mineral content for “Salemy” pomegranate trees. Addition of liquid organic fertilizers has some importance and benefit, as they can be prepared easily, as well as being free from weed seeds, fungi and various pathogens, and ease of use, whether sprinkled on vegetative growth or added to soil or with irrigation water (Benits, 2006). Several studies have been conducted to find out the role of liquid organic fertilizers in fruit trees growth, Al-Aa’reji and Perot (2017) found that the use of some organic fertilizers such as (humi max, nutrigren, vit-org) with two concentrations for each of them (15, 30 mg. L^{-1}) to apricot trees leads to an increase in leaves mineral content . AL-Shujairy and Al-Hadethi (2021) found that liquid organic fertilizer (vit –org) at 30 and 60 ml.tree^{-1} caused significant increases in stem diameter, leaves dry weight and leaves mineral content for “Hollywood” plum trees. Due to few of similar studies in Iraq, this study aims to determine the effect of organic fertilizers on growth and leaves mineral content and avoid using chemical fertilizers and use clean agriculture of apricot transplants.

MATERIALS AND METHODS

This study was conducted in private orchard in Baghdad province, during 2020 growing season to investigate the influence of organic fertilizers on growth and leaf mineral content of three year's old trees of “Qaisi” apricot transplants. This study included two factors: three levels of poultry manure, 0 (P_0), 125g.tree^{-1} (P_{125}) and 250g.tree^{-1} (P_{250}) and four levels of liquid organic fertilizer (Vit –org), without adding (V_0) , 20 ml.tree^{-1} (V_{20}) , 40 ml.tree^{-1} (V_{40}) and 60 ml.tree^{-1} (V_{60}) and their interaction.

Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 6, 2021, Pages. 10196 - 10202
Received 25 April 2021; Accepted 08 May 2021.

Treatments were replicated three times (three transplants in experimental unit) at factorial experiment in a RCBD. The number of transplants used was 108 transplants. The following parameters were determined in experimental season:

1. Transplant height (cm): Transplant heights were measured by metric tape measure at the beginning and end of the experiment, according to the difference between them and that such an increase in transplant height.

2. Leaves number.

3. Leaf chlorophyll contents (SPAD unit).

4. Leaf dry weight (%): Various leaves were taken from transplants was weighing then drained and calculated the percentage of dry matter by dividing weight after drying on weight before drying× 100.

5. Leaves mineral content: Leaves samples were collected for chemical analysis at the 1st week of June. Each sample consisted of 15 leaves. Transplant^{-1}. Leaves were washed with tap water, rinsed with distilled water, and then dried at 70 c^0 until a constant weight, ground and digested according (Chapman, and Pratt, 1978). Nitrogen was estimated by micro-kjeldahl method of (A.O.A.C, 1980). Phosphorus was estimate the chromatic by using spectrophotometer by (Estefan *et.al*, 2013). Potassium was determined using atomic absorption spectrophotometer "Perkin Elmer 1100B" after samples digested according to Estefan *et al*. (2013). Zinc was determined using atomic absorption as (Black, 1965).

The obtained results were subjected to analysis of variance according to (Elsahookie and Wuhaib, 1990) using L.S.D 0.05 for comparing differences between various treatment means.

RESULTS AND DISCUSSIONS

Effects of Poultry manure and Liquid organic fertilizer (Vit –org) on Increase in transplant height, Leaves number, Leaf chlorophyll contents and Leaves dry weight: Data concerning the effect of treatments on increase in transplant height, leaves number, leaf chlorophyll contents and leaves dry weight are listed in Table (1). The data cleared that, poultry manure at 250 gm.Transplant^{-1}(P_{250}) significantly increased in transplant height of 12.86 cm and highest leaves number of 396.00 leaf.plant^{-1} and highest leaf chlorophyll content of 67.71 SPAD unit and highest leaf dry weight of 30.59 %, while lower values of these traits was in control treatment (P_0). Table (1) also shows that liquid organic fertilizer (Vit –org) at 60 ml.tree^{-1} (V_{60}) superiority of control treatment and gave the highest increased in transplant height of 13.37 cm and highest leaves number of 347.44 leaf.plant^{-1} and highest leaf dry weight of 31.11 %.Also, the lower values of these traits were in control treatment (V_0). The interactions between poultry manure and liquid organic fertilizer significantly affected in all studied traits especially the interaction treatment ($P_{250}V_{60}$).

Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 6, 2021, Pages. 10196 - 10202
Received 25 April 2021; Accepted 08 May 2021.

The results show that organic fertilizers addition has a positive effect on vegetative growth characteristics, and vegetative characteristics increase may be attributed to the effect of organic fertilizers in improving soil chemical, biological and physical characteristics. Physiological processes such as increasing the efficiency of photosynthesis in leaves (Hamed et al., 2017) and consequently increasing vegetative growth. The reason is also due to fact that this fertilizer contains most of the macro and micro nutrients necessary for fruit trees growth (Amanullah et al., 2007). Addition of poultry manure leads to an increase in microorganisms' ability in soil to produce hormones such as auxins, cytokinins and gibberellins, and thus it affects the growth and increase absorption nutrients from soil. Al-Hadethi (2019) mentioned that the addition of poultry manure led to an increase in leaves hormonal content of hawthorn transplants, which reflected positively on vegetative growth. These results are in agreement with those obtained by Kurer et al. (2017) on pomegranate trees; they found a significant increase in vegetative growth when adding poultry manure.

Table (1) Effects of Poultry manure and Liquid organic fertilizer (Vit –org) on Increase in transplant height, Leaves number, Leaf chlorophyll contents and Leaves dry weight of "Qaisi" apricot transplants.

Increase in transplant height (cm)					**Leaves number**			
V	**P**				**P**			
	0	**125**	**250**	**Mean**	**0**	**125**	**250**	**mean**
V_0	8.68	9.15	11.33	9.72	251.00	322.67	341.33	305.00
V_{20}	9.17	11.75	11.47	10.80	267.33	291.33	394.67	317.78
V_{40}	9.92	12.94	13.10	11.99	261.00	329.00	419.00	336.33
V_{60}	10.37	14.22	15.52	13.37	273.33	340.00	429.00	347.44
mean	9.54	12.02	12.86		263.17	320.75	396.00	
L.S.D	**V**	**P**	**Int.**		**V**	**P**	**Int.**	
5%	0.87	0.75	1.50		13.93	12.06	24.13	
Leaf chlorophyll contents (SPAD unit)					**Leaf dry weight (%)**			
V_0	47.87	53.55	66.12	55.85	28.43	29.64	29.92	29.33
V_{20}	48.96	56.87	66.52	57.45	29.19	29.86	29.88	29.64
V_{40}	50.51	59.14	68.20	59.28	29.64	29.77	30.65	30.02
V_{60}	50.16	60.74	70.00	60.30	30.47	30.98	31.89	31.11
mean	49.38	57.58	67.71		29.43	30.06	30.59	
L.S.D	**V**	**P**	**Int.**		**V**	**P**	**Int.**	
5%	N.S	5.11	10.21		0.37	0.32	0.64	

Effects of Poultry manure and Liquid organic fertilizer (Vit –org) on leaves mineral content: Data concerning the effect of organic fertilizers treatments on leaves mineral content are listed in Table (2). The data cleared that poultry manure at 250 gm.Transplant^{-1}(P_{250}) significantly increased and gave the highest leaf nitrogen, phosphor, potassium and zinc content. Table (2) also shows that liquid organic fertilizer (Vit –org) at 60 ml.tree^{-1} (V_{60}) significantly superiority of control treatment and gave the highest leaf nitrogen, potassium and zinc content, while liquid organic

Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 6, 2021, Pages. 10196 - 10202
Received 25 April 2021; Accepted 08 May 2021.

fertilizer (Vit –org) did not affect on leaf phosphor content. The interaction between treatments especially interaction treatment ($P_{250}V_{60}$) as it gave the highest leaf nitrogen content of 1.256 % , highest leaf phosphor content of 0.179 %, highest leaf potassium content of 1.768 % and highest leaf zinc content of 15.84 $mg.kg^{-1}$. The increase in leaf mineral content due to organic fertilizers application is attributed to its role in increasing soil organic matter, then improving soil composition and increasing amount of available elements of the plant that absorb and increase its concentration in it (AL Obaidy, 2020).

Table (2) Effects of Poultry manure and Liquid organic fertilizer (Vit –org) on leaves mineral content of "Qaisi" apricot transplants.

Leaves nitrogen content (%)					Leaves phosphor content (%)			
V	P				P			
	0	125	250	Mean	0	125	250	mean
V_0	1.114	1.139	1.190	1.148	0.140	0.151	0.158	0.150
V_{20}	1.123	1.152	1.202	1.159	0.142	0.153	0.166	0.154
V_{40}	1.133	1.157	1.225	1.172	0.143	0.159	0.171	0.158
V_{60}	1.137	1.164	1.256	1.186	0.146	0.164	0.179	0.163
mean	1.127	1.153	1.218		0.143	0.157	0.169	
L.S.D	V	P	Int.		V	P	Int.	
5%	0.013	0.011	0.022		N.S	0.013	0.026	
Leaves potassium content (%)					Leaves zinc content ($mg.kg^{-1}$)			
V_0	1.324	1.388	1.480	1.397	10.85	11.66	12.94	11.82
V_{20}	1.341	1.512	1.589	1.481	11.45	13.58	15.22	13.42
V_{40}	1.404	1.535	1.714	1.551	11.86	13.90	15.40	13.72
V_{60}	1.458	1.626	1.768	1.617	12.07	14.64	15.84	14.18
mean	1.382	1.515	1.638		11.56	13.45	14.85	
L.S.D	V	P	Int.		V	P	Int.	
5%	0.075	0.065	0.130		1.21	1.05	2.10	

REFERENCES

1. A.O.A.C. 1980. Official Methods of Analysis. 13th. Ed. Association of Official Analytical Chemists. Washington, D.C.
2. Al-Aa'reji, J.M.A and Jihad Sh. K. Perot. 2017. Effect of some liquid organic and (NPK) fertilizers on growth and fruiting of apricot trees "*Prunus armeniaca* L. "cv. Royal. Kirkuk Journal of Agricultural Sciences.8 (4):7-24.
3. Al-Hadethi, M.E.A. 2019. Response of hawthorn transplants to biofertilizers and poultry manure. Iraqi Journal of Agricultural Sciences. 50(2):734- 740.
4. Al-Issa, I and M. Batha. 2012. Deciduous fruit production. First edition. Damascus University Publications. Syria.
5. Al- Obaidy, N.N.A. 2020. Effect of poultry manure application and spraying with licorice root and turmeric extracts in growth and yield of "Salemy" pomegranate trees *Punica granatum* L. M. Sc. Thesis. College of Agriculture. Kirkuk University, Iraq.

Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 6, 2021, Pages. 10196 - 10202
Received 25 April 2021; Accepted 08 May 2021.

6. AL-Shujairy, H.K.E and M.E.A, Al-Hadethi. 2021. Effect of organic treatment on growth and leaves mineral and hormonal content in plum trees. Annals of the Romanian Society for Cell Biology. 25(4):12055-12062.
7. Ali, N.S. 2012. Fertilizer Technology and Uses. Ministry of Higher Education and Research. Univ. Baghdad. pp. 202.
8. Alwan, J. M. 2017. Deciduous Fruit Technology. Its propagation - its cultivation - its care and its production (Part Two). Al-Wadah Publishing House. Amman. Jordan.
9. Amanullah, M.M; E, Somasundaram; K, Vaiyapuri and K,Sathyamoorthi. 2007. Poultry manure to crops – A Review. Agric. Rev., 28 (3): 216-222.
10. Benits, R.2006.Biochemical variability of Olive orchard soils under different management systems. Research in Spain.
11. Black, C. A. 1965. Methods of soil Analysis. Part 2. Amer. Soc. O Agron. Inc. U.S.A. pp. 1097.
12. Central Organization for Statistics and Information Technology (PCBS). The Ministry of Planning and Development Cooperation. Report production of summer fruit trees for the year 2019. Baghdad. Iraq.
13. Chapman, H,D. and P. E, Pratt. 1978. Methods of Analysis for Soils, Plants, and Waters. Univ. of Calif., Div. Agric. Sci., Priced Pub., 4034.pp. 150.
14. Chakraborty, B., Labh, S. ., Rani, R. ., & Bhattacharjee, S. . (2021). Biodiversity and Management Status of Charia beel in Northern Bangladesh. Journal of Scientific Research in Medical and Biological Sciences, 2(2), 63-80. https://doi.org/10.47631/jsrmbs.v2i2.232
15. Chen, Z and X, Jiang. 2014. Microbiological safety of chicken litter or chicken litter-based organic fertilizers: A Review. Agriculture. 4: 1-29.
16. Elsahookie,M.M and K.M, Wuhaib. 1990. Design and Analysis of experiments. Univ. Of Bagh. Dar al hekma.pp.488.
17. Estefan, G; R.Sommer and J.Ryan .2013. Methods of soil, plants and water analysis, ICARDA, International for Agriculture Research in the dry areas, third edition. www.icarda.org.
18. FAO. 2018. FAO. Statistics Division 2018.
19. Hamed, F; I, Al-Issa and A. Salman. 2017. Basics of fruit and vegetable production. Damascus University Publications. Faculty of Agriculture. Damascus University. Syrian Arab Republic.
20. Janick, J.2005.The origin of fruits, Fruit growing and fruit breeding. Plant breeding. Rev.25: 255-230.
21. Kurer, B.S; D.R, Patil; K, Gandolkar; R. K, Mesta; M.S, Nagaraj; A.M. Nadaf and D.P. Prakash. 2017. Response of pomegranate to different organic manures under northern dry zone of Karnataka, India. International Journal of Current Microbiology and Applied Sciences. 6(11): 86-90.
22. Muslat, M. M and O. H. Musleh. 2015. Fundamentals of Organic Agriculture. College of Agriculture, University of Anbar, Iraq.

Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 6, 2021, Pages. 10196 - 10202
Received 25 April 2021; Accepted 08 May 2021.

23. Nardi, S ; D, Pizzeghello; M, Schiavon and A, Ertani. 2016. Plant biostimulants: physiological responses induced by protein hydrolyzed-based products and humic substances in plant metabolism. Scientia Agricola. 73(1):18-23.
24. Pylak, M ; K, Oszust and M, Frac. 2019. Review report on the role of bioproducts, biopreparations, biostimulants and microbial inoculants in organic production of fruit. Rev Environ Sci Biotechnol . 18:597–616.