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RESPONSE OF ZEBDA AND LANGRA MANGO TREES TO SOME BIOFERTILIZATION TREATMENTS

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ABSTRACT

The influence of biofertilization with phosphorene at 5,10, and 15 g/tree, pottassine at 250, 500 and 1000 ppm and active bread yeast at 0.4, 0.8 and 1.0% on leaf mineral content, yield as well as physical and chemical properties of Zebda and Langra mango fruits was investigated during 2003 and 2004 seasons.

Obtained results showed that application of phosphorene at 5 to 15 g/tree, pottassine at 250 to 1000 ppm and active bread yeast at 0.4 to 1.0% was very effective in enhancing nutritional status of the trees, yield as well as physical and chemical characters of the fruits in Zebda and Langra mango trees. The promotion was associated with increasing the applied rates. Application of active bread yeast and pottassine was superior than phosphorene in improving all studied parameters, except P%. No practical influence on the investigated parameters was observed when using higher rates of phosphorene (10 and 15g/tree,) pottassine (500 and 1000 ppm) and active bread yeast (0.8 and 1.0%)

From the economic point of view, the best results with regard to nutritional status of the trees, yield and fruit quality were obtained when Zebda and Langra mango trees biofertilized three times with active bread yeast at 0.8% or three times with pottassine at 1000 ppm or phosphorene at 10.0g/tree once.

Keywords : Phosphorene, pottassine.active bread yeast, zebda, langra, mango, biofertilization.

INTRODUCTION

Mango total acreage in Egypt reached about 102353 feddans and the fruiting area is about 66071 feddans producing about 325467 tons fruits. (Statistical Estimates of Ministry of Agriculture,2002)

Biofertilization for fruit crops has called the attention of pomologists and it becomes in the last few decades a positive alternative to chemical fertilizers. Biofertilizers were very safe for human, animal and environmental and using them lower the great pollution occurred in our environment.

Phosphorene is a biofertilizer product containing active micro-organisms hydrolysing the insoluble phosphate into soluble one under high soil pH and great percentage of calcium carbonate, consequently partially overcome the phosphate fixation.

Application of phosphorene greatly promoted nutritional status, yield and fruit quality of Baldy mandarin trees (Abd El – Moumen, 1994). In, guava (Haggag *et al*, 1995) and Chemlali olive seedlings (Ragab,1999).

Pottassine (30% K_2O – 8% P_2O_5) is a biofertilizer product containing potassium. Potassium plays an important role in improving yield and fruit quality. (Banik *et al*, 1997 and Rojas,1996).

The possibility of using the active bread yeast for improving growth and productivity of fruit crops was mentioned by Subba Rao (1984). However, the various positive effects of applying active bread yeast as a newly used

biofertilizer were attributed to its own from different nutrients, higher percentage of proteins, larger amount of vitamin B and the natural plant growth hormone namely cytokinins. In addition, application of active bread yeast was very effective in releasing CO_2, which reflected on improving net photosynthesis Ferguson *et al*, 1987 and Idso *et al*, (1995). Nowadays, Bred (*Saccharaomyces cervisiae*) as a natural biostimulant appeared to induce an astonished influence on growth and yield of many crops, since it has various basic function, i.e.CO_2 production as well as formation of alcohol, acids and esters (Magoffin and Hoseney, 1974; and Martinez- Anoya *et al.*,1990).Spraying Valencia orange trees with active bread yeast either once on March or August or twice at both dates was favorable in improving growth, fruit set, number of fruits and yield as well as fruit weight and volume (Hegab *et al.*,1997). They added that carrying out two sprays of 0.50 % active bread yeast gave the best results with regard to yield and fruit quality parameters., Ahmed and Ragab (2002) supported the beneficial effect of yeast on nutritional status of Picual olive trees.

MATERIALS AND METHODS

This study was carried out in a private orchard located at Sadat city, El-Minufiya Governorate, during two consecutive seasons of 2003 and 2004 on two grafted mango cultivars namely; Zebda and Langra. All of the trees were 10 – year- old at the start of study. They were grown in loamy soil and planted at 7× 7 m apart. Trees of both cultivars were nearly similar in growth vigour. Soil analysis was carried out according to the standard methods that outlined by Wilde *et al* (1985) and the data are listed in Table(1).

Table 1: Chemical and Physical properties of farm soil (Sadat city)

Analysis	Percentage
Mechanical analysis	
Sand	90
Silt	5
Clay	5
Texture	Sand
pH	8.2
EC	1.5 dS /m
$CaCo_3$	5.50
Cation	
N	0.009
P	0.443
K	0.575
Ca^{2+}	2.65
Mg^{2+} + meq /L	2.40
Na^{+}	4.435
Anions	
$Co3^{2-}$	0.00
HCO^{3-}	3.85
Cl^{-} meq/L	53.0
$SO^{2-}4$	55.65

The experiment for each mango cv. was arranged in complete randomized block design. Regular agricultural practices such as hoeing, drip irrigation, fertilization and pest control management were done as usual to all the investigated mango trees .

Table 2 : Chemical composition of Bread Yeast

Protein	47%
Carbohydrates	33%
Minerals	8%
Nucleic acids	8%
Lipids	4%
Approximate composition of vitamins :	
Thiamine	6-100 m /g
Riboflavin	35-50
Niacin	300-500
Pyridoxine HCL	28
Panto thenate	70
Biotin	1.3
Cholin	4000
Folic acid	5-13
Vit- B_{12}	0.001
Approximate composition of minerals :	
Na	0.12 mg/g
Ca	0.75
Fe	0.02
Mg	1.65
K	21.00
P	13.50
S	3.90
Zn	0.17
Si	0.03
Cu	8.00
Se	0.10
Mn	0.02
Cr	2.20
Ni	3.00
Va	0.04
Mo	0.40
Sn	3.00
Li	0.17

* After, Nagodawithana,W.T. (1991)

The selected trees of each mango cv. (30 trees) were thoroughly subjected to the following 10 treatments .

1- Control (without biofertilizer addition).
2- Soil addition of phosphorene at 5.0 g/tree.
3- Soil addition of phosphorene at 10.0 g/tree.
4- Soil addition of phosphorene at 15.0 g/tree.
5- Foliar application of pottassine at 250 ppm.
6- Foliar application of pottassine at 500 ppm.
7- Foliar application of pottassine at 1000 ppm.
8- Foliar application of active bread yeast at 0.4 %.
9- Foliar application of active bread yeast at 0.8 %.
10- Foliar application of active bread yeast at 1.0 %.

Such ten treatments were replicated three times, three trees per each. Phosphorene, i.e.,5.0, 10.0 or 15.0 g/tree was mixed with 1.0 kg super phosphate(the recommended rate) before application and the mixture was broadcasted around each tree (1st week of February)

Pottassine (30% K_2O – 8% P_2O_5) at 250, 500, 1000 ppm were sprayed three times :

1- The first one of April (after full bloom) in Zebda and at the first of May in Langra mango.
2- The second one after fruit setting.
3- The third after 30 days on fruit setting.

Active bread yeast at 0.4 , 0.8 and 1.0 % was foliage sprayed, yeast solutions at all concentrations used were carefully prepared before spraying by dissolving the definite amounts of yeast in warm water (38C°) and adding sugars at the same rate. Solutions were sprayed three times (four week intervals) after full bloom (the first of April).

In late July of each seasons, samples comprised from twenty leaves of six month old were selected at random from each replicate to determine their content from N% , P% and K% (According to Wilde *et al*, 1985). Determination were carried out on dry weight basis. At harvest time according to the prevailing conditions (mid August for Zebda and mid September for Langra) yield expressed in weight (kg) and number of fruits per tree were recorded. Beside, fruit quality in terms of fruit weight (g), percentages of pulp, seed and peel, total soluble solids %, total acidity %, total sugars % and reducing sugars % according to (Lane and Eynon volumetric method), pulp content of vitamin C according to AOAC (1985) was determined. All data obtained were statistically analyzed according to Mead *et al.* (1993) using L.S.D test to recognize the significancy between various biofertilizer treatment.

RESULTS AND DISCUSSION

1- Effect of biofertilization on leaf minerals content :

It is clear from the data in Table 3 that biofertilization through using phosporene at 5.0 to 15.0 g/tree, pottassine at 250 to 1000 ppm and active bread at 0.4 to 1.0% significantly stimulated percentages of N, P and K in the leaves of Zebda and Langra mango trees as compared to control trees. The increase in these macronutrients was associated with raising rates of phosphorene, pottassine and concentrations of active bread yeast. Meaningless promotion on these elements was observed among the higher two levels of phosphorene (10 and 15 g/tree), pottassine (500 and 1000 ppm) and active bread yeast (0.8 and 1.0 %) . Application of active bread yeast significantly increased N and K in the leaves than used phosphorene and pottassine.

The *vice versa* was obtained concerning P %. Biofertilizing the trees with active bread yeast at 1.0 % produced the maximum percentages of N and K in the leaves. The maximum percentage of P was recorded on Zebda and Langra mango trees received phosphorene at 15g/tree. These results were true in 2003 and 2004 seasons. The effect of phospharene as a biofertilizer containing P solublizing bacteria in accelerating the release of P and reducing P fixation as well as the effect of active bread yeast on enhancing the uptake of N and K could explain the present results. The maximum percentage of K was recorded on trees received pottassine at 1000 ppm . The great depletion of N and P may used in both the vegetative growth, as well as fruit development in response to K applications. These results are in agreement with those obtained by Abd El – Moumen (1994), Haggag *et al* (1995) and Ragab (1999) on phosphorene and Maas (1989), on pottassine and Ahmed , Ragab (2002) on yeast.

2- Effect of biofertilization on yield attributes:

Data concerning the yield expressed in weight (kg) and number of fruits per tree of Zebda and Langra mango trees in response to biofertilization with phosphorene, pottassine and active bread yeast are presented in Table 4. Yield expressed in weight and number of fruits per tree was positively affected by biofertilization the trees with phosphorene , pottassine and active bread yeast. Biofertilization significantly improved the yield of both mango cvs than non-biofertilization.

Increasing levels of phosphorene from 5.0 to 15.0 g/tree, pottassine from 250 to 1000 ppm and concentrations of active bread yeast from 0.4 to 1.0 % was followed by gradual promotion on yield in terms of weight and number of fruits per tree. Significant differences on yield were observed between all levels and concentrations of the three biofertilizers.

Foliar application of active bread yeast at 0.4 to 1.0 % and potassine at 250 to 1000 ppm were favourable for improving yield than using phosphorene via soil at 5 to 15g/tree. The best results with regards to yield were obtained due to supplying Zebda and Langra mango trees with active bread yeast at 0.8 %, under such promising treatment Zebda and Langra mango trees produced 53.70, 63.90 and 37.6, 48.0 kg in both seasons.

Table (3) : Effect of biofertilization with phosphorene, pottassine and active bread on leaf minerals content (%) of Zebda and Langra mango trees in 2003 and 2004 season .

Biofertilization treatments	Zebda						Langra					
	N%		P%		K%		N%		P%		K%	
	2003	2004	2003	2004	2003	2004	2003	2004	2003	2004	2003	2004
Control	0.93	0.97	0.10	0.10	0.68	0.48	0.97	1.16	0.09	0.10	0.60	0 60
Phosphorene at 5.0 g/tree	1.06	1.13	0.26	0.30	0.93	1.05	1.07	1.32	0.19	0.23	0.93	0.98
Phosphorene at 10 g/tree	1.22	1.33	0.30	0.35	1.09	1.19	1.22	1.40	0.21	0.25	1.03	1.09
Phosphorene at 15.0 g/tree	1.24	1.35	0.35	0.39	1.11	1.19	1.23	1.43	0.25	0.30	1.10	1.19
Pottassine at 250 p.p.m	1.08	1.10	0.14	0.15	1.15	1.20	1.08	1.34	0.12	0.13	1.11	1.24
Pottassine at 500p.p.m	1.25	1.30	0.18	0.19	1.21	1.30	1.23	1.40	0.15	0.16	1.16	1.29
Pottassine at 1000 p.p.m	1.27	1.37	0.20	0.30	1.40	1.52	1.30	1.50	0.17	0.18	1.20	1.29
Active bread yeast at 0.4%	1.36	1.47	0.14	0.13	0.99	1.09	1.18	1.39	0.12	0.13	0.89	1.06
Active bread yeast at 0.8%	1.49	1.63	0.17	0.18	1.12	1.21	1.41	1.65	0.15	0.15	1.10	1.13
Active bread yeast at 1.0%	1.52	1.69	0.18	0.19	1.13	1.23	1.42	1.66	0.16	0.17	1.11	1.14
New L.S.D at 5%	0.11	0.13	0.03	0.04	0.12	0.11	0.09	0.08	0.03	0.03	0.11	0.09

Table (4) : Effect of biofertilization with phosphorene, pottassine and active bread yeas on number of fruit per tree and yield (kg) per tree of Zebda and Langra mango trees in 2003 and 2004 seasons.

Biofertilization treatments	Zebda				Langra			
	No. of fruits/tree		Yield (kg/tree)		No. of fruits/tree		Yield (kg/tree)	
	2003	2004	2003	2004	2003	2004	2003	2004
Control	79.2	88.3	38.0	47.0	88.5	91.5	18.50	29.80
Phosphorene at 5.0 g/tree	99.0	110.0	42.7	48.3	101.0	113.0	28.30	39.30
Phosphorene at 10.0 g/tree	109.0	115.0	48.6	56.0	111.0	124.0	31.10	42.30
Phosphorene at 15.0 g/tree	109.5	122.0	49.3	58.0	112.0	125.5	31.70	42.90
Pottassine at 250 p.p.m	100.0	120.0	49.30	58.0	103.0	116.0	26.20	32.0
Pottassine at 500 p.p.m	111.0	122.50	46.60	58.30	102.30	119.50	27.80	38.0
Pottassine at 1000 p.p.m	113.0	123.60	50.60	61.00	110.40	123.60	28.0	38.50
Active bread yeast at 0.4%	99.0	110.0	46.3	50.1	102.0	123.5	30.40	42.30
Active bread yeast at 0.8%	110.0	121.0	53.50	63.70	112.00	124.90	36.80	47.70
Active bread yeast at 1.0%	111.00	121 60	53.70	63.90	112.56	125.30	37.60	48.00
New L.S.D at 5%	8.2	3 0	2.1	2.3	8.9	9.0	1.8	1.7

The essential role of K on enhancing growth and total carbohydrates synthesis of producing more flowers could explain the present results, K is also, responsible for balancing C/N ratio while may encouraging flowering. and subsequently fruit set. The positive action of biofertilization on stimulating the uptake of essential nutrients, building organic foods and enhancing growth characters could explain the presnet results. The results of Abd El – Moumen (1994) , on phosphorene , Singh and Khan (1990), Suriyapananont (1992) and Shata *et al* (1996) on pottassine and Hegab *et al* (1997) on active bread yeast, supported the present results.

3- Effect of biofertilization on physical and chemical properties of the fruits :

Data in Tables 5, 6, 7and 8 clearly show biofertilization with phosphorene, pottassine and active bread yeast was responsible for improving fruit quality in terms of increasing fruit weight and dimensions, pulp weight %, total soluble solids %, total and reducing sugars %, vitamin C content (mg/100g pulp) and decreasing seed weight % and total acidity % compared to non-biofertilization . The promotion on fruit quality was related to raising levels of phosphorene, pottassine and concentration of active bread yeast. Significant differences on fruit quality were observed among all rates of each biofertilizer. Spraying active bread yeast at 0.4 to 1.0 % and pottassine 250 to 1000 ppm preferable in enhancing fruit quality than using phosphorene at 5 to 15 g/tree. Amending Zebda and Langra mango trees with active bread yeast at 0.8 % gave satisfactory promotion on fruit quality of both mango cvs. Unfavourable effects on fruit quality were observed in the trees which did not receive any biofertilizers. These results were true in both three experimental seasons. The effect of biofertilization on enhancing the accumulation and translocation of carbohydrates in fruits was accompanied with accelerating fruit ripening and this explained the present results.

The promotion on fruit quality in response to biofertilization was supported by the results of Abd El-Moumen (1994) on phosphorene and Banik *et al* (1997) on pottassine and Hegab *et al.* (1997) on active bread yeast.

Economically, the best results with regards to nutritional status of the trees, yield and fruit quality were obtained on Zebda and Langra mango trees biofertilized three times with active bread yeast at 0.8% or once application of phosphorence at 10.0 g/tree and pottassine at 1000 ppm

Table (5) : Effect of biofertilization with phosphorene, pottassine and active bread yeast on some on some physical properties of Zebda mango fruits in 2003 and 2004 seasons.

Biofertilization treatments	Fruit weight (g)		Fruit length (cm)		Fruit width (cm)		Pulp %		Seed %		peel %	
	2003	2004	2003	2004	2003	2004	2003	2004	2003	2004	2003	2004
Control	316.5	318.5	13.65	14.00	8.30	8.22	65.2	64.30	15.10	14.80	19.70	20.90
Phosphorene at 5.0 g/tree	331.0	333.40	14.10	14.19	8.37	8.28	66.30	65.40	13.80	12.60	19.90	22.00
Phosphorene at 10.0 g/tree	346.0	350.1	14.34	14.37	8.44	8.33	67.50	66.50	12.2	11.40	20.30	22.10
Phosphorene at 15.0 g/tree	350.0	352.2	14.36	14.40	8.46	8.35	67.60	66.60	12.00	11.0	20.40	22.40
Pottassine at 250 p.p.m	360.10	363.2	14.51	14.60	8.40	8.53	64.70	65.30	11.0	11.0	24.30	23.70
Pottassine at 500 p.p.m	365.30	369.4	14.73	14.83	8.53	8.56	65.50	66.20	10.9	11.2	23.60	22.60
Pottassine at 1000 p.p.m	370.10	375.20	14.78	14.83	8.55	8.59	69.60	69.90	10.10	11.30	23.30	18.80
Active bread yeast at 0.4%	369.0	366.70	14.61	14.66	8.65	8.41	68.70	67.70	11.0	10.60	20.30	21.70
Active bread yeast at 0.8%	383.0	379.80	14.85	14.90	8.61	8.46	69.80	68.9	10.0	9.70	20.20	21.40
Active bread yeast at 1.0%	386.0	381.0	14.80	14.92	8.62	8.48	70.0	69.0	9.80	9.60	20.20	21.40
New L.S.D at 5%	11.0	12.0	0.22	0.16	0.05	0.03	1.00	1.10	0.8	0.09	N.S	N.S

Table (6): Effect of biofertilization with phosphorene, pottassine and active bread yeast on some physical properties of Langra mango fruits in 2003 and 2004 seasons.

Biofertilization treatments	Fruit weight (g)		Fruit length (cm)		Fruit width (cm)		Pulp %		Seed %		peel %	
	2003	2004	2003	2004	2003	2004	2003	2004	2003	2004	2003	2004
Control	168.8	172.0	9.11	9.20	7.20	7.22	55.5	56.30	17.40	17.50	27.10	26.20
Phosphorene at 5.0 g/tree	179.20	183.90	9.30	9.38	7.30	7.30	57.0	57.90	16.3	16.0	26.70	26.10
Phosphorene at 10.0 g/tree	190.30	185.70	9.49	9.55	7.36	7.39	58.30	59.20	15.0	14.70	26.70	26.10
Phosphorene at 15.0 g/tree	191.70	197.0	9.51	9.57	7.38	7.41	59.50	60.30	15.20	14.30	25.30	25.30
Pottassine at 250 p.p.m	200.0	211.0	9.73	9.87	7.75	7.78	62.0	63.30	13.70	13.40	24.30	23.30
Pottassine at 500 p.p.m	229.35	233.0	9.93	9.95	7.78	7.79	64.20	64.50	13.81	13.30	21.99	22.20
Pottassine at 1000 p.p.m	220.30	237.30	9.96	9.97	7.79	7.80	65.10	65 20	13.70	13.50	21.20	21.30
Active bread yeast at 0.4%	200.0	215.30	9.60	9.75	7.60	7.60	62.0	62.0	15.0	15.0	23.0	23.0
Active bread yeast at 0.8%	235.0	243.0	9.83	9.92	7.71	7.75	66.0	67.0	14.30	13.80	19.70	19.20
Active bread yeast at 1.0%	243.3	245.6	9.99	9.93	7.75	7.76	65.70	68.60	13.80	13.50	20 50	17.90
New L.S.D at 5%	10.0	9 20	0.18	0.17	0 06	0.04	1.0	1.10	1.0	0.9	0 50	0 40

Table (7): Effect of biofertilization with phosphorene, pottassine and active bread yeast on some chemical properties of zebda mango fruits in 2003 and 2004 seasons.

Biofertilization treatments	T.S.S %		Total acidity %		T.S.S/ Acid		Total Sugars %		Reducing Sugars %		Vitamin C (mg/ 100g pulp)	
	2003	2004	2003	2004	2003	2004	2003	2004	2003	2004	2003	2004
Control	14.80	15.0	0.485	0.396	30.52	37.88	11.40	11.50	5.11	5.30	34.70	33.80
Phosphorene at 5.0 g/tree	15.10	15.30	0.430	0.350	35.35	44.00	12.10	12.20	6.16	5.80	35.80	35 60
Phosphorene at 10.0 g/tree	15.60	15.70	0.381	0.310	40.58	50.80	12.30	12.50	6.76	6.70	36.90	36.80
Phosphorene at 15.0 g/tree	15.60	16.0	0.376	0.310	41.38	51.61	12.40	12.60	6.80	6.82	37.0	36.90
Pottassine at 250 p.p.m	16.00	16.50	0.320	0.281	49.80	60.90	12.00	12.50	7.30	7.20	37.70	37 80
Pottassine at 500 p.p.m	16.35	16.80	0.280	0.271	60.90	70.56	12.50	12.70	7.53	7.46	38.50	38.60
Pottassine at 1000 p.p.m	17.00	17.10	0.270	0.251	61.70	71.60	13.00	13.10	7.60	7.51	39.30	39.50
Active bread yeast at 0.4%	16.50	16.60	0.1330	0.261	49.70	60.89	12.70	12.90	7.20	7.15	38.36	38.20
Active bread yeast at 0.8%	17.0	17.30	0.280	0.232	60.50	70.66	13.10	13.20	7.59	7.45	39 60	39.50
Active bread yeast at 1.0%	17.10	17.50	0.276	0.230	61.73	71.67	13.20	13.20	7.61	7.50	40 00	39.60
New L.S.D at 5%	0.3	0.3	0.041	0.038	1.11	1.18	0.20	0.2	0.31	0.22	1.00	1.10

Table (8): Effect of biofertilization with phosphorene, pottassine and active bread yeast on some chemical properties of Langra mango fruits in 2003 and 2004 seasons.

Biofertilization treatments	T.S.S %		Total acidity %		T.S.S/ Acid		Total Sugars %		Reducing Sugars %		Vitamin C (mg/100g pulp)	
	2003	2004	2003	2004	2003	2004	2003	2004	2003	2004	2003	2004
Control	16.40	16.90	0.510	0.498	32.16	33.94	12.90	13.90	6.11	6.21	26.0	27.60
Phosphorene at 5.0 g/tree	16.90	17.30	0.460	0.456	36.74	37.80	13.50	13.60	6.52	6.81	26.70	28.30
Phosphorene at 10.0 g/tree	17.50	17.9	0.427	0.422	40.53	42.52	13.90	14.0	6.72	7.12	27.50	29.00
Phosphorene at 15.0 g/tree	17.30	18.0	0.425	0.418	40.94	43.06	14.0	14.20	6.81	7.21	27 60	29.10
Pottassine at 250 p.p.m	17.0	17.20	0.391	0.392	45.60	46.70	14.0	14.0	7.10	7.60	28.30	28.40
Pottassine at 500 p.p.m	17.75	17.86	0.346	0.331	52.50	53.20	14.1	14.30	7.30	7.42	28.50	28.80
Pottassine at 1000 p.p.m	18.10	18.30	0.320	6.340	53.60	51.30	14.2	14.50	7.40	7.56	29.00	29.20
Active bread yeast at 0.4%	17.90	18.30	0.392	0.391	45.52	46.55	14.4	14.60	7.10	7.50	28.50	29.70
Active bread yeast at 0.8%	18.60	18.8	0.356	0.361	52.53	51.25	14.80	15.10	7.31	7.82	29.20	30.40
Active bread yeast at 1.0%	18.8	18.7	0.351	0.357	53.56	52.10	14.90	15.0	7.53	7.93	29.30	30.50
New L.S.D at 5%	0.2	0.2	0.31	0.27	2.11	2.25	0.4	0.4	0.20	0 21	0.5	0.6

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استجابة أشجار المانجو صنفي الزبدة واللانجرا لبعض معاملات التسميد الحيوي

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تم دراسة تأثير التسميد الحيوي باستخدام الفوسفورين بمعدل ٥ ، ١٠ ، ١٥ جرام/ شجرة والبوتاسين بمعدل ٢٥٠، ٥٠٠ ، ١٠٠٠ جزء في المليون وخميرة الخبز النشطة بتركيز ٠,٤ ، ٠,٨ ، ١% علي التركيب المعدني للورقة والمحصول والخصائص الطبيعية والكيمائية لثمار المانجو الزبدة واللانجرا وذلك خلال موسمي ٢٠٠٣ ، ٢٠٠٤ .

وقد أشارت النتائج المتحصل عليها أن استخدام السماد الحيوي الفوسفورين بمعدل ٥-١٥ جرام للشجرة والبوتاسين بمعدل ٢٥٠-١٠٠٠ جزء في المليون وخميرة الخبز النشطة من ٠,٤ – ١% كانت فعالة جدا في تحسين الحالة الغذائية للأشجار والمحصول والخصائص الطبيعية والكيميائية لثمار المانجو الزبدة واللانجرا ، وكان التحسن مرتبطا بزيادة الكمية المستخدمة منها ولقد تفوق استخدم كل من خميرة الخبز النشطة والبوتاسين عن الفوسفورين في تحسين جميع الصفات تحت الدراسة ما عدا نسبة الفوسفور في الأوراق ، ولم يكن هناك تأثير ملحوظ علي الصفات تحت الدراسة ما بين المعدلين الأعلي من الفوسفورين (١٠-١٥ جرام للشجرة) وكذلك التركيز الأعلي من البوتاسين (٥٠٠-١٠٠٠ جزء في المليون) والتركيز الأعلي من خميرة الخبز النشطة (٠,٨ – ١%) .

ومن الناحية الاقتصادية فإن افضل النتائج من حيث الحالة الغذائية للأشجار والمحصول وجودة الثمار أمكن الحصول عليها في أشجار المانجو الزبدة واللانجرا التي تم تسميدها حيويا باستخدام خميرة الخبز النشطة بتركيز ٠,٨% ثلاث مرات أو استخدام البوتاسين بمعدل ١٠٠٠ جزء في المليون ثلاث مرات أو استخدام الفوسفورين بمعدل ١٠ جرام للشجرة مرة واحدة .