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Reducing Mineral N in Ewais Mango Orchards Using different Organic Fertilization Sources

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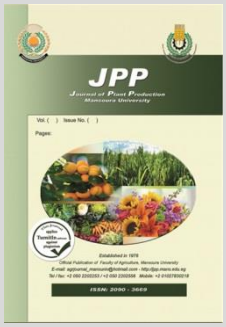

ABSTRACT

This study was carried out during the 2018, 2019, and 2020 seasons, at private Ewaise mango orchard located at west Samalout district, Minia Governorate, Egypt. An attempt to reduce mineral nitrogen fertilizers partially in Ewaise mango trees orchards under sandy soil conditions by application of a different organic fertilization namely (plant compost, chickens manure, and pigeon manure). Using nitrogen fertilization with 70% as a mineral source and 30% as organic source was very effective in improving all growth characteristics and yield per tree. Compared with using nitrogen completely in inorganic form and 40% inorganic plus 60% organic, a gradual increase in leaf chemical composition as well as physical and chemical characteristics of fruits reducing the percentages of inorganic nitrogen from 100% to 40% and at the same time increasing the percentages of organic fertilizers from 30% to 60% caused a gradual increase in the quality of the fruit increasing in fruit weight, TSS%, total sugars, reducing sugars and vitamin C and decreasing percentage seed weight, fruit peel % and total acidity%.The best source of organic fertilizer was plant compost, chicken manure and pigeon manure in ascending order. However , to improve Ewaise mango trees yield quantitively and qualitatively it is advisable to supply the trees with the suitable nitrogen)1000 g N / tree - year) as 40% inorganic (Ammonium nitrate) + 60% organic (20% plant compost + 20 chicken manure + 20% pigeon manure) for producing organic fruits.

Keywords: organic rertilization–plant compost–ammonium nitrate–chickens manure – ewais mango

INTRODUCTION

Mango (*Mangifera indica* L.) belongs to the family Anacardiaceae considered as one of the most important tropical fruit of the world mango grows under a wide range of climatic and soil conditions. In Egypt, mango ranks second after citrus, whereas its total area of fruitful orchards reached approximately 265509 fed. producing about 1091535 tons of fruits (Egyptian Ministry of Agriculture, 2019).

However, lower yield with poor quality is one of the main problems facing mango grows in the newly reclaimed lands particularly under sandy soil conditions namely poor fruit set, High fruit drop, irregular bearing, low productivity and malformation disease (Sayed *et al.*, 2009).

Nitrogen, as a plants nutrient is required by plants incomparatively larger amounts than other nutrients. N is an essential co- reorient of many compounds of plants such as chlorophylls, enzymes, nucleotides, hormones, proteins, and vitamins (Marchner, 1995).

Nitrogen deficiency generally results in stunted growth and chlorotic leaf because lack of nitrogen limits the synthesis of proteins and chlorophylls. This leads to poor assimilation and results in premature flowering and shortening of the growth cycle.

The presence of N in excess promotes the development of the above - ground organs with relatively poor root growth and fruiting (Mengel, 1984; Nijjar, 1985; Mengel and Kirkby, 1987; Miller *et al.*, 1990; Yagodin, 1990 and Marschner, 1995).

Organic matter is the nonliving half of the organic system in the soil, it is made up of simple nutrients, protein, carbohydrates, lignin and some other complex constitutes. These components play a crucial role in the physical of the soil and help to bind the soil particles together into stable aggregates. Organic matter creates a sponge - like effect of the some water being retained and only the surplus passes through. It was also able to attract and hold nutrients on its surface. (Miller *et al.*, 1990; Angers *et al.*, 1995; Dahama, 1999; Arutjumjan, 1999; Obreza and Ozores, 2000 and Bonanzinga *et al.*, 2010).

Organic fertilization would permit a reduction in the use of agrochemicals. The positive action of these nature biostimulants is attributed to their high content of different vitamins, different nutrients, amino acids, organic acid antibiotics and natural hormones such as IAA, GA3, and cytokinins (Mengel and Kirkby 1987; Simon *et al.*, 1999 and Arutiumgan, 1999).

The positive action of organic fertilization on enhancing water retention, enzymes, root development, organic matter, availability of nutrients and fixation of nitrogen as well as reducing soil pH and soil salinity and soil pathogens was emphasized by several authors (Mengel and Kirkby , 1987, Miller *et al.*, 1990 and Goramnagar *et al.*, 2000).

The objective of this study was to select the best proportion of inorganic and organic fertilization of nitrogen that results in improving on some growth characteristics, tree nutritional status, yield and fruit quality of Ewaise mango trees grown under the sandy soil.

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MATERIALS AND METHODS

This investigation was conducted during their consecutive seasons of 2018, 2019, and 2020. On twenty - seven 16 years old Ewaise mango trees onto Succary mango rootstock. The trees are grown in a private mango orchard located in the west Samalout district, El- Minai Governorate. The uniform in vigor trees of Ewaise mango (27 trees) was planted 6.0 x 6.0 meter apart. (116 tree/ fed.) in sandy soil under a surface irrigation system with a water table depth not less than two meters deep.

The results of the orchard soil analysis (according to Black *et al.*, 1965) are shown in Table (1) the selected trees received all horticultural practices that applied in the orchard except those dealing with N fertilization .

Table 1. Analysis of the tested soil

Constituent	Value	Constituent	value
Sand %	78.0	E.C. (1: 2.5 extract ppm) mmhos(25°C)	962
Silt %	12.0	$CaCO_3$%	4.6
Clay %	10.0	M.O. %	0.9
Texture	Sandy	Total N %	0.07
pH (1:2.5 extract)	7.99	Available P (ppm)	1.7
		Available K (ppm)	122

The experiment included the following nine treatments from inorganic (ammonium nitrate 33.5 % N), organic (plant compost 2.0% N, chicken manure 2.5 % N and pigeon manure 5.0 % N).

T_1- Application of the suitable N (1000 g N / tree / year) as 100% inorganic source (2985.0 g ammonium nitrate tree/ year).

T_2- Application of the suitable N as 70 % inorganic source (2090 g ammonium nitrate tree/ year) + 30 % organic source (15.0 kg plant compost / tree/ year).

T_3- Application of the suitable N as 70 % inorganic source (2090 g ammonium nitrate tree/ year) + 30 % organic source (12.0 kg chicken manure / tree/ year).

T_4- Application of the suitable N as 70 % inorganic source (2090 g ammonium nitrate tree/ year) + 30 % organic source (6.0 kg pigeon manure /tree/ year).

T_5- Application of the suitable N as 70 % inorganic source (2090 g ammonium nitrate tree/ year)
+ 10 % organic source (4.0 kg chicken manure/ tree/ year)
+ 10 % organic source (5.0 kg plant compost / tree/ year)
+ 10% organic source (2.0 kg pigeon manure / tree/ year).

T_6- Application of the suitable N as 40 % inorganic source (1195 g ammonium nitrate tree/ year) + 60 % organic source (24.0 kg chicken manure / tree/ year).

T_7- Application of the suitable N as 40 % inorganic source (1195 g ammonium nitrate tree/ year) + 60 % organic source (30.0 kg plant compost / tree/ year).

T_8- Application of the suitable N as 40 % inorganic source (1195 g ammonium nitrate tree/ year) + 60 % organic source (12.0 kg pigeon manure / tree/ year).

T_9- Application of the suitable N as 40 % inorganic source (1195 g ammonium nitrate tree/ year)
+ 20 % organic source (8.0 kg chicken manure/ tree/ year)
+ 20 % organic source (10.0 kg plant compost / tree/ year)
+ 20 % organic source (4.0 kg pigeon manure / tree/ year).

Each treatment was replicated three times, one tree per each inorganic and organic fertilization of nitrogen was added in the forms of ammonium nitrate (33.5 % N), plant compost (2.0 % N), chicken manure (2.5 % N) and pigeon manure (5.0 % N) in Table (2).

Ammonium nitrate as an inorganic nitrogen source was divided into three equal batches and applied at the first week of March, May, and July each season. Organic (plant compost, chicken manure, and pigeon manure) were added once in at first week of Jan each seasons.

Treatments were arranged in a randomized complete block design (RCBD) with three replications for each treatment, one tree for each.

Table 2. Analysis of the plant compost, pigeon manure, and chickens manure fertilizers

Parameters	Values		
	Plant compost	Pigeon manure	Chicken manure
Cubic meter weight (kg.)	600.0	-	-
Moisture %	29.0	-	-
O.M. %	30.7	55.0	58.26
Organic carbon %	28.56	30.0	27.90
pH (1: 2.5 extract)	27.25	8.1	10.25
EC (ds/m) (1: 2.5 extract)	10.25	4.0	5.9
C/N ratio	14.28	-	-
Total N %	2.0	5.0	2.5
Total P %	1.02	2.5	1.12
Total K %	1.21	2.0	1.21
Total Ca %	1.25	-	-
Total Mg %	1.30	-	-
Total Fe (ppm)	18.5	29.0	18.5
Total Mn (ppm)	37.55	22.0	16.6
Total Zn (ppm)	43.22	51.0	43.22

During 2018, 2019 and 2020 seasons the following parameters were measured:

1- Some vegetative growth characters namely shoot length (cm), number of leaves/ shoot and leaf area (cm^2) (Ahmed and Morsy, 1999). In the spring growth cycle.

2- Plant pigments namely chlorophylls A, B, total chlorophylls and total carotenoids (mg/ 1 g F.W.) (Von Wettstein, 1957).

3- Percentages of N, P, K, and Mg in the leaves from non-fruiting shoots of the spring growth cycle (Summer, 1985; Chapman and Pratt, 1965 and Wilde *et al.*, 1985).

4- Yield per tree is expressed in the number of fruits/ tree and fruit weight (kg.).

5- Some physical and chemical characteristics of the fruits namely fruit weight (g.), length and width (cm.) of fruit, fruit peels % seeds %, pulp %, T.S.S. %, total acidity (as a citric acid/ 100 ml juice, total and reducing sugars (Lane and Eynon ,1965) and vitamin C content (mg/ 100 ml juice) (A.O.A.C., 2000).

The proper statistical analysis was done and the treatment means were compared using new L.S.D. at 5% (Mead *et al.*, 1993).

RESULTS AND DISCUSSION

1-Some growth characteristics:

Data in Table (3) clearly show that supplying Ewaise mango trees with nitrogen as 70% inorganic N and 30% organic (plant compost, chicken manure, and pigeon manure) significantly was very effective in stimulating the four growth characteristics namely length shoot, the number of leaves/ shoot, leaf area and shoot thickness in the spring growth cycle. Compared with using completely via inorganic nitrogen or when N was used as 40%

inorganic N and 60% organic fertilization. This promotion was associated with using plant compost, chickens manure, and pigeon manure in ascending order. Using nitrogen as 70% inorganic nitrogen plus 30% organic (10% plant compost + 10% chickens manure + 10% pigeon manure) significantly was superior these growth characters.

Table 3. Effect of different proportions of inorganic and organic of nitrogen on some growth characteristics of Ewaise mango trees during 2018, 2019 and 2020 seasons.

Different inorganic and organic fertilization treatment	Spring shoot length (cm)			Number of leaves/ shoot			Leaf area $(cm)^2$			Shoot thickness (cm.)		
	2018	2019	2020	2018	2019	2020	2018	2019	2020	2018	2019	2020
T_1-100 % AN	11.3	11.5	11.8	8.0	8.3	8.5	73.0	73.5	74.2	0.67	0.69	0.71
T_2- 70% AN+ 30% PC	12.2	12.6	12.8	9.0	9.2	9.5	74.4	75.0	75.5	0.77	0.79	0.81
T_3- 70% AN+ 30% CM	13.5	13.9	14.1	9.8	10.0	10.5	75.6	76.1	76.4	0.89	0.91	0.93
T_4- 70% AN+ 30% PM	14.6	15.0	15.3	11.2	11.5	12.0	77.0	77.5	78.0	0.91	0.96	0.99
T_5- 70% AN+ 10% CM + 10% PM + 10% PC	16.3	17.0	17.3	12.0	12.5	13.0	79.0	80.2	80.5	0.95	1.00	1.03
T_6- 40% AN + 60% PC	9.5	9.3	9.5	5.0	5.5	6.0	69.0	70.0	70.5	0.61	0.62	0.63
T_7 – 40% AN + 60% CM	9.9	10.0	10.2	6.0	6.5	6.8	70.2	71.0	71.5	0.62	0.64	0.66
T_8- 40% AN + 60%PM	10.1	10.2	10.5	6.5	7.0	7.3	71.0	71.4	71.8	0.64	0.66	0.70
T_9 – 40% AN + 20% CM + 20% PM + 20% PC	11.0	11.2	11.5	7.5	8.0	8.2	72.3	73.0	73.4	0.66	0.69	0.71
New LSD at 5%	1.0	1.1	1.3	0.9	1.0	1.0	1.1	1.2	1.2	0.04	0.04	0.05

AN = Ammonium Nitrate **PM = Pigeon Manure**
CM = Chickens Manure **PC = Plant Compost**

A significant reduction in these growth characters was observed when nitrogen was added via 40% inorganic N 60% organic fertilizers . The minimum values were recorded in the trees that received nitrogen as 40% inorganic (ammonium nitrate) + 60% organic (plant compost). Supplying the tree with nitrogen as 70% inorganic (ammonium nitrate) + 30 % organic N fertilizer (10% plant compost +10% chickens manure +10 % pigeon manure) gave the maximum values. These results were true during 2018 , 2019 and 2020 seasons.

2- Leaf chemical composition;

It is clear from the data in Tables (4, 5) that chlorophyll a, chlorophyll b, total chlorophylls, total carotenoids, N, P, K, and Mg in the leaves were significantly enhanced in response to the application of the suitable nitrogen via 70% inorganic ammonium nitrate)+ 30% organic fertilizers (plant compost, chicken manure, and pigeon manure) compared with using nitrogen completely via inorganic nitrogen or when N was added via 40% inorganic plus 60% organic fertilizers. The promotion was gradually associated with reducing percentages of inorganic N from 100% to 40% and increasing organic N from 0.0 to 60% using pigeon manure better than chickens manure and plant compost. The maximum values of leaf pigment and N, P, K and Mg (as%) in the leaves were recorded on the trees that received nitrogen as 40% inorganic (ammonium nitrate) + 20% plant compost + 20 % chicken manure + 20% pigeon manure). While the lowest values were recorded on the trees that were fertilized with nitrogen as 100% ammonium nitrate (inorganic). These results were true during the three seasons 2018, 2019, and 2020.

Table 4. Effect of different proportions of inorganic and organic of nitrogen on some plant pigment in the leaves of Ewaise mango trees during 2018, 2019 and 2020 seasons.

Different inorganic and organic fertilization treatment	Chlorophyll a (mg/1.0 g F.W.)			Chlorophyll b (mg/1.0 g F.W.)			Total chlorophylls (mg/ 1.0 g F.W.)			Total carotenoids (mg/1.0 g F.W.)		
	2018	2019	2020	2018	2019	2020	2018	2019	2020	2018	2019	2020
T_1-100 % AN	3.3	3.4	3.5	1.0	1.1	1.1	4.3	4.5	4.6	0.9	0.9	1.0
T_2- 70% AN+ 30% PC	3.7	3.9	4.1	1.3	1.4	1.6	5.0	5.3	5.7	1.0	1.0	1.1
T_3- 70% AN+ 30% CM	4.0	4.1	4.3	1.4	1.6	1.7	5.4	5.7	6.0	1.1	1.1	1.1
T_4- 70% AN+ 30% PM	4.1	4.2	4.4	1.5	1.7	1.8	5.6	5.9	6.2	1.1	1.2	1.3
T_5- 70% AN+ 10% CM + 10% PM + 10% PC	4.5	4.6	4.8	1.7	1.9	2.0	6.2	6.5	6.8	1.3	1.4	1.5
T_6- 40% AN + 60% PC	4.7	4.8	5.0	1.9	2.0	2.2	6.6	6.8	7.2	1.4	1.6	1.7
T_7 – 40% AN + 60% CM	4.9	5.1	5.4	1.9	2.1	2.3	6.8	7.2	7.7	1.6	1.7	1.8
T_8- 40% AN + 60%PM	5.1	5.2	5.6	2.1	2.3	2.4	7.2	7.5	8.0	1.9	2.0	2.1
T_9 – 40% AN + 20% CM + 20% PM + 20% PC	5.3	5.4	5.9	2.3	2.6	2.7	7.6	8.0	8.6	2.3	2.4	2.4
New LSD at 5%	0.6	0.7	0.7	0.3	0.2	0.2	0.8	0.8	0.9	0.2	0.2	0.2

AN = Ammonium Nitrate **PM = Pigeon Manure**
CM = Chickens Manure **PC = Plant Compost**

Table 5. Effect of different proportions of inorganic and organic of nitrogen on some percentages of N, P, K and Mg in the leaves of Ewaise mango trees during 2018, 2019 and 2020 seasons.

Different inorganic and organic fertilization treatment	Leaf N %			Leaf P %			Leaf K %			Leaf Mg %		
	2018	2019	2020	2018	2019	2020	2018	2019	2020	2018	2019	2020
T_1-100 % AN	1.45	1.48	1.51	0.11	0.12	0.13	1.29	1.31	1.31	0.51	0.52	0.52
T_2- 70% AN+ 30% PC	1.52	1.54	1.55	0.13	0.15	0.16	1.32	1.35	1.35	0.53	0.54	0.57
T_3- 70% AN+ 30% CM	1.65	1.66	1.68	0.15	0.16	0.17	1.36	1.37	1.38	0.55	0.57	0.59
T_4- 70% AN+ 30% PM	1.70	1.72	1.74	0.17	0.18	0.19	1.38	1.39	1.40	0.56	0.58	0.61
T_5- 70% AN+ 10% CM + 10% PM + 10% PC	1.77	1.79	1.81	0.20	0.22	0.23	1.41	1.43	1.44	0.58	0.61	0.64
T_6- 40% AN + 60% PC	1.80	1.82	1.85	0.24	0.26	0.27	1.42	1.43	1.45	0.60	0.63	0.67
T_7 – 40% AN + 60% CM	1.83	1.85	1.88	0.27	0.29	0.30	1.46	1.47	1.48	0.61	0.64	0.69
T_8- 40% AN + 60%PM	1.90	1.91	1.91	0.29	0.30	0.31	1.50	1.51	1.52	0.63	0.66	0.72
T_9 – 40% AN + 20% CM + 20% PM + 20% PC	1.94	1.94	1.96	0.33	0.34	0.35	1.55	1.56	1.57	0.72	0.74	0.81
New LSD at 5%	0.05	0.07	0.07	0.02	0.02	0.03	0.04	0.04	0.05	0.03	0.03	0.04

AN = Ammonium Nitrate **PM = Pigeon Manure**
CM = Chickens Manure **PC = Plant Compost**

3-The yield:

It is obvious from the data in Table (6) that fertilizing the trees with n as 70% inorganic (ammonium nitrate) + 30 % organic (plant compost, chickens manure, and pigeon manure), significantly improved manure of fruits per tree and yield - tree rather than using nitrogen as 100% inorganic N as well as when N was added via inorganic N at 40% regardless of organic fertilization. The best organic manures in this respect were pigeon manure, chicken manure, and plant compost in descending order. A significant reduction in the yield per tree was observed when nitrogen was added in inorganic N form at 40% and 60% organic. The maximum yield (43.5 , 45.6, and 47.5 kg) during three seasons, respectively was observed when the trees received nitrogen as 70% inorganic (ammonium nitrate)+ 30 % organic (10% plant compost + 10 % chicken manure + 10% pigeon manure). The yield of the trees that were fertilized with nitrogen as 100% inorganic N (ammonium nitrate) was (3.7, 35.7 & 37.4 kg) during three seasons respectively. The percentage of increase on the yield due to application of the previously promised treatment over the control treatment reached 29.1 %, 27.7 %, and 27.0 % during 2018, 2019, and 2020 seasons, respectively. These results were true during three seasons.

Table 6. Effect of different proportions of inorganic and organic of nitrogen on yield and some physical characteristics of the fruits of Ewaise mango trees during 2018, 2019 and 2020 seasons.

Different inorganic and organic fertilization treatment	Number o fruits/ tree			Yield / tree			Fruit weight (g.)			Fruit height			Fruit diameter		
	2018	2019	2020	2018	2019	2020	2018	2019	2020	2018	2019	2020	2018	2019	2020
T_1-100 % AN	210.0	215.0	220.0	33.7	35.7	37.4	160.5	166.0	170.0	8.00	8.11	8.15	6.13	6.20	6.25
T_2- 70% AN+ 30% PC	215.0	220.0	225.0	35.7	37.6	38.9	166.0	171.0	173.0	8.11	8.20	8.22	6.22	6.26	6.29
T_3- 70% AN+ 30% CM	220.0	225.0	230.0	38.1	40.1	41.6	173.0	178.0	181.0	8.31	8.33	8.36	6.36	6.40	6.42
T_4- 70% AN+ 30% PM	225.0	230.0	233.0	40.5	42.6	43.8	180.0	185.0	188.0	8.40	8.42	8.50	6.45	6.48	6.51
T_5- 70% AN+ 10% CM + 10% PM + 10% PC	235.0	240.0	246.0	43.5	45.6	47.5	185.0	190.0	193.0	8.55	8.58	8.61	6.55	6.59	6.62
T_6- 40% AN + 60% PC	192.0	200.0	205.0	27.8	29.6	30.9	145.0	148.0	151.0	7.11	7.16	7.18	5.66	5.71	5.77
T_7 – 40% AN + 60% CM	199.0	205.0	210.0	29.9	31.4	32.8	150.5	153.0	156.0	7.38	7.44	7.51	5.71	5.76	5.82
T_8- 40% AN + 60%PM	202.0	208.0	212.0	31.2	33.3	34.6	154.6	160.0	162.0	7.55	7.60	7.66	5.80	5.86	5.89
T_9 – 40% AN + 20% CM + 20% PM + 20% PC	210.0	212.0	215.0	33.2	34.6	35.5	158.0	163.0	165.0	7.66	7.70	7.76	5.86	5.91	5.98
New LSD at 5%	5.0	5.0	5.0	1.5	1.7	1.8	2.1	2.1	2.2	0.08	0.09	0.09	0.05	0.06	0.06

AN = Ammonium Nitrate **PM = Pigeon Manure**
CM = Chickens Manure **PC = Plant Compost**

4-Physical and chemical characteristics of the fruits

It was clear from the data in Tables (6 to 8) that amending the trees with suitable nitrogen as 40% to 70% inorganic N (ammonium nitrate) + 30% to 60% organic N (plant compost, chickens manure and pigeon manure) significantly was very effective in improving fruit quality in terms of increasing fruit weight , fruit height, fruit diameter, pulp %, TSS %, total and reducing sugars %, and vitamin C content and decreasing percentages of seeds and fruit peel % weight and total acidity comparing to used N as 100% inorganic. The best organic manure in this connection was pigeon manure followed by chicken manure and plant compost in this respect. Treating Ewaise mango to trees with nitrogen as 40% inorganic (ammonium nitrate) plus 60% organic (20% plant compost + 20 % chickens manure + 20 % pigeon manure) gave the best results concerning fruit quality.

Table 7. Effect of different proportions of inorganic and organic of nitrogen on some physical and chemical characteristics of the fruits of Ewaise mango trees during 2018, 2019 and 2020 seasons.

Different inorganic and organic fertilization treatment	Seeds %			Fruit peel %			Pulp %			TSS %		
	2018	2019	2020	2018	2019	2020	2018	2019	2020	2018	2019	2020
T_1-100 % AN	10.7	10.8	10.8	18.0	17.9	17.8	71.3	71.3	71.4	13.8	14.0	14.2
T_2- 70% AN+ 30% PC	10.1	10.0	10.0	17.6	17.2	17.0	72.3	72.8	73.0	14.1	14.3	14.5
T_3- 70% AN+ 30% CM	9.9	9.8	9.7	17.3	17.0	16.8	72.8	73.2	73.5	14.3	14.6	14.7
T_4- 70% AN+ 30% PM	9.7	9.5	9.6	17.0	16.6	16.5	73.3	73.9	74.1	14.4	14.7	14.9
T_5- 70% AN+ 10% CM + 10% PM + 10% PC	9.5	9.3	9.2	16.7	16.5	16.3	73.8	74.2	74.5	14.8	15.0	15.3
T_6- 40% AN + 60% PC	8.3	8.2	8.0	16.2	16.0	16.0	75.5	75.8	76.0	15.9	16.2	16.5
T_7 – 40% AN + 60% CM	8.0	8.0	7.9	16.1	15.8	15.8	75.9	76.2	76.7	16.2	16.5	16.7
T_8- 40% AN + 60%PM	8.0	8.0	7.8	15.8	15.7	15.6	76.2	76.3	76.4	16.4	16.7	16.9
T_9 – 40% AN + 20% CM + 20% PM + 20% PC	7.5	7.4	7.3	15.5	15.2	15.0	77.0	77.4	77.4	16.8	17.1	17.3
New LSD at 5%	0.4	0.4	0.5	0.6	0.7	0.7	7.3	1.4	1.4	0.3	0.4	0.5

AN = Ammonium Nitrate **PM = Pigeon Manure**
CM = Chickens Manure **PC = Plant Compost**

Table 8. Effect of different proportions of inorganic and organic of nitrogen on some chemical characteristic of the fruits of Ewaise mango trees during 2018, 2019 and 2020 seasons.

Different inorganic and organic fertilization treatment	Total acidity %			Total sugars %			Reducing sugars %			V.C. (mg/ 100 ml. juice)		
	2018	2019	2020	2018	2019	2020	2018	2019	2020	2018	2019	2020
T_1-100 % AN	0.481	0.490	0.470	11.2	11.3	11.6	5.0	5.2	5.3	42.5	43.0	43.2
T_2- 70% AN+ 30% PC	0.411	0.408	0.400	11.7	11.9	12.0	5.3	5.5	5.6	44.0	45.2	45.5
T_3- 70% AN+ 30% CM	0.400	0.395	0.390	11.9	12.0	12.3	5.4	5.6	5.8	44.6	45.6	45.8
T_4- 70% AN+ 30% PM	0.395	0.390	0.385	11.9	12.1	12.4	5.4	5.7	5.7	44.9	46.0	46.3
T_5- 70% AN+ 10% CM + 10% PM + 10% PC	0.380	0.375	0.370	12.6	12.7	12.8	5.9	6.1	6.2	46.0	47.5	47.9
T_6- 40% AN + 60% PC	0.375	0.370	0.360	13.4	13.5	13.7	6.5	6.6	6.8	46.2	79.0	49.5
T_7 – 40% AN + 60% CM	0.370	0.370	0.360	13.6	13.8	13.9	6.7	6.9	6.9	47.0	50.2	50.3
T_8- 40% AN + 60%PM	0.365	0.360	0.360	13.8	14.1	14.4	6.9	7.1	7.3	47.6	50.8	51.0
T_9 – 40% AN + 20% CM + 20% PM + 20% PC	0.345	0.340	0.340	14.2	14.3	14.5	7.4	7.5	7.7	48.0	51.6	52.0
New LSD at 5%	0.019	0.017	0.017	0.4	0.4	0.5	0.3	0.3	0.3	1.1	1.2	1.4

AN = Ammonium Nitrate **PM = Pigeon Manure**
CM = Chickens Manure **PC = Plant Compost**

CONCLUSION

The promoting effect of different organic manure namely (plant compost, chicken manure, and pigeon manure) when applied at the optimum rate of the suitable nitrogen on vegetative growth characteristics, leaf pigments and nutrients, yield, and fruit quality of Ewaise mango trees might be attributed to the positive action of these organic manures in enhancing the soil. Organic matter, water holding capacity, soil aggregation, and aeration , nutrient transport, vitamins, natural hormones and antibiotics as well as reducing soil pH, pathogens, salinity leaching processes, and soil erosion consequently enhancing soil fertility and the availability of most elements and tree nutritional status (Gorammaar *et al.*, 2000; Obreza and Ozoresm, 2000; Wang *et al.*, 2000 and Venzon *et al.*, 2001).

The results of (Mahmoud, 2012; Mohamed *et al.*, 2012; Ibrahiem,, 2012; Refaai *et al.*, 2012; El- Khawaga and Meklad, 2013; Omer, 2015; Ibrahiem *et al.*, 2018 and Hamed and Othman- Maha, 2021).

REFERENCES

Ahmed, F.F. and Morsy, M.H. (1999): A new method for measuring leaf area in different fruit species. Minia J. of Agric. Res. & Develop. (19): pp. 97-105.

Angres, D.A.; Voraney, R.P. an Cote, D. (1995): Dynamics of soil organic matter and corn residues affected by tillage practices. Soil Sci. Soc. Am. J. 59, 1311-1315.

Annual Reports of Statistical Institute and Agriculture Economic Research (Ministry of Agric. and Reclamation (2019).

Arutjumjan, A.S. (1999): The effectiveness of organ-mineral fertilizer mixture in vineyard Agrobilogya, 1: 46-48.

Association of Official Agricultural Chemists (AO.A.C.) (2000): Official Methods of Analysis (A.O.A.C.) 12th ed. Benjamin Franklin Station, Washington D.C. U.S.A. pp. 490-510.

Black, G.A. ; Evans, D.D.; Ersminger, L.E. ; White, J.L. and Dark, F.E. (1965): Methods of soil analysis . Amer. Soc. Agron. Inc. Bull. Medison, Wisconsin, USA pp. 891-1400.

Bonazinga, M.; Marteluci, R. and Nardi, G. (2001): The organic viticulture sector in Tuscan (Bibliography citation) influmatore Agrario 57:31, 71-72 CAB Abstracts.

Chapman, H.D. and Pratt, P.E. (1965): Methods of Analysis for Soil, Plant and water Univ. of Calif. Division of Agric. Sci. 172-173.

Dahama, A.K. (1999): organic farming for sustainable Agriculture, Agro. Botanica, Daryagun, New Delhi, India, P. 258.

El-Khawaga, A.S. and Meklad , M.F. (2013): Effect of mixing bio and chemical fertilization on vegetative growth , yield and fruit quality of Valencia orange trees. Hort. Sci. J. of Suez Canal Univ. 1(1): 269-279.

Gorammagar, H.B.; Gondane, S.U.; Rafeekher, M. Sort, P.N. and Murkute, A.A. (2000): Studies on integrated nutrient management in Nagpur oranges. J. of Soils and Crops. 10: 2, 288-291.

Hamad, Al. S.A. and Othman- Maha, M. (2021): Reducing mineral nitrogen partially using different sources of organic and bio-fertilization and its effect on fruiting in keitte mango trees under sandy soil conditions. Researcher, V (13) 4: 22-30.

Ibrahiem, H.I.M.; Saied, H.H.M. and Awad, M.S.Eh. (2018): Effect of using humic acid and amino acids enriched with different nutrients as partial replacement of mineral nitrogen fertilizers in Zebda mango orchards. New York Sci. J. (7): 62-71.

Ibrahiem, W.M.A. (2012): Behavior of Taimour mango trees to inorganic and organic fertilization and application of E.M. Ph. D. thesis Fac. of Agric. Minia Univ. Egypt.

Lane, J.H. and Eynon, L. (1965): Determination of reducing sugars by means of fehlings solutions with methylene bleu as indicator. A.O.A.C. Washington D.C., U.S.A.

Mahmoud, Kh. H. (2012): Reducing inorganic N fertilizer in Balady mandarin orchard through application of extracts of yeast, seaweed and favor and manure. M. Sc. Thesis Fac. of Agric. Minia Univ. Egypt.

Marschner, H.(1995): Mineral nutrition of higher plants. Academic Press (London).

Mead, R.; Currnow, R.N. and Harted, A.M. (1993): Methods in Agricultural and Experimental and Biology 2nd Ed. Hall, London, pp. 10- 44.

Mengel, K.E. (1984): Nutrition and Metabolism of plants. Fisher Verlage Stutgart and New York, pp. 110-115.

Mengel, K.E. and Kirkby, E.A. (1987): Principles of plant Nutrition. Worblaufen- Bern Switzerland, International Potash Institute. Pp. 70-85.

Miller, R.W., Donahue, R.L. and Miller, J.U. (1990): Soils and Introduction to soil and plant growth. Prentice Hall Inter Increase Engle World Cliffs. New Jersey, pp. 303-339.

Mohamed, A.Y.; Mohamed, H.H. and Ali, A.S. (2012): Adjusting the best source and proportion of mineral, organic and bionitrogen fertilizers for grande Naine bananas, Minia J. of Agric. Res. & Develop. 32 (2): 313-331.

Nijjar, G.S. (1985): Nutrition of fruit trees. Published by Kaylyani publishers, New Delhi, India: p. 100.

Obreza, T.A. and Ozores, H.M. (2000): Management of organic amendments in Florida citrus production system. Fifty Ninth Annual Meeting of the soil crop science society of Florida Sarasota , Florida, U.S.A.

Omar, M.G.G. (2015): Response of Saidy date palms growing under New Valley conditions to some inorganic, organic and biofertilization as well as some antioxidant treatments. Ph.D. Thesis Fac. of Agric. Minia Univ. Egypt.

Refaai, M.M.; Ahmed, F.F. and Al- Wasfy, M.M. (2012): using of compost enriched with some microorganisms strains as a partial replacement of mineral N fertilizers in Ewaise mango orchards world academy of Sci. Engineering and Technology 69: 1647- 1666.

Sayed, A.L.S.; Iqbal, Z.; Ahmed, K.; Muhammad, H.; Khan, Z.I.; Danish, M.; Arshad, M.U., Ahmad, S.S.; Sher, A.S. and Valeem, E.E. (2009): The extent of micro minerals in healthy and malformed oranges of mango. Pak . K. J. Bot, 41: 2817-2820.

Simon, S.; Corroyer, N.; getting, F.X.; Girard, T., Combe, F.; Fouriel, J. and Buzzi, C. (1999): Organic farming optimiaiton of techniques. Arboriculture fruitier, 533: 27- 32.

Summer, M.E. (1985): Diagnosis and Recommendation integrated System (DRIS) as a Guide of orchard Fertilization. Hort. Abst. 55(8): 7502.

Venzon, M.; Pallini, A. and Amaral, D.S.L. (2001): Strategies of environmental pest management (Agriculture Orgallica Portuguese) Informes Agropecuario Empress de pesqisa Agropecuaria Minas Gerais Belo Hortconte Brazil 22, 212: 19-28.

Von-Wettstein, D.V.(1957): chlorophyll-Ithal under submikrosphische formiuechrel der plastiden celi, Drp. Res. Amer. Soc. Hort. Sci. 20 pp, 427-433.

Wang, C.Q.; Wang, S. L.; Zhoiu, J. Y.; Zhou, Q. Y.; Deng, Z. Y. and Han, W.C. (2000): On the Citrus requirement on nutrition and the special organic compound fertilizers. South China fruits 29: 5, 18-22.

Wilde, S.A. Corey, R.B.; Iyer, J.G. and Voigt, G.K. (1985): Soil and plant analysis for there culture.3rd Ed. Oxford and IBH publishing Co., New Delhi India, pp. 1-218.

Yagodin, B.A. (1990): Agricultural; chemistry. Mir publishers Moscow. Pp. 278-281.

تقليل استخدام النتروجين المعدني في بساتين المانجو العويس باستخدام مصادر مختلفة من التسميد العضوي

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أجريت هذه الدراسة خلال ثلاثة مواسم متتالية وهى 2018 و 2019 و2020 بمزرعة خاصة تقع فى غرب سمالوط- محافظة المنيا- مصر لمحاولة تقليل استخدام الاسمدة المعدنية الازوتية جزئيا فى بساتين المانجو العويس النامية فى الاراضى الرملية باستخدام مصادر مختلفة من الاسمدة العضوية وهى (كمبوست النبات وزرق الدواجن وزرق الحمام) ولقد تم استخدام الاسمدة العضوية مع السماد المعدنى بنسب مختلفة. أدى تسميد أشجار المانجو العويس بالكمية المثلى من النتروجين فى صورة 70% مصدر غير عضوى (نترات النشادر) و30% أسمدة عضوية (كمبوست النبات وزرق الدواجن وزرق الحمام) الى تحسين جميع الصفات الخضرية وكمية المحصول وذلك بالمقارنة باستخدام الأزوت كلياً فى الصورة الغير عضوية او استخدام الأزوت بنسبة 40% غير عضوى و 60% عضوى. كان هناك تحسن تدريجى فى التركيب البكيمياوى للورقة وكذلك الصفات الطبيعية والكيميائية للثمار بنقص النسبة المئوية للسماد الازوتى الغير عضوى من 100% الى 40% وفى نفس الوقت زيادة النسبة المئوية للاسمدة العضوية من 30% الى 60% وكان التحسن فى صفات الجودة متمثلا فى زيادة وزن الثمرة والنسبة المئوية للمواد الصلبة الذائبة الكلية والسكريات الكلية والمختزلة وفيتامين ج وفى تقليل نسبة وزن البذرة والقشرة والحموضة الكلية. وكان أفضل مصادر السماد العضوى هو (كمبوست النبات وزرق الدواجن وزرق الحمام مرتبة ترتيبا تصاعديا فى هذا الصدد. لأجل تحسين انتاجية اشجار المانجو العويس كما ونوعا فانه ينصح بتسميد اشجار المانجو العويس النامية فى التربة الرملية تحت ظروف منطقة المنيا بكمية الازوت الموصى بها وهى (1000 جرام ازوت للشجرة/ السنة) فى صورة 40% سماد غير عضوى (نترات النشادر) + 60 سماد عضوى (مقسمة بالتساوى من كمبوست النبات وزرق الدواجن وزرق الحمام) وذلك لانتاج ثماره عضوية خالية من الكيماويات.