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EFFECT OF IRRIGATION WITH AGRICULTURAL DRAINAGE WATER ON GROWTH AND FRUITING OF HINDY BISINNARA MANGO TREES

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ABSTRACT

As water requirements of Egypt are increasing continuously, the reuse of agricultural drainage water for irrigations is one of the possibilities for the expansion of agricultural land in Egypt. Therefore, a field experiment was conducted over two successive seasons (2005 and 2006) in a private mango orchard located at Kom- Ombo, Aswan Governorate to evaluate the possibility of reusing agricultural drainage water for irrigation and to investigate its effect on growth, nutritional status of the trees, yield and fruit quality of Hindy Bisinnara mango trees grown in loamy clay soil. The trees were irrigated with both drainage water and Nile water alone and also with different proportions of each (65 : 35 , 50: 50 and 35: 65).

Irrigation with agricultural drainage water alone or mixed with Nile water at a ratio of 65% drainage water + 35% Nile water affected badly shoot length , number of leaves / shoot and leaf area in the three growth cycles , percentages of N, P and K in the leaves, yield as well as physical and chemical characters of the fruits. Percentages of Na and Cl in the leaves increased sharply with increasing the proportions of agricultural drainage water. No depressive effects on all the considered aspects were obtained when agricultural drainage water was mixed with Nile water at a ratio of 50: 50 and 35 : 65.

From the economical stand point, drainage water may be mixed in equal parts (50: 50) with River Nile water for irrigating of mature Hindy Bisinnara mango trees growing in loamy clay soil. For more safety, irrigation with Nile water may be applied for leaching soil and preventing salt accumulation every four mixed water irrigations. Irrigation with such blended water was not accompanied with any harmful effects on growth and fruiting of Hindy Bisinnara mango trees.

INTRODUCTION

In view of the limited supply of River Nile water in Egypt especially in recent years, the need for other sources of irrigation water has become of great importance. Surprisingly the utilization of water in irrigation is controlled by its quality particularly the concentration of total dissolved salts and the relative proportion of sodium to other cations (Ayers and Branson , 1977; Lauchli and Epstein, 1984; Issa 1991 and Schmutz and Ludders 1993 aub).

As water resources are increasingly becoming scarce, agricultural drainage water reuse has become an important sources of irrigation water in Egypt, particularly in the Nile delta region. However, as the demand for reuse keeps growing, the expansion or even the continuation of drainage reuse will be threatened by the deterioration of drain water quality due to municipal and industrial waste water disposal into the agricultural drainage system. Egypt faces multidimensional challenges in sustaining the current level of reuse and promoting more drain water reuse over the next decades. The reuse of drainage water increased from 2.6 billion in 1997 to about 5.2 billion cubic meters per year in 2007.

The ability of reusing drainage water mixed in different proportions with river Nile water for irrigation of fruit crops has been recently investigated on mango trees (Dahshan , 1986). However, such studies are still scanty for different mango cvs which has been rated as low tolerant plant for soil and / or water salinity (Bhambota *et*

al., 1990; Schmutz and Ludders, 1993a & 3b; Hamman, 1997; Maksoud, 1998; Schmutz and Ludders, 1999 and Mohamed, 2005).

Previous studies confirmed the possibility of using drainage water for irrigation of mango trees especially when mixed in different proportions with Nile water (Dahshan , 1986).

Salinity in water or in soil especially at higher levels is an environmental factor that in a general retarded growth, caused nutrients imbalance and caused a great reduction on yield in different mango cvs. It is responsible for inhibiting the biosynthesis of plant pigments and organic foods (Aly, 1979 ; Sourial *et al.*, 1979a and 1979b; Abd El- Karim – Nemate, 1991; Ahmed and Darwish, 1992 Schmutz *et al.*, 1993; Haggag *et al.*, 1994; Schmutz and Ludders, 1994 , Ali, 1995 ; Ahmed and Ahmed, 1997; Schmutz and Ludders, 1998 and Wang *et al.*, 2000).

The present work is an attempt to examine how far agricultural drainage water alone or mixed in different proportions with River Nile water can be used for the irrigation of mature Hindy Bisinnara mango trees. In addition, selecting the best proportion of Agricultural drainage water and River Nile which can be applied without major ill effects on the behaviour of the trees.

MATERIALS AND METHODS

This study was conducted during 2005 and 2006 seasons on twenty uniform in vigout 30 years old Hindy Bisinnara mango trees onto Balady mango rootstock, grown in a private orchard located at Kom Ombo district, Aswan Governorate . The trees were planted at 7 X 7 meter. The texture of the soil is loamy clay. The soil is well drained with a water table not less than two meters deep. Soil analysis (mechanical, physical and chemical analysis) was made at 0.0 – 100 cm soil depth according to Chapmann and Pratt (1975) and Wilde *et al.*, (1985) methods. The data of soil analysis are shown in Table 1.

Table 1 : Analysis of tested soil

Sand %	**: 29.0**
Silt %	**: 33.1**
Clay %	**: 37.9**
Texture	**: Loamy clay**
pH (1: 2.5 extract)	**: 7.92**
E.C . (1 : 2.5 extract)	**: 0.69**
O. M. %	**: 2.0**
Total N %	**: 0.1**
Available P (Olsen, ppm)	**: 4.1**
Available K (ammonium acetate , ppm)	**: 401.0**

Kom Ombo main drain at Kom- Ombo city was the source of agricultural drainage water in both growing seasons. The five water quality treatments used for irrigation of Hindy Bisinnara mango trees during 2005 and 2006 seasons are described in Table 2.

Table 2: The description of water quality treatments

Treatment	Description
Agricultural drainage water (ADW) only	**100 % agricultural drainage water**
Diluted ADW	**65% ADW + 35% NW**
Diluted ADW	**50 % ADW + 50 % NW**
Diluted ADW	**35 % ADW + 65 % NW**
Nile water (NW)	**100 % Nile water**

Before carrying out the twenty one irrigations during each growing seasons as shown in Table 3 , water samples from the five water quality treatments were analysed for E.C. (mmhos/ 1 cm / 25°C)

according to Ayers and Branson (1979). Irrigation was carried out to keep the soil moisture content at the field capacity. Each treatment was repeated four times , with one tree per each.

The layout of this experiment was completely randomized block design with four replicates

The selected twenty trees received the same amount of N (5 kg ammonium sulphate / tree , 20.6 / N), K (500 g potassium sulphate / tree, 48.0 % K_2O) and P (.650 g calcium superphosphae/ tree , 37.5 % P_2O_5) . Other horticultural practices such as pruning, hoeing as well as pest management were carried out as usual.

In both seasons, four branches (one year old) were chosen on each tree, one toward each direction. Four shoots on each branch were labeled for measuring shoot length (cm.) number of leaves / shoot and leaf area (cm^2) according to Ahmed and Morsy, (1999) in the three growth cycles namely Spring , Summer and Autumn (1st week of June). Twenty mature leaves (7 months-old) were picked from fruiting shoots in the Spring growth cycle per each tree (1st week of Sept). The leaves were oven dried at 70°C, digested and analysed for their content of N, P, K, Na, Cl using the standard methods outlined by Chapmann and Pratt (1975) and Wilde *et al.,* (1985).

In addition, both dates of first and full bloom were recorded in all investigated trees

Yield expressed in weight (kg) and number of fruits/ tree were recorded on the middle of July in both seasons.

Twenty fruits were taken randomly from each tree for the determination of fruit weight (g.) and dimensions (length and width , in cm.) , percentages of total soluble solids , total and reducing sugars and total acidity (expressed as g citric acid / 100 g pulp) (A.O.A.C. , 1985). Also, ascorbic acid content in 100 g pulp was determined by using 2.6 dichlorophenol endophenol dye (A.O.A.C. , 1985).

All obtained data were tabulated and statistically analyzed according to Mead *et al.,* (1993) using new L.S.D. at 5 %.

Table 3: Electrical conductivity (EC, ds/m) of the water quality treatments in the various irrigations of Hindy Bisinnara mango orchard during 2005 and 2006 seasons.

Water quality treatments	2005																					
	EC (ds/m) in water before the twenty one irrigations																					
	25	10	25	10	20	30	5	10	15	20	25	30	5	10	15	20	25	30	5	10	15	
Drainage water (DW) only	Feb.	Mar.	Mar.	Apr.	Apr.	Apr.	May	May	May	May	May	May	June	June	June	June	June	June	July	July	July	
Diluted drainage water (65:35%)	2.11	2.36	2.41	2.46	2.52	2.62	2.66	2.66	2.71	2.72	2.73	2.76	2.80	2.81	2.82	2.83	2.86	2.89	2.51	2.41	2.40	
Diluted drainage water (50:50%)	1.81	1.86	1.90	1.92	1.95	1.96	1.99	2.01	2.01	2.03	2.05	2.10	2.12	2.15	2.16	2.18	2.20	2.22	2.10	2.05	2.00	
Diluted drainage water (35:65%)	1.00	1.09	1.11	1.13	1.14	1.14	1.16	1.19	1.20	1.24	1.29	1.29	1.32	1.34	1.40	1.44	1.45	1.44	1.34	1.32	1.31	
Nile water (NW) only	0.65	0.75	0.77	0.79	0.81	0.12	0.85	0.85	0.86	0.88	0.95	0.96	0.98	0.44	1.01	1.02	1.04	1.04	1.01	1.00	0.98	
Drainage water (DW) only	0.40	0.44	0.44	0.45	0.45	0.46	0.46	0.46	0.46	0.47	0.47	0.47	1.48	0.48	0.47	0.47	0.46	0.45	0.44	0.43	0.42	
Diluted drainage water (65:35%)	2006																					
Diluted drainage water (50:50%)																						
Diluted drainage water (35:65%)																						
Nile water (NW) only																						
Drainage water (DW) only	2.31	2.32	2.32	0.32	2.34	2.34	2.35	2.35	2.35	2.57	2.43	2.44	2.45	2.46	2.51	2.52	2.54	2.44	2.40	2.34	2.34	
Diluted drainage water (65:35%)	1.82	1.84	1.85	1.86	1.46	1.47	1.91	1.94	1.94	1.98	2.00	2.02	2.04	2.09	2.10	2.14	2.14	2.14	2.09	2.05	2.04	
Diluted drainage water (50:50%)	1.39	1.40	1.40	1.41	1.42	1.44	1.45	1.46	1.44	1.46	1.47	1.47	1.48	1.48	1.48	1.49	1.49	1.50	1.45	1.40	1.35	
Diluted drainage water (35:65%)	0.88	0.89	0.89	0.90	0.91	0.92	0.94	0.95	0.96	0.98	0.99	1.00	1.05	1.15	1.19	1.20	1.24	1.26	1.24	1.21	1.19	
Nile water (NW) only	0.44	0.44	0.44	0.45	0.45	0.45	0.46	0.46	0.47	0.47	0.48	0.47	0.48	0.49	0.49	0.49	0.49	0.49	0.44	0.44	0.44	

RESULTS AND DISCUSSION

Electrical conductivity (E.C.) in ADW, NW and other diluted ADW water.

Overall, agricultural drainage water (ADW) had quality less than that of the Nile water (NW) , as E.C. value of ADW was about 4.5 fold of those of the NW . Regarding the seasonal variations in E.C. of the five water quality treatments, it is clear that values were gradually increased upward the hot months . Regarding the salinity problems, NW and diluted ADW till 50 % : 50 % had an E.C. value in the category of non hazard (1.5 mmhos/ 1cm / 25°C) according to Ayers and Branson (1977). This means that no harmful effects on the behaviour of the trees in response to the application of such waters. However, the drainage water and diluted DW at 65 : 35 % had an E.C. value in the category of slight to moderate (1.5 to 2.3 mmhos/ 1 cm / 25°C). This indicate that irrigation with these waters will result in adverse effects on the performance of the trees.

Effect of irrigation with ADW, NW and diluted ADW on growth characters

Data illustrated in Table 4 reveal that irrigating of Hindy Bisinnara mango trees with ADW alone or with diluted ADW at all proportions with NW resulted in a reduction in shoot length , number of leaves / shoot and leaf area in the three growth cycles (Spring, Summer and Autumn) compared to irrigation with NW alone. However, harmful effects on these characters was observed with irrigation with ADW and diluted ADW at 65% ADW: 35 % NW. While insignificant reduction on these growth characters was obtained on using diluted ADW containing 35 to 50 % ADW + 65 to 50 % NW compared to irrigation with NW alone. The same effect was noticed in 2005 and in 2006 season.

The present results are in agreement with those reported by Dahshan (1984). The negative action of salinity especially at the higher levels on growth characters was emphasized by the results of

Ahmed and Darwish (1992), Ali (1995) and Ahmed and Ahmed (1997).

Effect of irrigation with ADW, NW and diluted ADW on nutrient concentrations in the leaves.

It is evident from the data in Table 5 that the percentages of N , P, K , Na and Cl in the leaves greatly varied among the five water quality treatments. Hindy Bisinnara mango trees irrigated with NW contained the highest percentages of N, P and K and the lowest percentages of Na and Cl , while the trees irrigated with ADW alone contained the minimum N, P and K % and the maximum Na and Cl %. Generally irrigation with ADW or diluted ADW reduced the percentages of N, P and K and increased Na and Cl % compared with using NW alone in the irrigation. Irrigation of the trees with water containing 65% ADW + 35 % NW as well as ADW alone significantly minimized N, P and K and maximized both Na and Cl compared to irrigation with NW alone or other diluted ADW. There was a slight reduction in N, P and K % and increment in Na and Cl % with using water containing 65 to 50% ADW with 35% to 50% NW compared to irrigation with NW. These results were true in both seasons.

These results are in concordance with those obtained by Mohamed (2005). The results of Dahshan (1986) and Wang *et al.*, (2000) supported the present results.

Effect of irrigation with ADW, NW and diluted ADW on dates of first and full bloom.

Data in Table 5 reveal that irrigation of Hindy Bisinnara mango trees with ADW alone or with diluted ADW at 35 to 65% ADW to 65 : 35% NW delayed the dates of first and full bloom compared to irrigation with NW alone . When the trees were irrigated with ADW only, they first bloomed at the last week of Jan. Date of full bloom in mango trees irrigated with ADW was 1st week of March. Hindy

Growth and fruiting of Hindy Bisinnara mango trees

Bisinnara mango trees irrigated with NW or diluted drainage water reached first and full bloom on the second week of January and last week of Feb. in both seasons respectively.

Effect of irrigation with ADW, NW and diluted ADW on panicle length.

Panicle length of Hindy Bisinnara mango trees as shown in Table 5 tended to increase gradually with decreasing the proportions of ADW applied with NW from 100% to 0.0 % (NW only) . It was significantly reduced with irrigation with ADW or diluted ADW at all proportions used. Irrigation with diluted ADW at 50 to 35 %plus 50 to 65% NW had a slight reduction on panicle length compared to irrigation with NW alone. The highest panicle length was recorded on the trees irrigated with NW only. Irrigation with ADW only minimized panicle length. These results were true in both seasons.

Effect of irrigation with ADW, NW and diluted ADW on the yield

It is apparent from the data in Tables 5 and 6 that yield, expressed in weight (kg.), and number of fruits / tree were negatively affected by irrigation with ADW or diluted ADW at different ratios with NW.

Irrigation with ADW or diluted ADW caused an apparent reduction in the yield (kg) and the number of fruits / tree. The reduction was associated with the increase in the percentages of ADW out of the total irrigations. A significant reduction in the yield and the number of fruits/ tree was observed with using ADW only or diluted ADW at 65% ADW to 35% NW compared to using NW or diluted ADW at 35 to 50% plus 65 to 50% NW. Irrigation with diluted ADW at 50% ADW plus 50 % NW had a slight reduction on the yield compared to irrigation with NW alone. From the economic point of view, irrigation with diluted ADW at 50% ADW plus 50 % NW is suggested to be favourable for enhancing the yield and number of fruits / tree, since no praction differences among such treatment and the irrigation with NW alone.

Table 4: Effect of irrigation water quality on shoot length, number of leaves / shoot and leaf area in the three growth cycles of Hindy Bisinnara mango trees during 2005 and 2006 seasons.

Drainage ADW and Nile water (NW) treatments (ADW: NW)	Spring growth cycle					
	Shot length cm.		No of leaves / shoot		Leaf area (cm^2.)	
	2005	2006	2005	2006	2005	2006
Drainage water (ADW) only	8.6	8.2	8.0	7.0	61.0	57.0
Diluted ADW (65 % : 35 %)	10.7	10.1	10.0	9.0	68.0	60.5
Diluted ADW (50 % : 50 %)	13.0	11.8	12.0	11.0	71.9	64.0
Diluted ADW (35 % : 65 %)	13.3	12.0	12.5	11.3	92.0	65.0
Nile water (NW) only	13.6	12.3	13.0	11.5	72.3	65.3
New L.S.D. at 5%	1.4	1.7	2.0	2.0	1.5	2.0
	Summer growth cycle					
Drainage water (ADW) only	6.0	5.8	6.0	5.0	51.0	47.0
Diluted ADW (65 % : 35 %)	7.0	6.9	7.0	7.0	55.0	41.0
Diluted ADW (50 % : 50 %)	8.1	8.2	9.0	9.0	63.0	55.9
Diluted ADW (35 % : 65 %)	8.4	8.3	9.0	9.0	64.0	56.1
Nile water (NW) only	8.6	8.5	10.0	10.0	64.5	56.3
New L.S.D. at 5%	1.0	1.0	1.0	1.0	2.1	2.5
	Autumn growth cycle					
Drainage water (ADW) only	8.5	7.8	6.5	6.0	51.0	45.0
Diluted ADW (65 % : 35 %)	10.9	10.0	7.8	7.2	55.0	50.0
Diluted ADW (50 % : 50 %)	13.9	13.0	8.9	9.0	60.0	65.0
Diluted ADW (35 % : 65 %)	14.0	13.5	9.0	9.2	60.0	66.0
Nile water (NW) only	14.2	13.7	9.0	9.4	61.0	66.0
New L.S.D. at 5%	1.1	1.3	1.0	1.0	2.2	2.3

Table 5: Effect of irrigation water quality on percentages of N, P, K, Na and Cl in the leaves, dates of first and full bloom, panicle length and yield of Hindy Bisinnara mango trees during 2005 and 2006 seasons.

Drainage ADW and Nile waters (NW) treatments (ADW: NW)	Leaf N %		Leaf P %		Leaf K %	
	2005	2006	2005	2006	2005	2006
Drainage water (ADW) only	1.42	1.38	0.09	0.11	0.92	1.01
Diluted ADW (65 % : 35 %)	1.50	1.46	0.12	0.15	0.99	0.07
Diluted ADW (50 % : 50 %)	1.55	1.55	0.15	0.18	1.06	1.13
Diluted ADW (35 % : 65 %)	1.56	1.56	0.16	.19	1.06	1.14
Nile water (NW) only	1.57	1.56	0.16	0.19	1.07	1.15
New L.S.D. at 5%	0.03	0.04	0.02	0.03	0.05	0.04
	Leaf Na %		Leaf Cl %		Date of first bloom	
Drainage water (ADW) only	0.11	0.14	0.08	0.10	Last week of Jan.	Last week of Jan.
Diluted ADW (65 % : 35 %)	0.08	0.11	0.06	0.08	3rd week of jan.	Second week of jan.
Diluted ADW (50 % : 50 %)	0.06	0.08	0.04	0.05	Second week of jan.	Second week of jan.
Diluted ADW (35 % : 65 %)	0.05	0.07	0.04	0.05	Second week of jan.	Second week of jan.
Nile water (NW) only	0.05	0.06	0.04	0.05	Second week of jan.	Second week of jan.
New L.S.D. at 5%	0.02	0.02	0.02	0.02	-	-
	Date of full bloom		Panicle length (cm)		Yield / tree (kg)	
Drainage water (ADW) only	1st week of Mar.		21.5	20.5	33.8	37.5
Diluted ADW (65 % : 35 %)	Last week of Feb.		25.2	25.3	44.5	56.0
Diluted ADW (50 % : 50 %)	Last week of Feb.		27.8	28.0	51.2	70.0
Diluted ADW (35 % : 65 %)	Last week of Feb.		28.0	28.1	51.7	70.9
Nile water (NW) only	Last week of Feb.		28.2	28.3	52.3	71.9
New L.S.D. at 5%	-	-	1.5	1.2	2.9	3.0

The minimum yield (33.8 and 37.5 kg/ tree) was obtained in the trees irrigated with ADW only during the two growing seasons. Irrigation with NW only gave the maximum values (52.3 and 71.9 kg / tree). Under the economical treatment (50% ADW : 50 % NW) yield per tree reached 51.2 and 70.0 kg in 2005 and 2006 seasons, respectively. These results were true in both seasons.

These results are in accordance with those obtained by Bielorai *et al.*, (1988).

Effect of irrigation with ADW, NW and diluted ADW on fruit quality

Data in Table 6 clearly show that irrigation of Hindy Bisinnara mango trees with ADW or with diluted drainage water at 65% ADW + 35% NW significantly gave unacceptable fruit quality compared to irrigation with Nile water (NW) or diluted ADW at 35 to 50 % ADW + 65 to 50 % NW . Irrigation with NW only gave the best results with regard to fruit quality in terms of increasing fruit weight and dimensions, total soluble solids %, total and reducing sugars % and vitamin C content and in decreasing total acidity . Salinity caused by irrigation with ADW alone or diluted ADW resulted in reducing fruit weight and dimensions, total soluble solids %, total and reducing sugars and Vitamin C content and increasing total acidity compared to irrigation with NW.

Increasing percentages of ADW applied with NW from 35 to 50 % had slight adverse effects on fruit quality. However, adverse effects on fruit quality were recorded as the percentages of ADW in the irrigation water was higher than 50%. A satisfactory promotion on fruit quality was recorded in the trees irrigated with water containing ADW at 50% plus NW at 50 % . Similar results were obtained in 2005 and 2006 seasons.

Table 6: Effect of irrigation water quality on number of fruits / tree as well as physical and chemical characters of Hindy Bisinnara mango fruits during 2005 and 2006 seasons.

Drainage ADW and Nile waters (NW) treatments (ADW: NW)	No. of fruits / tree		Fruit weigh (g.)		Fruit length (cm)	
	2005	2006	2005	2006	2005	2006
Drainage water (ADW) only	211.0	250.0	160.0	150.0	6.5	6.3
Diluted ADW (65 % : 35 %)	260.0	280.0	171.0	200.0	7.1	6.7
Diluted ADW (50 % : 50 %)	371.0	330.0	189.0	212.0	7.8	7.5
Diluted ADW (35 % : 65 %)	272.0	333.0	190.0	213.0	7.9	7.6
Nile water (NW) only	274.0	336.0	191.0	214.0	8.0	7.6
New L.S.D. at 5%	10.0	12.5	8.2	10.0	0.3	0.3
	Fruit width (cm)		T.S.S. %		Total sugars %	
Drainage water (ADW) only	4.7	4.6	10.2	11.0	7.8	7.9
Diluted ADW (65 % : 35 %)	5.1	5.4	11.2	12.0	8.6	8.6
Diluted ADW (50 % : 50 %)	5.5	5.7	13.2	12.9	9.6	10.5
Diluted ADW (35 % : 65 %)	5.6	5.8	13.3	13.0	9.7	10.6
Nile water (NW) only	5.6	5.8	13.4	13.1	9.8	10.7
New L.S.D. at 5%	0.3	0.3	0.3	0.4	0.3	0.4
	Reducing sugar %		Total acidity %		Ascorbic acid content (mg/100 ml pulp)	
Drainage water (ADW) only	4.1	4.3	0.501	0.497	40.0	42.0
Diluted ADW (65 % : 35 %)	4.4	4.8	0.470	0.460	45.1	48.0
Diluted ADW (50 % : 50 %)	4.8	5.3	0.410	0.430	49.2	52.5
Diluted ADW (35 % : 65 %)	5.3	5.6	0.410	0.488	50.0	52.5
Nile water (NW) only	5.1	5.7	0.408	0.427	51.0	52.6
New L.S.D. at 5%	0.2	0.2	0.027	0.029	1.9	2.0

These results are in harmony with those obtained by Bielorai *et al.*, (1988).

The adverse effects of salinity on growth and fruiting of Hindy Bisinnara mango could be attributed to its retarding effect on cell division and cell elongation, interrupting the activity of meristematic tissues, reducing phototsynthesis during disturbing normal stomatal opening and closure , decreasing translocation of assimilates and uptake of nutrients, lowering the absorption and motion of water from roots to vegetative portions and reducing xylem tissues and number of xylem and vessels in xylem (Nijjar , 1985)

Accordingly, and from an economical point of view, agricultural drainage water with qualities similar to those of the present work may be combined in equal proportions with Nile water for irrigating mature Hindy Bisinnara mango trees. To minimize salts accumulation, one complete river Nile irrigation may be applied every four mixed water irrigations for leaching the excess of salts in the soil.

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تأثير الرى بماء الصرف الزراعى على النمو والاثمار فى اشجار المانجو الهندى بسنارة

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نظرا لأن الاحتياجات المائية لمصر فى زيادة مستمرة فإن اعادة استخدام مياه الصرف الزراعى للرى هو احد الامكانيات المتاحة لزيادة الرقعة الزراعية فى مصر .

لذلك فقد اجريت تجربة حقلية خلال عامين متتالين (٢٠٠٥ ، ٢٠٠٦) فى بستان مانجو خاص يقع فى مركز كوم امبو بمحافظة اسوان وذلك لتقييم امكانية اعادة استخدام مياه الصرف الزراعى للرى ولدراسة تأثير مياه الصرف الزراعى المعاد استخدامها على النمو الخضرى والحالة الغذائية للاشجار والمحصول وخصائص الجودة للثمار فى أشجار المانجو الهندى بسنارة النامية فى التربة الطينية الطميية ولقد تم رى الاشجار بماء الصرف الزراعى وماء نهر النيل فقط وتم رى الاشجار بنسب مختلفة من ماء الصرف الزراعى وماء نهر النيل بنسب ٦٥ : ٣٥ ، ٥٠ : ٥٠ ، ٣٥ : ٦٥ على الترتيب.

أظهرت نتائج الدراسة أن الرى بماء الصرف الزراعى بمفرده طوال موسم النمو أو مخلوطا مع ماء النيل بنسبة ٦٥% ماء صرف : ٣٥ % ماء نيل قد اثر سلبيا على طول النمو وعدد الاوراق على النمو، ومساحة الورقة فى دورات النمو الثلاثة والنسبة المئوية للنيتروجين والفوسفور والبوتاسيوم فى الاوراق وكمية المحصول وكذلك الخصائص الطبيعية والكيميائية للثمار أما النسبة المئوية للكلوريد والصوديوم فى الاوراق فلقد زادت بدرجة كبيرة بزيادة النسبة المستخدمة من مياه الصرف الزراعى وكان الرى باستخدام ماء الصرف الزراعى المخلوطة بماء النيل بنسبة ٥٠ % ماء نيل : ٥٠ % ماء صرف أو ٦٥% ماء نيل : ٣٥% ماء صرف لم يكن له أى تأثير ضار على صفات النمو الخضرى والحالة الغذائية للاشجار والاثمار كما ونوعا.

من وجهة النظر الاقتصادية فإنه ينصح برى اشجار المانجو الهندى بسنارة النامية فى التربة الطينية الطميية بماء الصرف الزراعى المخلوط مع مياه النيل بنسبة ٥٠% من كل منهما ولاجل الأمان يفضل اجراء ريه من مياه النيل بعد كل اربعة ربات من ماء الصرف الزراعى المخلوط بمياه النيل لاجراء غسيل للتربة ولمنع تراكم الاملاح . إن الرى بهذا الماء المخلوط لا يكون مصحوبا بأية تأثيرات ضارة على نمو وإثمار أشجار المانجو الهندى بسنارة.