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YIELD, QUALITY AND PROFITABILITY OF UREAFORM FERTILIZED APRICOT TREES

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ABSTRACT

The experimental work has been conducted in a private farm located at El-khatatba region, Menofia Governorate during three successive years (2004, 2005 and 2006) to evaluate the effect of ureaform (UF) as a slow release fertilizer comparing with ammonium nitrate (AN) as a conventional one and their performance with farmyard manure (FYM) application on the quality characters, yield and its components of *Canino* apricot variety. Also, the economic return has been estimated.

The fertilization treatments has been ureaform in four rates (60, 80, 100 & 120 kg N.fed^{-1}), ammonium nitrate in one rate (100 kg N.fed^{-1}) and no fertilized one (control). Physical characters (height, diameter, shape of fruit and pulp & stone weight), chemical characters (TSS%, total acidity, TSS/ acidity in fruit and NPK in leaf & fruit) and apricot yield and its components (fruit No./ tree, yield/ tree & yield/ fed) have been recorded.

The results show that UF fertilizer has almost had strong positive effect on chemical, physical, apricot yield and its components. Also, they show magnitude of the consumption ability belonging to nitrogen of UF treatments comparing with that of AN which would decrease lost nitrogen and in turn reflect positively on environment. The results suggest that the rate of 100 kg N.fed^{-1}. year $^{-1}$ (UF_3) in case of FYM absence and 80 kg N.fed^{-1}. year $^{-1}$ (UF_2) in case of FYM presence to be seasonally recommended. The result of economic study (net return and investment factor) has also supported this selection.

Keywords:, slow release nitrogen fertilizer, ureaform, ammonium nitrate, farmyard manure, net return, apricot tree

INTRODUCTION

Since beginning reclamation and cultivation of desert soils, the investment map of fruits production - in Egypt- was changed; such soils became an important source for producing most kinds of these crops. However, these soils have several problems representing low inherent fertility, low nutrients retention and high infiltration rate, so that the different nutrients addition as an ordinary fertilizers in agricultural normal practices usually are apt to leach out of root zone.

In the last few decades, the efforts were focusing on reducing the harmful environmental impacts of N-fertilizers use and finding new alternatives which make supplying N-fertilizer in a form which is less susceptible to runoff. Amongst such alternatives were the slow release nitrogen fertilizers (SRNFs) applications which are extremely useful on sandy soils. Hauck (1971) reviewed most SRNF types applied on that time and which still in use till now.

More recently, numerous investigators offered some new forms of SRNFs, for example Liang et al. (2007), Wu & Liu (2008) and Wu et al. (2008) who interested in polymer coated fertilizers taking into account that these polymers had high absorbency power for water and so they are very important in the matter of sandy soils exploitation. SRNFs use is now being mandated in best management practices with different kinds of crops; vegetables, ornamentals, fruits ...ets (Irish, 2001; Heriteau and Stonehill, 2003; Phillips, 2005 and Rushing & Greer, 2005). Ureaform (UF) products are the most popular slow release nitrogen fertilizers accounting for 63% of the total of synthetically produced materials (Sartain, 2007), they are sparingly soluble 60% of it as water insoluble nitrogen and compose largely of longer chained UF polymers (Abbady, 1991).

Ureaform fertilizer gave promised results with many fruit crops (Gobara et al., 1998, Mansour et al., 1999, Ismail, 2000 and Abbady et al., 2008). Apricot fruit is one of the most important fruit crops which now grow promotingly on sandy soil. The growers are costumed to applying the conventional nitrogen fertilizers (Marinov, 1995, Shaltout & El-Gazzar, 2001 and Bussi et al., 2002).

Because of N-fertilization, to far extent, determine productivity, profitability, pollution status and plant health, the application of UF fertilizer to fertilize apricot crop is worthy to try. Therefore, the aim of this paper is to shoot the light upon optimum practices to apply ureaform fertilizer (SRNF) to maximize apricot crop productivity and obtain maximum economic return comparing with soluble nitrogen form.

MATERIALS AND METHODS

The present investigation has been conducted during three successive years (2004, 2005 and 2006) on Canino apricot variety (*Pruns Armeniaca L.*) trees grown in a well drained loamy sand soil of private farm located at El-Khatatba region, Menofia Governorate. The trees were eight years old, buded on apricot seedling rootstock and planted at 4X 5 meter apart. The first season (2004) has been considered as an introductory season to overcome the residual effect of the previously used fertilization during the preceding years, so its data has been excluded. The soil analysis has been carried out according to Wilde et al. (1985) and it is shown in Table (1).

Table (1). Some soil properties of the studied soil.

Property	pH	EC (dS/m)	Ca	Mg	Na	K	CO_3	HCO_3	Cl	SO_4	O.M. %	Sand %	Silt %	Clay %	Texture class	$CaCO_3$ %
Value	8.18	2.32	3.38	4.95	15.67	0.83	0.00	1.34	16.58	6.91	0.93	82.97	9.74	8.29	loamy sand	3.82

A split plot design has been used in this experiment

(a) main plots have been FYM in two treatments; 0.0 and 20 m3/ fed

(b) subplots have come as follow:

1- Control (not received any fertilizer)

2- Ammonium nitrate, 100 kg N/ fed (1500 g AN / tree/ year, AN)

3- Ureaform, 60 kg N/ fed (750 g UF/ tree/ year, UF1)

4- Ureaform, 80 kg N/ fed (1000 g UF/ tree/ year, UF2)

5- Ureaform, 100 kg N/ fed (1250 g UF/ tree/ year, UF3)
6- Ureaform, 120 kg N/ fed (1500 g UF/ tree/ year, UF4)

Every treatment has been replicated three times, 4 trees per each (144 trees). At the beginning of fertilization season of third year, the subplots again have been split into 2 subsubplot (c), one of them has received the same amount and form of nitrogen fertilizer as was in previous year (tagged +). The other one has dispatched nitrogen fertilizer to study the residual effect of previous application in year 2005 (tagged *).

FYM has been added in a cavity (60x60x60 cm) beside the trees in the first week of January, season 2005. The ammonium nitrate (33.3 N %) was added side dress in two doses. The first one 1125 g/ tree has been divided into 8 doses and added weekly interval during the period from March to May. The second one 375 g/ tree has been added weekly through July after harvesting apricot yield. The ureaform (40 % N, 60% activity index) manufactured by Abbady et al. (1991) has been added side dress in one dose at the first week of February. The trees have been drip irrigated and received known agricultural practices which already applied in deciduous fruit trees. Leaf samples have been taken randomly after 50-70 day from vegetative bud brust.

The tested treatments have been evaluated through the following parameters:-

1- Yield:- the harvesting took place on mid June, fruits number/ tree, yield/ tree and yield/ fed have been recorded.
2- Fruit quality:- fifty fruits from the yield of each replicate have been taken randomly for determining weights of each of fruits, pulp and stone, total soluble solids percentage (TSS %) and total acidity percentage (g malic acid/ 100 g pulp) according to A.O.A.C. (1985).
3- N, P and K contents in leaf and fruits on dry weight basis have been determined according to Wilde et al. (1985)

The obtained data have been statistically analyzed according to Snedecor & Cochran (1980).

RESULTS AND DISCUSSIONS

This study has determined the effect of ureaform (UF) fertilizer application comparing to recommended rate of ammonium nitrate and their performance with farmyard manure (FYM) application on each of the fruits quality, yield and its components as well as the economic return.

1- Quality characters

a) Chemical composition

The results of second and third year (table 2) has indicated that no significant effect for FYM application has been observed on TSS%, total acidity and TSS/ acidity ratio as well as macronutrients content of leaf and fresh fruit. However, nitrogen content of fresh fruit has been slightly higher only in case of presence FYM specially with UF treatments which probably due to the effect of FYM on liberation of more nitrogen from UF fertilizer (Abbady et al., 2008).

Table (2). Effect of slow & fast release nitrogen fertilizers and FYM application on chemical compositions of apricot through two successive years.

		Year 2005									Year 2006								
	Treat. (B)	TSS %	Total acidity %	TSS/ acidity ratio	Macronutrients % in leaf			Macronutrients in fresh fruit (mg/ kg)			Treat. (C)	TSS %	Total acidity %	TSS/ acidity ratio	Macronutrients % in leaf			Macronutrients in fresh fruit (mg/ kg)		
					N	P	K	N	P	K					N	P	K	N	P	K
Without farmyard manure (A)	Control	15.10	0.72	20.97	2.05	0.32	2.00	450.00	180.00	2014.00	Cont.+	15.00	0.70	21.43	2.10	0.37	2.10	460.00	189.00	2114.00
											Cont.*	15.00	0.70	21.43	2.10	0.37	2.10	460.00	189.00	2114.00
	AN	16.35	0.69	23.69	3.20	0.10	3.00	590.00	220.00	2300.00	AN+	23.00	0.63	36.50	3.34	0.15	3.10	601.00	231.10	2411.00
											AN*	17.00	0.65	26.15	3.20	0.25	2.90	598.00	251.00	2250.00
	UF1	17.15	0.64	26.79	2.50	0.15	2.80	545.00	210.00	2250.00	UF1+	18.00	0.58	31.03	2.63	0.20	2.90	556.00	223.00	2350.00
											UF1*	18.00	0.60	30.00	3.00	0.26	3.40	604.90	211.00	2453.00
	UF2	17.10	0.66	25.90	3.40	0.20	2.60	590.00	280.00	2230.00	UF2+	27.00	0.60	45.00	3.58	0.25	2.70	600.00	289.00	2339.00
											UF2*	22.00	0.62	35.48	2.18	0.20	3.50	688.00	281.00	2491.00
	UF3	16.45	0.68	24.19	2.15	0.20	2.30	680.00	255.00	2290.00	UF3+	21.00	0.63	33.87	2.28	0.25	2.40	693.00	256.00	2392.00
											UF3*	20.00	0.64	31.25	2.12	0.12	2.81	509.00	229.50	2399.00
	UF4	16.00	0.70	22.85	2.80	0.28	2.30	580.00	230.00	2200.00	UF4+	21.00	0.63	33.33	2.90	0.35	2.40	593.00	238.00	2311.00
											UF4*	20.00	0.65	30.77	3.00	0.30	3.00	603.90	230.00	2464.00
	mean	16.36	0.68	24.07	2.68	0.21	2.50	572.50	229.17	2214.00	mean+	20.83	0.63	33.53	2.81	0.26	2.60	583.83	237.68	2319.50
											mean*	18.67	0.64	29.18	2.60	0.25	2.95	577.30	231.92	2361.83
With farmyard manure	Control	15.10	0.72	20.97	2.05	0.32	2.00	450.00	180.00	2014.00	Cont.+	15.00	0.70	21.43	2.10	0.37	2.10	460.00	189.00	2114.00
											Cont.*	15.00	0.70	21.43	2.10	0.37	2.10	460.00	189.00	2114.00
	AN	16.50	0.68	24.26	2.20	0.10	2.60	606.00	213.00	2230.00	AN+	19.00	0.61	31.66	2.33	0.15	2.70	616.00	223.00	2331.00
											AN*	17.00	0.63	26.98	2.03	0.20	3.10	570.00	201.90	2310.00
	UF1	17.30	0.56	30.89	2.50	0.20	3.00	653.00	280.00	2134.00	UF1+	20.00	0.52	39.21	2.63	0.25	3.10	663.00	291.00	2234.00
											UF1*	16.00	0.52	30.19	2.80	0.25	3.40	599.00	250.90	2450.00
	UF2	17.24	0.58	29.72	3.25	0.24	2.90	730.00	220.00	2319.00	UF2+	24.00	0.51	48.00	3.37	0.29	3.00	739.00	235.00	2419.00
											UF2*	20.00	0.52	38.46	1.75	0.20	3.20	643.00	229.90	2394.00
	UF3	16.60	0.62	26.77	2.40	0.15	2.08	684.00	215.00	2080.00	UF3+	26.00	0.57	46.42	3.57	0.20	2.18	694.00	225.00	2180.00
											UF3*	17.00	0.58	29.31	2.33	0.29	3.70	680.00	239.00	2418.00
	UF4	16.50	0.67	24.62	2.20	0.24	3.20	670.00	250.00	2320.00	UF4+	21.00	0.61	35.00	2.27	0.29	3.30	681.00	263.80	2420.00
											UF4*	20.00	0.62	32.25	3.06	0.25	3.30	689.00	281.30	2430.00
	mean	16.54	0.64	26.21	2.43	0.21	2.63	632.17	226.33	2182.83	mean+	20.83	0.59	36.95	2.71	0.26	2.73	642.17	237.80	2283.00
											mean*	17.50	0.60	29.77	2.35	0.26	3.13	606.83	232.00	2352.67
L.S.D 5%	A	0.04	0.01	0.65	0.01	0.02	0.04	2.52	5.59	1.87	L.S.D A	0.71	0.01	1.16	0.37	0.02	0.04	0.67	1.70	3.47
	B	0.05	0.02	0.74	0.03	0.02	0.07	4.43	3.89	4.18	B	0.31	0.01	0.85	0.31	0.02	0.05	4.92	1.38	2.76
	A*B	0.07	0.03	1.05	0.05	0.03	0.10	6.28	5.52	5.92	C	0.23	0.01	0.68	0.16	0.01	0.02	1.34	1.04	1.33
											A*B	0.45	0.01	1.20	0.43	0.03	0.06	6.97	1.95	3.91
											A*C	0.32	0.01	0.96	0.23	0.02	0.02	1.89	1.47	1.87
											B*C	0.56	0.02	1.67	0.40	0.03	0.04	3.27	2.54	3.25
											A*B*C	0.79	0.03	2.36	0.57	0.04	0.06	4.62	3.60	4.59

AN= ammonium nitrate UF= ureaform

* the experimental unit received N fertilizer in second year only

\+ the experimental unit received N fertilizer in third year

Promisingly, under all circumstances of the experiment, ureaform treatments (on average) have had extremely positive effect on studied chemical quality characters; TSS% and TSS/ acidity ratio values which have been increased, at the same time, total acidity has been decreased comparing with AN treatment. Also, ureaform treatments (on average) have led to increasing macronutrients content (N, P & K) of leaf and fruit, specially with FYM application comparing with AN treatment. It seems that the broken down radicals of ureaform being formed during its decomposition acts as a sequestering agents to other elements letting them in available form to uptake. The same results were obtained by Abbady et al. (2003).

Examination of the results (Table 2) has illustrated as well, that there has been positive relation between N and K content of leaf and that of fruit; the more N and K content of leaf, the more N and K content of fruit. This tendency has not recorded with phosphorus element. Moreover, there has been reversed relation between the K content in fruit and acidity %; the more the K content in fruit, the less the acidity %. These results has been in agreement with the findings of Morris et al. (1982) who explained this phenomenon on the faith of that the accumulated potassium cations (K+) may substitute for protons (H+) drived from the organic acid, consequently, the acidity % has been gotten low. Also, no trend for the effect of different ureaform rates on chemical quality characters has been observed either in the presence or absence of FYM in the studying period.

Linking with yield/ fed results, strong positive relation has been observed between each of nitrogen & potassium level in fresh fruits and the quantity of obtained yield (Table 4). These results have been agreed with those of Szucs (1986). In the matter of final split treatments tagged (+) and (*), there has been considered superiority for the treatments tagged (+) to those tagged (*) for all studied quality characters, and such superiority has barely increased with FYM application.

b)- Physical characters

As shown in table (3), FYM presence has had positive effect on most of physical characters either in 2nd or 3rd years. Also, ureaform treatments (on average) have had positive effect comparing with AN treatment. However, UF_3 treatment in case of absence FYM and UF_2 treatment in case of presence FYM have had special effect on diameter, height, pulp weight and stone weight of fruit either in 2nd or 3rd year. These rates have attained maximum yield and profitability (will be shown in Fig. 1, later). It is also observed marked superiority for such characters of the treatments tagged (+) to those tagged (*), regardless the rate or type of fertilizer.

2- Yield and yield components

Data listed in Table (4) show positive effect for FYM on the yield and its components in both second and third year. Also, positive effect for UF treatments (on average) comparing with that of AN treatment has been observed on the same parameters and dragged on all other circumstances of the experiment; second or third year, presence or absence of FYM and even the final split treatments tagged (+) or (*).

Table (3). Effect of slow & fast release nitrogen fertilizers and FYM application on some physical characters of apricot through two successive years.

	Year 2005							Year 2006						
	Treat. (B)	Fruit height (cm)	Fruit diameter (cm)	Fruit shape	Fruit weight (g)	Fruit pulp weight (g)	Stone weight (g)	Treat. (C)	Fruit height (cm)	Fruit diameter (cm)	Fruit shape	Fruit weight (g)	Fruit pulp weight (g)	Stone weight (g)
Without farmyard manure (A)	Control	3.73	12.80	0.29	34.17	32.26	1.91	Cont.+	2.72	10.75	0.24	31.00	29.1	1.9
								Cont.*	2.70	10.80	0.24	31.00	29.15	1.85
	AN	3.70	12.80	0.28	34.30	32.74	1.56	AN+	2.71	10.80	0.28	34.41	31.83	2.58
								AN*	2.70	10.80	0.25	31.00	28.55	2.45
	UF1	3.73	12.40	0.29	39.53	37.22	2.31	UF1+	3.72	12.40	0.30	37.72	35.49	2.23
								UF1*	2.73	10.40	0.26	33.30	31.05	2.25
	UF2	4.07	13.43	0.29	31.68	29.96	1.72	UF2+	4.02	13.50	0.29	36.61	33.86	2.75
								UF2*	3.07	11.43	0.27	34.33	31.68	2.65
	UF3	4.10	14.20	0.28	45.47	43.02	2.45	UF3+	4.12	14.12	0.29	63.31	60.84	2.47
								UF3*	3.10	12.20	0.25	60.00	57.62	2.38
	UF4	4.00	13.17	0.30	38.69	36.41	2.27	UF4+	4.00	13.20	0.30	37.33	35.03	2.30
								UF4*	3.00	11.17	0.27	39.42	37.22	2.20
	mean	3.89	13.13	0.29	37.31	35.27	2.04	mean+	3.55	12.46	0.28	40.06	37.69	2.37
								mean*	2.88	11.13	0.26	38.18	35.88	2.30
With farmyard manure	Control	3.73	12.80	0.29	34.17	32.26	1.91	Cont.+	2.72	10.75	0.24	31.00	29.1	1.9
								Cont.*	2.70	10.80	0.24	31.00	29.15	1.85
	AN	4.13	13.10	0.31	37.54	35.51	2.03	AN+	3.10	11.05	0.31	35.08	33.02	2.06
								AN*	2.95	11.10	0.27	32.00	30.05	1.95
	UF1	4.10	13.60	0.30	41.74	39.53	2.21	UF1+	4.10	13.60	0.30	57.50	55.27	2.23
								UF1*	3.13	11.60	0.27	45.33	43.18	2.15
	UF2	4.10	13.83	0.29	44.04	41.36	2.68	UF2+	4.12	13.85	0.29	62.33	60.13	2.70
								UF2*	3.15	11.83	0.27	59.00	56.95	2.50
	UF3	4.00	13.50	0.29	39.46	37.29	2.17	UF3+	4.02	13.45	0.29	43.00	40.50	2.20
								UF3*	3.01	11.50	0.26	40.00	37.30	2.05
	UF4	4.13	13.60	0.30	41.51	38.63	2.88	UF4+	4.13	13.70	0.30	43.60	40.70	2.90
								UF4*	3.13	11.60	0.27	53.00	50.25	2.75
	mean	4.03	13.41	0.30	39.74	37.43	2.31	mean+	3.70	12.73	0.29	45.42	43.12	2.33
								mean*	3.01	11.41	0.26	43.39	41.15	2.21
LSD 5%	A	0.02	0.08	0.00	0.34	0.30	0.52	LSD A	0.37	0.05	0.03	1.24	1.25	0.03
	B	0.04	0.06	0.01	1.05	0.70	0.77	B	0.34	0.04	0.02	0.37	0.37	0.02
	A*B	0.06	0.08	0.01	1.49	0.99	1.09	C	0.20	0.02	0.01	0.91	0.90	0.01
								A*B	0.48	0.06	0.04	0.52	0.53	0.03
								A*C	0.28	0.03	0.02	1.28	1.27	0.02
								B*C	0.48	0.06	0.04	2.22	2.20	0.04
								A*B*C	0.67	0.08	0.05	3.13	3.11	0.05

AN= ammonium nitrate UF= ureaform + the experimental unit received N fertilizer in third year

* the experimental unit received N fertilizer in second year only

Table (4). Effect of slow & fast release nitrogen fertilizers and FYM application on the yield of apricot through two successive years.

	Year 2005						Year 2006						Total yield (ton)	CA (N kg ton-1)
	Treat. (B)	Fruit No./ tree	Yield (kg/ tree)	Yield (ton/ fad)	Relative increase to AN		Treat. (C)	Fruit No./ tree	Yield (kg/ tree)	Yield (ton/ fad)	Relative increase to AN			
					value	%					value	%		
Without farmyard manure (A)	Control	730.00	25.25	5.05	-0.95	-15.83	Cont.+	530.00	24.91	4.98	-5.03	-50.25	10.03	0.00
							Cont.*	530.00	24.91	4.98	-1.02	17.00	10.03	0.00
	AN, 80	875.00	30.02	6.00	0.00	0.00	AN+	815.00	50.05	10.01	0.00	0.00	16.01	12.49
							AN*	545.00	29.98	6.00	0.00	0.00	12.00	8.33
	UF1, 48	1265.00	50.00	10.00	4.00	66.67	UF1+	1850.00	69.97	13.99	3.98	39.76	23.99	5.00
							UF1*	1945.00	64.77	12.95	6.95	115.83	22.95	2.61
	UF2, 64	1895.00	59.98	12.00	6.00	100.00	UF2+	2460.00	90.06	18.01	8.00	79.92	30.01	5.33
							UF2*	2325.00	79.82	15.96	9.96	166.00	27.96	2.86
	UF3, 80	2200.00	100.03	20.01	14.01	233.50	UF3+	1420.00	89.90	17.98	7.97	79.62	37.99	5.26
							UF3*	1325.00	80.00	16.00	10.00	166.67	36.01	2.78
	UF4,96	1295.00	50.10	10.02	4.20	67.00	UF4+	1740.00	64.95	12.99	2.98	29.77	23.00	10.47
							UF4*	1525.00	60.12	12.02	6.02	100.33	22.04	5.44
	mean	1376.67	52.56	10.51	4.54	75.22	mean+	1469.17	64.97	12.99	2.98	29.80	23.51	6.43
							mean*	1365.83	56.60	11.32	5.32	94.31	21.83	3.67
With farmyard manure	Control	730.00	25.25	5.05	-6.96	-57.95	Cont.+	530.00	24.91	4.98	-5.00	-50.10	10.03	0.00
							Cont.*	530.00	24.91	4.98	-4.05	44.85	10.03	0.00
	AN, 80	1600.00	60.06	12.01	0.00	0.00	AN+	1245.00	49.90	9.98	0.00	0.00	21.99	9.09
							AN*	765.00	45.14	9.03	0.00	0.00	21.04	4.75
	UF1, 48	1920.00	80.14	16.03	4.02	33.47	UF1+	1390.00	79.93	15.99	6.01	60.22	32.02	3.75
							UF1*	1655.00	75.02	15.00	5.97	66.11	31.03	1.93
	UF2, 64	2275.00	100.19	20.04	8.03	66.86	UF2+	2750.00	110.00	22.00	12.02	120.44	42.04	3.81
							UF2*	2410.00	103.63	20.73	11.70	129.57	40.77	1.96
	UF3, 80	1775.00	70.04	14.01	2.00	16.65	UF3+	1770.00	110.32	22.06	12.08	121.04	36.07	5.55
							UF3*	1525.00	89.98	18.00	8.97	99.34	32.01	3.12
	UF4,96	1930.00	80.11	16.02	4.01	33.39	UF4+	1605.00	69.98	14.00	4.02	40.28	30.04	7.19
							UF4*	1225.00	64.93	12.99	3.96	43.85	39.01	3.08
	mean	1705.00	69.30	13.86	1.85	15.40	mean+	1548.33	74.17	14.83	4.86	48.65	28.70	4.90
							mean*	1351.67	67.27	13.45	4.43	63.95	28.98	2.47
LSD 5%	A	3.16	0.48	0.04	—	—	LSD A	7.88	2.38	0.02	—	—	—	—
	B	5.21	1.59	0.03	—	—	B	4.89	1.73	0.02	—	—	—	—
	A*B	7.39	2.25	0.03	—	—	C	1.55	1.40	0.01	—	—	—	—
							A*B	6.93	2.45	0.03	—	—	—	—
							A*C	2.18	1.97	0.01	—	—	—	—
							B*C	3.80	3.42	0.02	—	—	—	—
							A*B*C	5.35	4.83	0.03	—	—	—	—

AN= ammonium nitrate

+ the experimental unit received N fertilizer in third year

* the experimental unit received N fertilizer in second year only

CA= Consumption ability

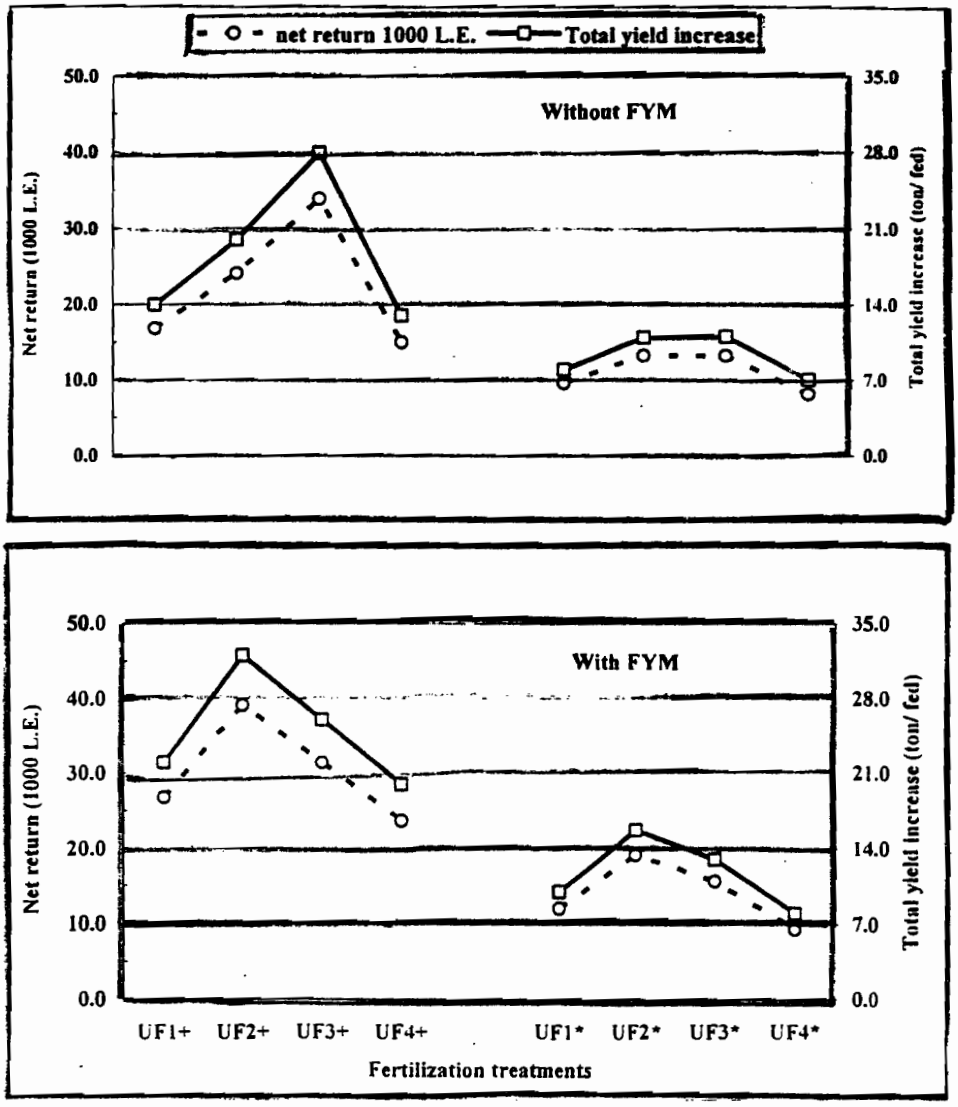

Fig. (1). Fertilization treatments in relation to total yield increase and net return.

In respect of the comparison amongst the effects of UF treatments on yield and its components, it is observed that the high rates of N-UF have attained lower yield. However, they have still been higher than that of the nitrogen soluble form (AN).

It is important to point out that the average yield produced from the recommended rate (100 kg N/ fed) of N-soluble form, AN has represented 2/3 that produced with application of 60 kg N/ fed as N-UF (least rate of N-UF) and 1/2 that of 100 kg N/ fed as N-UF (the same rate of AN). It is worthy to mention that the world average apricot yield per tree is 37 kg, according to Gazanfer (1995) but with ureaform application, it has been enabled to reach 100 kg/ tree under the condition of this experiment.

The relative increases of UF-treatments yield calculated of AN-treatment yield have taken the same above direction. However, it is noticed more superiority for UF treatments (on average) to AN treatment especially in absence of FYM in second and third year. This may be attributed to the organic nature of ureaform – short or long chains of methelyne urea (Abbady, 1991)- which would hide the response of yield to FYM effect comparing with that of inorganic fertilizer (AN).

The consumption ability (CA) represents the quantity of nitrogen from fertilizer consumed to produce one ton of apricot yield, calculated with dividing the nitrogen rate on the crop yield as shown in model

CA= N rate ,kg, / yield fed^{-1}, ton.

Data in Table (4) illustrated that the CA (on average) has varied from 3.87 to 4.97 N-kg ton^{-1} apricot against 6.92 to 10.41 N-kg ton^{-1} apricot for AN treatment in presence and absence of FYM, respectively. I.e. the CA value of AN (on average) is 8.67 kg-N ton^{-1} apricot and that of UF (on average) is 4.42 kg-N ton^{-1} apricot and the difference is 4.25 kg-N ton^{-1} apricot. Such difference has evoked some questions: Where did this difference go? and What is it acting? The expected, a portion might be still in fruit tissue causing a bad quality characters and other portion likely to be seeped to pollute the surrounding environment (NO_3^- or NO_x-gas emission).

The results have suggested the rate of 100 kg N fed^{-1} (UF_3) in case of FYM absence and 80 kg N fed^{-1} (UF_2) in case of FYM presence to be recommended. Since their performance has still expanded successfully to third year and have had the least CA values.

3- Economic evaluation

The reduction of both costs and environmental load by improving applied nitrogen fertilizers quality, nowadays, are the goal which all efforts are devoted to. It is thought that SRNF application will promisingly fulfill such difficult equation. This economic study may affirm this assumption. The applied models to evaluate the economical position are:

$$NR = YI - C$$

$$IF = YI / C$$

Where: NR = net return (L.E.)

YI = yield increase in cash and so called gross return only due to N-fertilizer application (L.E.)

C = overall cost involved in fertilizer application (price and labour cost)

IF = investment factor (L.E.)

The expenses (c) of purchase and application of fertilizers were:

L.E. 800 / ton of ammonium nitrate.

L.E. 1900 / ton of ureaform (cost of 1 ton urea and some other chemicals required to prepare 1 ton UF)

L.E. 45 labour of adding fertilizer/ fed/ time

L.E. 35 labour of adding 10 m3 FYM

selling price of 1 ton apricot fruit (YI in cash) is L.E. 1250

NR values have been strongly affected by FYM application and different nitrogen treatments (Table 5). In the matter of the effect of FYM application, relative increase of NR as percentage values (calculating for the treatments average which have taken FYM to those have not) have been amounted 63% and 23% for 2nd and 3rd year, respectively. As for different nitrogen treatments, relative increase values of NR of UF-treatments (on average) calculating of that of AN treatment have been amounted 1065 and 115.64% at absence and presence of FYM in 2nd year and also 241% and 184% in the same order in 3rd year..

Comparing the effect of different rates of ureaform, it could select UF3 (100 kg N/ fed) in case of FYM absence and UF2 (80 kg N/ fed) in case of FYM presence as an optimum rates to give higher net return. Frequently, net return values of final split treatments tagged (+) in each treatment separately have surpassed those tagged (*). From the data of final position (Table 5 and illustrated graphically in Fig. 1), it seems that apricot trees have had a high response to nitrogen fertilization because the treatments tagged (+) have given high yield increase which consequently has led to high net return and investment factor, and the expected, this action will probably be kept till next year. Therefore, it could be recommended with UF application annually at selected rates, however, further studies in this respect are needed.

Considering IF as a scale to choice optimal rate to give maximum profitability, it could be arranged the rates in descending order as follow: UF_2 with FYM > UF_1 with FYM> UF_3 without FYM ≈ UF_2 without FYM> UF_1 without FYM> UF_3 with FYM> UF_4 with FYM> UF_4 without FYM> AN with FYM> AN without FYM. Fortunately, this results support the usage of ureaform fertilizer and confute the opinions said that SRNF are very expensive.

In conclusion, this study has shown it is good to use ureaform as SRNF and promoted a capability for selecting between the application only high rates of ureaform fertilizer or low rates with FYM additions. The major arbitrate, however is the final net return and investment factor. In final word, environmental return must not be omitted.

Table (5). Yield increase, gross return, net return and investment factor (IF) produced from application of different treatments on apricot in two years.

Treatment		Year 2005										Year 2006										Final position for return / fed				
	Treat. (B)	Applied fertilizer kg/fed	Fertilizer cost	labour/ fed for fertilization	applied FYM m3/fed	cost of adding FYM / fed	total cost / fed	yield increase ton/ fed	gross return at market rate L.E.	net retrun L.E.	Investment factor	Treat. (C)	Applied fertilizer kg/fed	Fertilizer cost	labour/ fed for fertilization	applied FYM m3/fed	cost of adding FYM / fed	total cost / fed	yield increase ton/ fed	gross return at market rate L.E.	net retrun L.E.	total yield increase / fed	total cost L.E.	gross return at market rate L.E.	net retrun L.E.	Investment factor
Without organic manure (A)	AN	300	240	135	0.00	0.00	375	0.95	1188	813	3.17	AN+	300	240	135	0.00	0.00	375	5.03	6288	5913	5.98	750	7475	6725	9.97
												AN*	0.00	0.00	0.00	0.00	0.00	0.00	1.02	1275	1275	1.02	375	1275	900	3.40
	UF1	150	285	45	0.00	0.00	330	4.95	6188	5858	18.75	UF1+	150	285	45	0.00	0.00	330	9.01	11263	10933	13.96	660	17450	16790	26.44
												UF1*	0.00	0.00	0.00	0.00	0.00	0.00	7.97	9963	9963	7.97	330	9963	9633	30.19
	UF2	200	380	45	0.00	0.00	425	6.95	8688	8263	20.44	UF2+	200	380	45	0.00	0.00	425	13.03	16288	15863	19.98	850	24975	24125	29.38
												UF2*	0.00	0.00	0.00	0.00	0.00	0.00	10.98	13725	13725	10.98	425	13725	13300	32.29
	UF3	250	475	45	0.00	0.00	520	14.96	18700	18180	35.96	UF3+	250	475	45	0.00	0.00	520	13.00	16250	15730	27.96	1040	34950	33910	33.61
												UF3*	0.00	0.00	0.00	0.00	0.00	0.00	11.02	13775	13775	11.02	520	13775	13255	26.49
	UF4	300	570	45	0.00	0.00	615	4.97	6213	5598	10.10	UF4+	300	570	45	0.00	0.00	615	8.01	10013	9398	12.98	1230	16225	14995	13.19
												UF4*	0.00	0.00	0.00	0.00	0.00	0.00	7.04	8800	8800	7.04	615	8800	8185	14.31
	mean	240.00	390.00	63.00	0.00	0.00	453.00	6.56	8195.00	7742.00	17.68	mean	240.00	390.00	63.00	0.00	0.00	453.00	8.61	10763.75	10537.25	11.89	679.50	14861.25	14181.75	21.93
With organic manure (A)	AN	300	240	135	20	70	445	6.96	8700	8255	19.55	AN+	300	240	135	0.00	0.00	375	5.00	6250	5875	11.96	820	14950	14130	18.23
												AN*	0.00	0.00	0.00	0.00	0.00	0.00	4.05	5063	5063	4.05	445	5063	4618	11.38
	UF1	150	285	45	20	70	400	10.98	13725	13325	34.31	UF1+	150	285	45	0.00	0.00	330	11.01	13763	13433	21.99	730	27488	26758	37.65
												UF1*	0.00	0.00	0.00	0.00	0.00	0.00	10.02	12525	12525	10.02	400	12525	12125	31.31
	UF2	200	380	45	20	70	495	14.99	18738	18243	37.85	UF2+	200	380	45	0.00	0.00	425	17.02	21275	20850	32.01	920	40013	39093	43.49
												UF2*	0.00	0.00	0.00	0.00	0.00	0.00	15.75	19688	19688	15.75	495	19688	19193	39.77
	UF3	250	475	45	20	70	590	8.96	11200	10610	18.98	UF3+	250	475	45	0.00	0.00	520	17.08	21350	20830	26.04	1110	32550	31440	29.32
												UF3*	0.00	0.00	0.00	0.00	0.00	0.00	13.02	16275	16275	13.02	590	16275	15685	27.58
	UF4	300	570	45	20	70	685	10.97	13713	13028	20.02	UF4+	300	570	45	0.00	0.00	615	9.02	11275	10660	19.99	1300	24988	23688	19.22
												UF4*	0.00	0.00	0.00	0.00	0.00	0.00	8.01	10013	10013	8.01	685	10013	9328	14.62
	mean	240.00	390.00	63.00	20.00	70.00	523.00	10.57	13215.00	12692.00	24.14	mean	240.00	390.00	63.00	0.00	0.00	453.00	11.00	13747.50	13521.00	16.28	749.50	20355.00	19605.50	27.26

Yield increase= the difference between yield of the treatment and the yield of control

Net return= gross return - total cost

Gross retun= value of yield increase (in terms of money)

Investment factor= gross return (L.E.)/ total cost (L.E.)

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إنتاجية ونوعية وربحية أشجار المشمش المسمدة باليوريافورم

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أجرى العمل التجريبى لهذه الدراسة فى مزرعة خاصة فى منطقة الخطاطبة بمحافظة المنوفية خلال ثلاث سنوات متعاقبة (٢٠٠٤، ٢٠٠٥، ٢٠٠٦) لتقييم تأثير سماد اليوريافورم بطئ الذوبان مقارنة بالأمونيوم نيترات كسماد تقليدى وأيضاً تقييم أداءهما عند استخدام السماد البلدى وذلك على محصول وصفات الجودة للمشمش صنف كانينو، بالإضافة الى تقدير العائد الإقتصادى. استخدمت اليوريافورم بالمعدلات ٦٠، ٨٠، ١٠٠، ١٢٠ كجم نيتروجين/ فدان مقابل معدل ١٠٠ كجم نيتروجين/ فدان (معدل التوصية) بالإضافة الى معاملة الكنترول (بدون تسميد). وقدرت الصفات الطبيعية (ارتفاع، قطر، شكل، وزن الثمرة ، وكذلك وزن اللب والنواة) وكذلك الصفات الكيميائية (المواد الصلبة % , الحموضة % , النسبة بين المواد الصلبة والحموضة، النسبة المئوية للعناصر الكبرى فى الأوراق والثمار) وكذلك المحصول ومكوناته (عدد الثمار/ شجرة، المحصول/ شجرة، محصول الفدان).

وأظهرت النتائج أن سماد اليوريافورم كان له غالباً أثر موجب على الخواص المدروسة وكذلك المحصول. أيضاً لوحظ ارتفاع القدرة الاستهلاكية لنيتروجين اليوريافورم مقارنة بالأمونيوم نيترات الأمر الذى يقلل من النيتروجين المفقود وينعكس إيجابا على البيئة. كما اقترحت النتائج أن المعدل ١٠٠ كجم نيتروجين/ فدان/ سنة فى حالة عدم إضافة السماد البلدى والمعدل ٨٠ كجم نيتروجين/ فدان/ سنة فى حالة إضافة السماد البلدى هما أمثل المعدلات للتوصية باستخدامهما وقد أيد ذلك نتائج الدراسة الاقتصادية حيث أعطيا أعلى عائد وأعلى معامل استثمار.