Misr J. Ag. Eng., 24(1): 88-102 IRRIGATION AND DRAINAGE

EFFECT OF SUPPLEMENTAL IRRIGATION AND INTERCROPPING TREATMENTS ON THE PRODUCTIVITY OF FIG TREES AND LENTIL CROP IN THE NORTH WEST Coast

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ABSTRACT

A field experiment was carried out during the two winter seasons of 2004/2005 and 2005/2006 in a private farm at El-Geefera village, Foka area, Marsa Matrouh Governorate. Egypt, to represent the rainfed conditions of the North West coast. The main objectives of the study were to test the effect of supplemental irrigation and intercropping technique on the productivity of fig trees (Ficus- carica) and lentil crop (Lens culinanris Medik.). A split plot statistical design with three replicates was used to conduct the experiment. Three irrigation treatments (rainfall (R), rainfall + one supplemental irrigation (SI_1), and rainfall + two supplemental irrigations (SI_2)) represented the main plots. Two intercropping treatments (fig tress + lentil crop (P_1), and fig tress only (P_2)) represented the sub-plots. Lentil crop (var. Sinai 1) was used in this experiment. For supplemental irrigation, a drag-hose sprinkler system was properly designed to meet the constraints that is found in the site as well as farmer's needs and used for applying irrigation water.

Results showed that, in the 1st season, the total water applied to lentil crop were 164.06, 224.06, and 294.06 mm/season for the rainfall, one supplemental irrigation, and two supplemental irrigations, respectively. While in the second season, the same values were 184.35, 259.35, and 319.35 mm/season for the same respective treatments. Results showed significant differences between seed yields obtained from each treatment during the two growing seasons. In the 1st season, seed yield values for the SI_2, SI_1, and R treatments were 509.2, 497.3, and 294.8 kg/fed, respectively.

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In the 2nd season, seed yield values for the same treatments were 558.8, 526.1, and 303.0 kg/fed, respectively. For straw yield, a similar trend was obtained. Straw yields for SI_2 and SI_1 treatments were 94.7 and 72.8% which were higher than that obtained from the rainfall treatment in the 1st season. Straw yields for the same treatments were 85 and 73.6% which were more than that of rainfall treatment during the second season. The same effect was also noticed in the yield component parameters. Water utilization efficiency (WUtE) values for lentil crop in the 1st season were 0.412, 0.528 and 0.428 kg seeds/m^3 for the SI_2, SI_1, and R treatments, respectively, while the values were 0.417, 0.483, and 0.391 kg seeds/m^3 in the 2nd season for the same respective treatments.

For fig trees, results showed that introducing supplemental irrigation resulted in a significant increase in fig yield as compared to that obtained under rainfed conditions only. Fig yields for the SI_2 and SI_1 treatments were 10.8 and 6.0% higher than that of the rainfall treatment in the 1st season. While fig yields for the same treatments were 9.5 and 3.4% higher than that of the R treatment in the 2nd season.

From the obtained results it could be concluded that: introducing supplemental irrigation in the North West coast area resulted in significant increases in lentil and fig yields, introducing the intercropping technique resulted in maximizing the use of unit land, and cultivating leguminous crops with low crop water requirements (e.g., lentil) improve the fertility build-up in the soils of the North West coast and increase yields even under rainfed conditions.

INTRODUCTION

Water is the major constraint to expand the agricultural area in Egypt which is essential to tighten the country's food gap. The optimum utilization and good management of the present water resources represent direct efforts towards minimizing water losses and raising the efficiency of water use. One way to achieve the above mentioned goals is the employment of modern irrigation systems (e.g., drip and sprinkler systems) especially in the newly reclaimed sandy soils (Abu-Zaid, 1995).

The North West coast land in Egypt extends for about 550km from Alexandria to El-Saloum with inland depth varies from 2 to 35km from the Mediterranean Sea. This coastal strip receives annually about 150–250mm of rain. The rainfall season starts from October until March with about 75% of the precipitating rainfall occurs during the period from November to February. Number of rainy days is about 25 days in the area east of Matrouh, 42 days in the area west of Matrouh and 32 days at El-Saloum area. The most of precipitation is light to medium and the number of heavy rainfall days (10 mm/day) doesn't exceed 4 days (Salem, 1994).

Supplementary irrigation is the application of water to plant when natural precipitation is not adequate to secure crop production. Depending on the size of the farm and type of irrigation system, application of water is possible by using modern power sources from deep well pumps and storage of large quantities of water in reservoirs, ponds, streams and river. City water is also often used directly by small farmers who use drip irrigation for their vegetable gardens. Under the climatic conditions of the North West coast, supplementary irrigation during rain stopped-spell periods is essential to secure crops production, increase yield and improve crop quality. If water shortage occurs early in crop development stage, maturity may be delayed and yield could be reduced significantly. Similarly if moisture shortage occurs later in the growing season, quality is often reduced even though total yields are not affected (Ghebreiyessus, 1999). The sprinkler system offers a great application potential as a highly efficient irrigation system, which improves crop yield and quality and uses less water and which makes it suitable system for supplemental irrigation.

Where it is not easy to bring more land into cultivation, intercropping is considered as an important way to increase the yield of unit area especially in developing countries. Sanchez (1976) pointed out that intercropping generally produces more total yield of mixed crops per hectare than when the individual crops are grown single-stand and that increase varies from 20 to 50% more yield per hectare as commonly obtained by intercropping annual crops.

Fig tree is an attractive fruit crop for arid zones because of its tolerance to water deficit. However, there is very little information about its water requirements. Tapia et, al. (2006) conducted a trial to determine the response of 4th leaf fig trees, in six varieties, to four irrigation rates in relation to estimated crop evapotranspiration (ETc) based on "Class A" pan evaporation data. They found that it's possible to irrigate 3-year old fig trees with 220 mm/year (2,200 m^3/ha-year).

Lentil crop has a very low requirement of water. Ismail (2002) showed that the water requirements for lentil crop in Lower Egypt is equal to 318 mm for the total growing period. He pointed that the water requirement for the initial stage (15 to 30 days) equals to 14.4 mm, the development stage (30 to 45 days) equals to 90 mm, the mid season stage (30 to 50 days) equals to 45 mm, the late–season stage (20 to 30 days) 85mm, and at harvest 35.9mm. He also pointed that crop coefficient (Kc) equals to 0.3 at initial stage, and 1.1 at development stage and 0.3 at harvest stage. Snyder et, al. (2002) found that crop coefficient (Kc) equals to 1 at mid stage and 0.3 at end of the season. Guy (2006) stated that the values of lentil crop coefficients for initial, mid season and late season at harvest equal to 0.3, 1.15 and 0.25, respectively.

The main objectives of this research are to:

1. Test the effect of supplemental irrigations on the productivity of fig trees and lentil crop.
2. Test the effect of intercropping technique of fig/lentil crops on their productivity.

MATERIALS AND METHODS

Experimental site:

A field experiment was conducted in 2004/2005 and 2005/2006 winter seasons in a private farm at El-Geefera Village, Foka area, Marsa Matrouh Governorate, Egypt. The farm is located 20km from El-Dabaa city and 5km to the south of Alexandria–Matrouh main road. Soil samples were collected from different locations at the farm from soil surface down to 0.6m depth. The samples were analyzed for mechanical analysis, bulk density, hydro-physical parameters, pH, electrical conductivity (EC), and soluble cations and anions. Results of the soil analysis are presented in Tables 1 and 2.

Table 1. Some physical properties of the soil at the experimental site.

Soil depth (cm)	Particle size distributions (%)			Soil texture class	Bulk density (gcm^{-3})	W.P. (%)	F.C. (%)	Available Water (%)
	Sand	Silt	Clay					
0 – 30	79.20	15.1	6.2	Sandy loam	1.23	12.6	23.3	10.7
30–60	78.70	14.2	6.6	Sandy loam	1.28	12.4	23.7	11.3

Table 2. Some chemical properties of the soil at the experimental site.

Soil depth (cm)	pH (1:2.5)	EC (dS/m)	O. M	Ca CO_3	Soluble cations (meq/l)				Soluble anions (meq/l)			
					Ca^{+2}	Mg^{+2}	Na^{+}	K^{+}	CO_3^{-2}	HCO_3^{-}	SO_4^{-2}	Cl^{-}
0–30	8.40	6.28	-	50.40	9.00	7.20	47.80	2.06	-	1.5	14.50	50.50
30–60	8.01	6.43	-	51.20	9.31	7.40	46.90	2.00	-	1.5	14.30	49.70

Irrigation system:

For supplementary irrigation, an optimum design for the system of irrigation that meets the constraints found in the site and farmer's needs was selected. The most convenience system design was the hose–drag sprinkler irrigation. The system's main components were as follows:

1) A water reservoir at a highest point in the farm connected to the head control by 75 mm diameter (OD) PVC pipe.
2) A simple head control unit includes electrical centrifugal pump of 1.5HP was used to provide sufficient water discharge that ranged from 3.0 to 12 m^3/h and a pressure head of 3.2 bar at the regulating valves (shut–off, non-return and flow meter).
3) Main line: by 75 mm diameter (OD) PVC pipe.
4) Sub-main line: 63mm diameter (OD) PVC pipe, with distance of 12 and hydrants (2 in) were located along the manifolds at the same wide spacing as the sprinkler laterals (12m) and coupled with flexible hoses of 25mm diameter and 14m length. The flexible hoses fitted with the sprinklers.

5) Sprinkler of RC 160 "Derlin" full circle moving part type, a low size intermediate pressure double nozzle (Φ 4.4 X 2.5 mm) with discharge of 1.3 m^3/h at 3.0 bar mounted on tripod stands 0.6m height.

Water distribution uniformity measurements (C_u):

The measurements were done by distributed catch cans in a grid system of 2 X 2 meters with sprinklers at the corners. The distance between sprinklers was 12 x 12m.

The distribution uniformity test lasted half an hour under the operating pressure. At the end of each run, the volume of water collected in each can was measured by means of graduated cylinder. The distribution uniformity was calculated according to the following equation:

$$Cu = \left[1 - \frac{\sum_{i=1}^{n} \left\| X_i - \bar{X} \right\|}{n.\bar{X}} \right] \times 100 \qquad \text{(Christiansen, 1942)}$$

Where X_i = water depth collected by catch can i; $\bar{X}$ = mean water depth collected in all catch cans; n = number of catch cans.

Discharge efficiency (E_d):

The relationship between water collected by catch cans and water discharged by sprinklers represents the discharge efficiency. It was calculated according to the following relation:

$$E_d = \frac{mean\ water\ depth\ observed}{mean\ water\ depth\ discharged} \times 100 \qquad \text{(Montero et, al. 2004)}$$

Weather data:

Standard weather data for the experimental site including air temperature (T_{air}, °C), relative humidity (RH, %), wind speed (U, ms^{-1}), sunshine hours (h/day), and rainfall (mm/month) were obtained from the Egyptian weather authority and were used to calculate the potential evapotranspiration (Et_o) values according to Penman-Montieth method (Tab. 3).

Effective rainfall:

The effective rainfall during growing seasons was calculated according the relation suggested by the U.S. Bureau or Reclamation (Smith, 1992). Effective rainfall is calculated according to the following equation:

$$\text{Peff} = \text{Ptot}\,(125 - 0.2\,\text{Ptot})/125 \quad \text{for Ptot} < 250\text{mm, and}$$

$$\text{Peff} = 125 + 0.1\,\text{Ptot} \qquad\qquad \text{for Ptot} > 250\text{mm}$$

where:

Peff = effective rainfall, and

Ptot = total rainfall

Water utilization efficiency (W.Ut.E.):

Water utilization efficiency was calculated for lentils crop according to Doorenbos and Pruitt (1975) as:

$$WUtE = \frac{Y_s}{W.a}$$

Where:

Ys = seed yield (kg)

W.a = water applied (m^3)

Table (3). Meteorological data and potential evapotranspiration values for the two experimental seasons.

Month	T_{mean} (^oC)	RH_{mean} (%)	U (m/sec)	S.S (h/day)	Rainfall (mm/month)	Eto (mm/month)
Nov.	20.6	80	2.56	5.3	42	76
2004	14.3	84	1.45	6.6	16	70
Dec.	15.1	78	1.96	5.8	65.5	85
Jan.	14.3	82	2.51	6.8	23	88
2005	17.1	76	2.42	8.0	24.5	97
Feb.	18.5	77	2.81	8.5	5	128
Mar.						
Apr.						
Total					176	544
Nov.	18.6	77.7	1.76	6.4	21	74
2005	15.5	84.1	2.35	5.7	49	70
Dec.	13.45	85.3	3.01	4.0	110	77
Jan.	14.53	79.3	2.94	6.1	18	85
2006	17.1	75.9	2.11	8.3	6	96
Feb.	20.3	77.1	2.78	8.7	10	126
Mar.						
Apr.						
Total					214	528

Soil water relations:

The amount of water applied per irrigation was calculated and the time of irrigation was calculated according to the following equation:

$$T = \frac{Et_o \times K_c}{I_a \times E_a (1 - LR)} \times I_n$$

where:

T = irrigation time (h).

Et_o = potential evapotranspiration (mm/day).

K_c = crop coefficient for lentils crop.

E_a = irrigation efficiency (%) = 77% (determined for the hose–drag sprinkler at the experimental site).

LR = leaching requirement = 10% of total amount water delivered.

I_a = precipitation rate (mm/h).

I_n = irrigation intervals (day).

For this study, lentil crop coefficient (Kc) values of 0.3, 1.15, and 0.25 for initial, mid season, late season and harvest, respectively were used. Snyder et, al. (2002)

Lentil cultivation and cultural practices:

Lentil seeds (variety Sinai 1) were sown at the rate of 60 kg seeds per fadden on November 19 and 23, and plants were harvested in the 3rd week of April in the 1st and 2nd seasons, respectively. Before cultivation, seed bed was prepared by plowing the soil twice by the chisel plough at depth ranged between 20 and 30cm. The plowing was perpendicular to land slop to confine the precipitation, prevent the runoff and improve rainfall penetration inside the soil. Due to postponement of the rainfall season, the seeds were soaked in water for 4 hours then water was snatched away and seeds were existed in for 2 hours to emanate the primary root and seeds were dispersed on the soil and were covered by chisel blade plow. At harvest time, lentil yield and yield components (number of pods per plant, number of seeds per pod and weight of 1000 seeds) and straw yield were recorded.

During the 1st season the precipitation was not enough as compared to the 2nd season, therefore after harvesting lentil crop, the fig trees inside the supplemental irrigation treatment were irrigated two times with sprinkler irrigation system until the picking of fig fruits. Fig yields were evaluated for every tree at summer seasons.

Experimental design and statistical analysis:

A split-plot experimental design with three replications was used. Three different irrigation treatments represented the main plots. The irrigation treatments were: (R) rainfall, (SI1) rainfall + one supplemental irrigation, and (SI2) rainfall + two supplemental irrigations. Two intercropping treatments represented the sub-plots. The two treatments were: (P1) fig trees + lentil crop, and (P2) fig trees only. The experimental plot equals 252 m2 (42m length × 6m width), with figs trees cultivation (6×6m).The data were analyzed using the CoHort Software (1986) statistical package. Average values from the three replicates of each treatment were interpreted using the analysis of variance (ANOVA). The Duncan's Multiple Range Test (SNK) was used for comparisons between different sources of variance as suggested by Steel and Torrie (1980).

RESULTS AND DISCUSSION

1.Lentils yield and yield components:

Monthly and seasonal water applied by sprinkler system as well as the effective rainfall (P_{eff}) to the lentil crop in the 2004/2005 and 2005/2006 growing seasons are presented in Table (4) and figure (1). Results showed that water applied as supplemental irrigations represented 26.8 % (SI_1) and 44.2% (SI_2) of the total water applied in the 1st growing season. While in the 2nd season, the same respective values were 27% and 50.1% of the total water applied. Results showed that the total water applied to lentil crop was 163.96, 223.96, and 293.96 mm/season for the rainfall (R), one supplemental irrigation, and two supplemental irrigation treatments, respectively. While in the second season, the same values were 189.35, 259.35, and 319.35 mm/season for the same respective treatments. The water applied under experimental conditions was in close agreement with the water requirements of 318mm/season for lentil crop grown at Lower Egypt as reported by Ismail (2002).

Table (4). Monthly and total water applied to the lentil crop during the 2004/2005 and 2005/2006 growing seasons.

	R			SI_1			SI_2		
	P_{eff} (mm)	I (mm)	Total (mm)	P_{eff} (mm)	I (mm)	Total (mm)	P_{eff} (mm)	I (mm)	Total (mm)
Nov. 2004	39.18	0	39.18	39.18	0	39.18	39.18	0	39.18
Dec.	15.59	0	15.59	15.59	0	15.59	15.59	0	15.59
19 Dec.	0.00	0	0.00	0.00	60	60.00	0.00	60	60.00
Jan. 2005	58.54	0	58.54	58.54	0	58.54	58.54	0	58.54
Feb.	22.15	0	22.15	22.15	0	22.15	22.15	0	22.15
Mar.	23.54	0	23.54	23.54	0	23.54	23.54	0	23.54
23 Mar.	0.00	0	0.00	0.00	0	0.00	0.00	70	70.00
Apr.	4.96	0	4.96	4.96	0	4.96	4.96	0	4.96
Total	163.96	0	163.96	163.96	60	223.96	163.96	130	293.96
Nov. 2005	20.29	0	20.29	20.29	0	20.29	20.29	0	20.29
Dec.	45.16	0	45.16	45.16	0	45.16	45.16	0	45.16
Jan. 2006	90.64	0	90.64	90.64	0	90.64	90.64	0	90.64
Feb.	17.48	0	17.48	17.48	0	17.48	17.48	0	17.48
28 Feb.	0.00	0	0.00	0.00	70	70.00	0.00	70	70.00
Mar.	5.94	0	5.94	5.94	0	5.94	5.94	0	5.94
19 Mar.	0.00	0	0.00	0.00	0	0.00	0.00	90	70.00
Apr.	9.84	0	9.84	9.84	0	9.84	9.84	0	9.84
Total	189.35	0	189.35	189.35	70	259.35	189.35	160	319.35

The effect of tested treatments on lentil yield, yield components (number of pods per plant, number of seeds per pod, seed yield per plant, and weight of 1000 seeds) and straw yield are shown in Table (5). Results showed a significant effect of the supplementary irrigation treatments on all measured parameters as compared to the effect of rainfall treatment on the same parameters in the two seasons.

Results showed significant differences between seed yields obtained from each treatment during the two growing seasons. In the 1st season, seed yield values for the SI_2, SI_1, and R treatments were 509.2, 497.3, and 294.8 kg/fed, respectively. In the 2nd season, seed yield values for the same treatments were 558.8, 526.1, and 303.0 kg/fed.

For straw yield a similar trend was obtained. Straw yields for SI_2 and SI_1 treatments were 94.7 and 72.8% higher than that obtained from the rainfall treatment in the 1st season. Straw yields for the same treatments were 85 and 71.2% more than that of rainfall treatment during the second season.

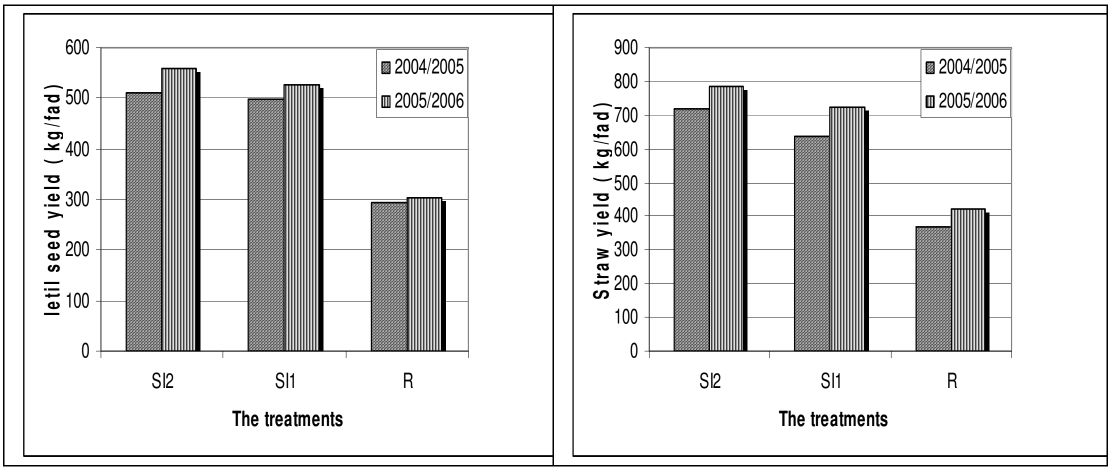
The highest number of pods/plant, number of seeds/pod, seed yield/plant, and 1000 seeds weight were obtained from the SI_2 treatment in both seasons. The values of the same parameters were significantly less under the rainfall treatment.

Results showed, on average, that the obtained yields in the second growing season were about 7% more than that of the 1st season indicating the importance of cultivating a leguminous crop (lentil under experimental condition) to improve the fertility of the soil, even under rainfed conditions, at the north west coast area.

Table (5). The effect of tested variables on lentil yield, yield components, and straw yield during the two growing seasons.

Treatment	Seeds yield (kg/fed)	Straw yield (kg/fed)	Number of pods/plant	Number of seeds/pod	Seeds yield (g/plant)	Weight of 1000 seeds (g)
2004/2005						
SI_2	509.2 a	717.4 a	74.78 a	1.86 a	2.55 a	40.62 a
SI_1	497.3 b	636.6 b	73.11 a	1.84 a	2.46 b	39.34 a
R	294.8 c	368.5 c	51.10 b	1.24 b	1.37 c	33.40 b
L.S.D 0.05	6.645	38.74	2.67	0.134	0.074	1.50
2005/2006						
SI_2	558.8 a	783.6 a	86.17 a	1.86 a	2.60 a	42.20 a
SI_1	526.1 b	725.1 b	83.42 b	1.84 a	2.56 a	40.08 b
R	303.0 c	423.6 c	53.45 c	1.53 b	1.44 b	33.02 c
L.S.D 0.05	16.29	42.31	2.64	0.264	0.0629	0.707

Fig. (1) Effect of irrigation treatments on lentil seed and straw yield



2.Water utilization efficiency (W.Ut.E.):

Water utilization efficiency (WUtE) values regarding lentil seeds were calculated and their values as in figure (2) during the 1st season were 0.412, 0.528 and 0.428 kg seeds/m^3 for the SI_2, SI_1, and R treatments, respectively. While the values were 0.417, 0.483, and 0.381 kg seeds/ m^3 in the 2nd season for the same respective treatments. From the obtained results, it is clear that supplemental irrigation increase the productivity per each millimeter of water added.

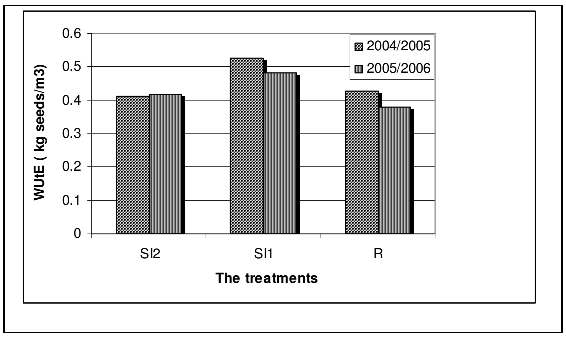


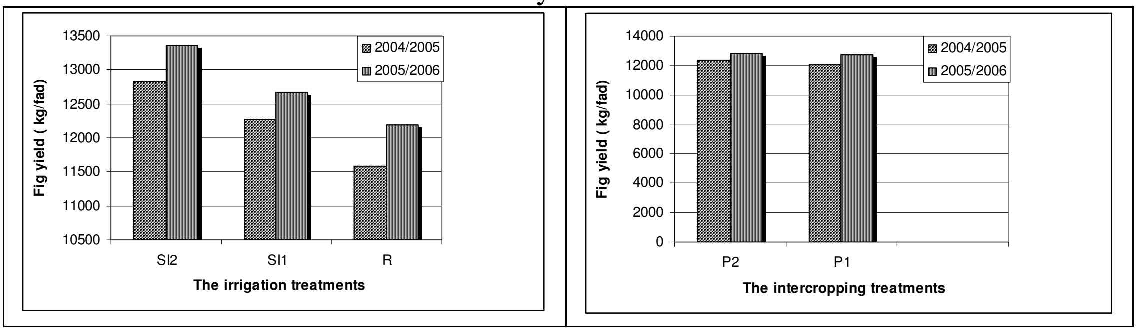
Fig (2) Water utilization efficiency (WUtE) for the irrigation treatments regarding lentil seeds

3. Fig yield:

Effect of supplemental irrigation and intercropping treatments on average fig yield in the two growing seasons is presented in figure (3). For fig trees, results showed that introducing supplemental irrigation resulted in a significant increase in fig yield as compared to that obtained under rainfed conditions only. Fig yields for the SI2 and SI1 treatments were 10.8 and 6.0% higher than that of the rainfall treatment in the 1st season. While fig yields for the same treatments were 9.5 and 3.4% higher than that of the R treatment in the 2nd season.

Results indicated also a general increase in fig yield under intercropping (fig/lentil) treatment in the two growing seasons with a significant increase in the 1st season only.

Fig (3) Effect of irrigation and intercropping on treatments fig yield



CONCLUSIOS

From the obtained results it could be concluded that:

1- Introducing supplemental irrigation in the North West coast area resulted in significant increases in lentil and fig yields as well as improving the use of each unit of applied water.

2- Introducing the intercropping technique resulted in maximizing the use of unit land.

3- Cultivating leguminous crops with low crop water requirements (e.g., lentil) improve the fertility build-up in the soils of the North West coast and increase yields even under rainfed conditions.

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الملخص العربي

تأثير معاملات الري التكميلي والتحميل علي انتاجية أشجار التين ومحصول العدس بالساحل الشمالي الغربي

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اجريت تجربة خلال موسمي الشتاء ٢٠٠٥/٢٠٠٤ و ٢٠٠٦/٢٠٠٥ بمنطقة تمثل الظروف المطرية بالساحل الشمالي الغربي، في مزرعة خاصة بقرية الجفيرة بمنطقة فوكة - محافظة مطروح - مصر. الهدف الرئيسي للبحث هو اختبار تأثير تقنية الري التكميلي والتحميل علي

انتاجية اشجار التين ومحصول العدس (صنف سيناء ١). وكان التصميم الاحصائي للتجربة هو القطع المنشقة مرة واحده، فكا نت معاملات الري الثلاث (مطر فقط ، مطر +رية واحدة ، مطر + ريتين) في القطع الرئيسية ، اما معاملتي التحميل (عدس محمل تحت اشجار التين و اشجار تين بدون تحميل) بالقطع المنشقية. ولإجراء عملية الري التكميلي تم تصميم نظام ري بالرش متنقل بوصلات الخراطيم المرنة، يوائم ظروف قلة العمالة وندرة المياه ويلبي احتياجات المزارع وقليل التكلفة. وقد أوضحت النتائج مايلي:

اجمالي المياه المضافة للعدس هي ١٦٣,٩٦، ٢٢٣,٩٦ ، ٢٩٣,٩٦ مم خلال الموسم الاول لمعاملات مطر فقط ، مطر +رية واحدة ، مطر + ريتين علي التوالي، بينما كانت الكميه لنفس المعاملات علي التوالي خلال الموسم الثاني ١٨٩,٣٥، ٢٥٩,٣٥ ، ٣١٩,٣٥ مم. وقد اوضحت النتائج ايضا زيادة معنوية لمحصول العدس بمكوناته نتيجة اضافة الري التكميلي في الموسمين، و كانت قيم محصول الحبوب ٥٠٩,٢ ، ٤٩٧,٤ ، ٢٩٤,٣ كجم / الفدان في الموسم الاول للمعاملات مطر + ريتين، مطر +رية واحدة، مطر فقط علي التوالي، اما خلال الموسم الثاني فكانت النتائج هي ٥٥٨,٨ ، ٥٢٦,١ ، ٣٠٣ كجم / الفدان لنفس الماملات علي التوالي. وبالنسبة لمحصول القش فكانت الزيادة في نفس الاتجاة وكانت نسبة الزيادة في محصول القش ٩٤,٧ و ٧٢,٨% عن معاملة المطر فقط لمعاملتي مطر + ريتين، مطر +رية واحدة، وخلال الموسم الثاني كانت الزيادة لنفس المعاملات علي التوالي ٨٥ ، ٧١,٢% من معاملة المطر فقط. ووجدت زيادة معنويه في مكونات المحصول في نفس الاتجاه. واشارت النتائج الي وجود زيادة معنوية في محصول التين نتيجة لاضافة مياة الري التكميلي وكانت الزيادة بنسبة ١٠,٨ ، ٦% لمعاملتي مطر + ريتين ، مطر + رية واحدة في الموسم الاول بينما الموسم الثاني كانت الزيادة بنسبة ٩,٥ ، ٣,٤% لنفس المعاملات. بينما لم يكن هناك تأثير سلبي لتحميل العدس تحت اشجار التين بل كانت هناك زيادة معنوية خلال الموسم الاول وغير معنوية خلال الموسم الثاني..واشارت النتائج إلي اتجاه عكسي في كفاءة استخدام وحده المياة بالنسبه لمحصول العدس حيث اعطت معاملة المطر + رية واحدة اعلي كفاءة في الموسمين بلغت ٠,٥١٨ ، ٠,٤٨٣ كجم بذور/ م٣ ماء مضاف. ومن النتائج المتحصل عليها يمكن استخلاص الاتي:

الري التكميلي في الساحل الشمالي الغربي للمحاصيل المحملة تحت اشجار التين تؤدي الي زيادة في المحصولين المحصول المحمل (العدس) ومحصول التين وتعظيم الإستفادة من وحده المياه المضافة.

تقنية التحميل تحت اشجار التين تؤدي الي تعظيم استخدام وحدة المساحة من الارض وخاصة اذا زرعت بالمحاصيل البقولية ذات الاحتياجات المائية المنخفضة (مثال ذلك العدس) وخاصة ان المحاصيل البقولية تمتاز بخاصية تحسين خواص التربة البنائية والسمادية وزيادة المحاصيل المحمل عليها تحت الظروف المطرية.

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