FERTIGATION FOR IMPROVING PEA PRODUCTIVITY IN NEW RECLAIMED LANDS

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ABSTRACT

Field experiments were conducted during two successive growing seasons (2004&2005) at the Desert Farm of faculty of Agriculture, Ain Shams University, EL-Bustan Region, Beheira Governorate that presents sandy soil conditions. Experiments had been conducted based on a collaborative project with the Regional Council for Research and Agricultural Extension in order to clarify the role of fertigation technique in improving pea productivity under drip and sprinkler irrigation systems. Nitrogen fertilizers (Ammonium nitrate, 33% N) were applied through drip and sprinkler irrigation systems with three rates (30, 45 and 60 kg-N/fed) and 60 kg-N/ fed was added by using traditional method of fertilization (broadcasting) as control.

Results of this study may be revealed that:

1- Highest yield (2.46 ton/fed) was obtained under drip irrigation with sprinkler irrigation (1.98 ton/fed), by about 19.5% enhancement.

2- Water use efficiency under drip irrigation (2.69kg/m^3) was higher than that under sprinkler irrigation systems (1.65kg/m^3), by about 38.6% enhancement.

3- Total yield increased by 11.79 – 12.62% under fertigation technique comparing with the traditional method of fertilization (broadcasting) under drip and sprinkler irrigation system respectively.

4- Pea yield increased from (0.35 to 2.46 ton/fed) and from (0.26 to 1.98 ton/fed) with increasing fertigation rate from 30 to 60kg-N/fed under both drip and sprinkler irrigation systems respectively.

5- NPK concentration in pea seeds increased by increasing fertigation rate from 30 to 60kg-N/fed under both drip and sprinkler irrigation system, but the increase in NPK under drip irrigation was higher than that under sprinkler irrigation system.

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6- Cost of pea production unit under fertigation was lower than that when using traditional method of fertilization (broadcasting) by by 19.73% and 21.36%under drip and sprinkler irrigation systems at rate of 60kg-N/fed respectively.

INTRODUCTION

Pea is considered as one of the most important winter vegetable legume crops in Egypt. The annual cultivated area is estimated to be 57963 feddans amounting to 12.5% of the total vegetable area according to **Agricultural Statistics, (2005).**

Pressurized irrigation systems have been widely used for irrigating vegetables and other crops for high water and agro-chemicals use efficiencies to facilitate planting newly reclaimed areas with limited water sources in the desert without environmental problem, hazard and impact **(Bianchi et al, 1985; Chase, 1985 and Davies et al, 1993).**

Chemigation technique has been introduced to improve the application of agricultural chemicals via irrigation systems. Uniform application of such chemicals is necessary to insure considerable increase in vegetable production and real decrease in production costs **(Bhella and Wilcus, 1985; El-Gindy, 1988; Abuja et al, 1991 and Chandler et al, 1992).**

Bravdo and Hepner (1987) reported that availability of nitrogen, phosphorus, and potassium fertilizers was increased by fertigation and this was reffected in improved yields of grapes compared with broadcasting method. **El-Gindy (1988)** found that yield of tomato and cucumber was higher for fertigation than broadcasting methods. The increase in yield was 37% for tomato under drip fertigation and 22.2 and 53.2% for cucumber under sprinkler and drip fertigation techniques, respectively. **Hamdy (1991)** found that applying nitrogen fertilizers based on fertigation technique gave increase in tomato yield, which was nearly by 70% greater than that of the control (without fertilization) and the conventional nitrogen application treatments. This evidently, indicates that such a nitrogen concentration is below the level required to meet the tomato requirement of third element at different growing stages. **Goyal et al. (1995)** reported that the yield of eggplant and peppers was high under fertigation comparing with traditional method. These increases in yield were 27.6 and 22.4% for eggplant and peppers crops,

respectively**.** **Abdel-Aziz (1998**) found that injection the fertilizers through irrigation systems produced 23.41% more in potato yield than that the conventional method of fertilization.

The objective of this study was to improve pea productivity by using fertigation technique.

MATERIALS AND METHODS

1- MATERIALS

1-1- Experimental site:

Field experiments carried out in the Desert Farm of Faculty of Agriculture, Ain Shams University that presents sandy soil conditions, El-Bustan Region, Beheira Governorate. Experimental area was divided into two parts; the first part was equipped solid-set sprinkler irrigation system and it divided into18 plots (12.5x18m for each) meanwhile, the second part was with surface drip irrigation system and it divided into 18 plots (5x20m for each) as shown in Fig. (1).

Some physical properties of soil and some chemical analysis of soil and irrigation water were conducted according to standard procedures **(Black, 1982)** and represented in Tables (1 and 2).

Table (1): Some physical properties of sandy soil.

Sample depth	Particle Size Distribution %				F.C. %	W.P. %	B.D. g/cm^3	Texture Class
	C. Sand	F. Sand	Silt	Clay				
0-30	52.8	41.4	4.1	1.7	9.4	4.3	1.68	Sandy
30-60	50.0	43.5	5.0	1.5	8.5	4.4	1.57	Sandy

FC= field capacity; WP= welting point, FC and WP were determined as percentage in weight; Bd= bulk density; WHC= water holding capacity; CL= clay loam; S= sand.

1-2- Irrigation systems:

Two irrigation systems were equipped in this study as shown in Fig.(1).

- Sprinkler irrigation: The sprinklers are fixed at 12 x 12 m spacing (four sprinklers for each plot), they were 1.0 m^3/h discharge at 2.2 bar operating pressure for each and wetted diameter 22 m.
- Drip irrigation (line source): PE laterals of 16 mm (ID) in diameter with 0.75 m spacing between lines and 20 m length. Emitters built-in with discharge of 4 lph/50cm spacing at 1.0 bar operating pressure.

Table(2):Some chemical properties of Sandy Soil and irrigation water.

a) Soil										
Sample depth, cm	pH 1:2.5	Ec dS/m	Soluble Cations, meq/l				Soluble Anions, meq/l			
			Ca^{++}	Mg^{++}	Na^{+}	K^{+}	CO^{--}_3	HCO^{-}_3	SO^{-}_4	Cl^{-}
0-30	8.2	1.27	2.9	2.8	5.1	0.6	--	3.6	2.0	6.1
30-60	8.3	1.22	2.9	2.1	5.2	0.7	--	3.7	2.1	6.3

b) Irrigation water.									
pH	EC dS/m	Soluble Cations in meq/l				Soluble Anions meq/l			SAR
		Ca^{++}	Mg^{++}	Na^{+}	K^{+}	HCO^{-}_3	SO^{--}_4	Cl^{-}	
7.74	0.55	1.03	0.74	8.01	0.42	1.95	4.52	3.73	8.51

1-3- Irrigation requirement:

Water requirement for pea crop was calculated as follows:

- Water consumptive use was calculated according to the climatic data recorded at El-Bustan Weather Station. using the following formula **(Doorenbos and Pruit, 1977)**

Table 3: Reference climatologic data at Bustan site during months of evaluation (Agricultural climatologic profiles, 2004-2006).

Month	T_{max} (^{0}c)	T_{min} (^{0}c)	RH_{min} (%)	RH_{max} (%)	ETo mm/day
The first season					
November	23.6	12.1	94.6	46.6	2.7
December	20.4	8.3	90.1	40.1	2.1
January	18.7	7.7	88.6	37.2	1.9
February	19.5	8.2	84.7	31.7	2.5
The second season					
November	25.1	13.9	87.5	38.1	2.3
December	21.9	10.6	88.7	41.9	1.8
January	20.2	9.24	89.4	41.4	2.1
February	21.2	9.3	89.2	37.4	2.5

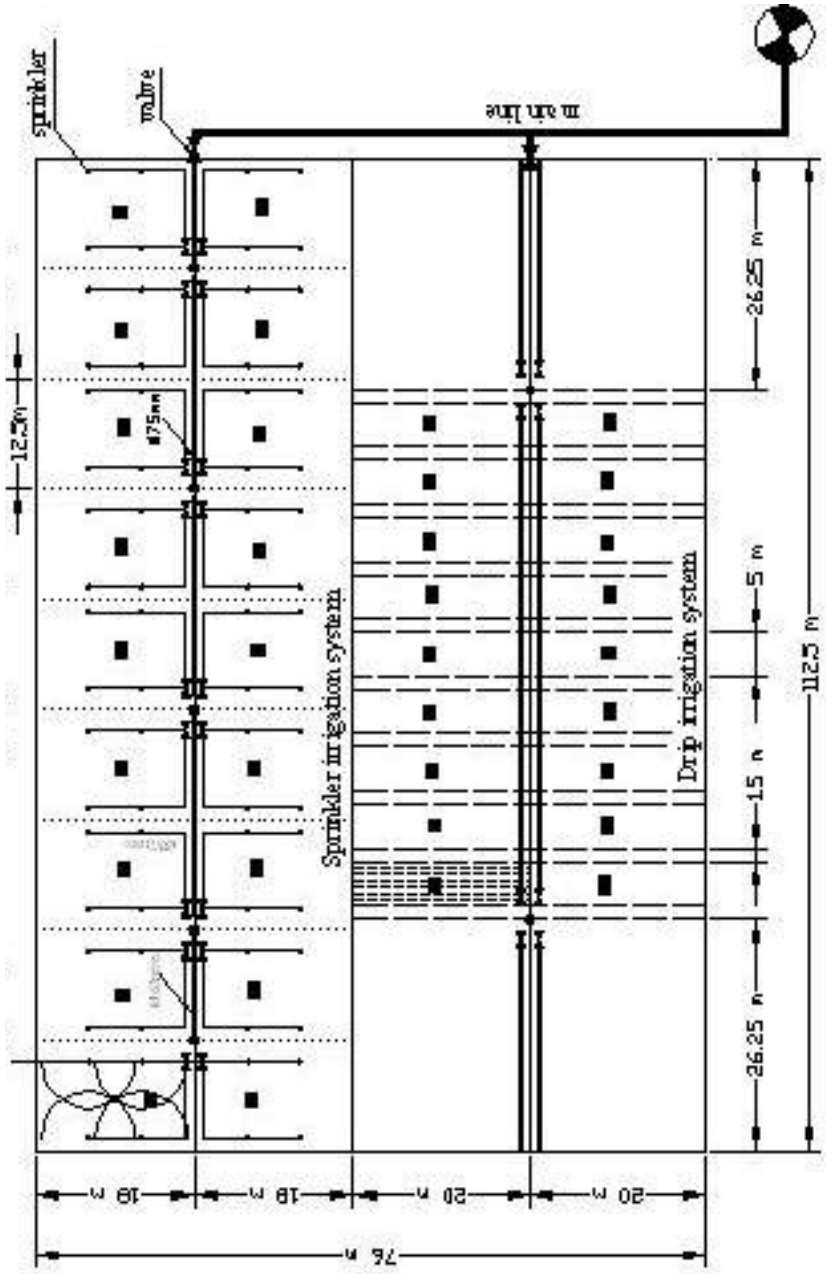

Fig. 1: Layout of drip and sprinkler irrigation systems

A crop coefficient value for pea crop was used according to the different growth stages of crop are presented in Table 4 **(FAO, 1984).**

Table 4: Reference values for crop coefficient for pea crop at different stages of growth

Growth stage	Initial	Crop Development	Mid season	Late season
Duration (days)	20	30	35	15
Crop coefficient (Kc)	0.45	0.80	1.15	0.3

$$ET_{crop} = ET_0 x K_c \quad \text{.....(1)}$$

ET_{crop}= Crop water consumptive use, mm/day,

ET_0 = Reference evapotranspiration, mm/day, and

Kc = Crop coefficient.

- Estimating of water requirements from the following equation:

$$WR = ET_{crop} * I(1 + LR) * 4.2 \quad \text{.....(2)}$$

Where:

W.R = Water requirement, m^3/fed, and

L.R = Leaching requirement, % and equal Ec_i /2 Ec_d,

1-4- Agricultural Practices:

a- Soil-bed preparation by ploughing of the soil two times using chisel plow with added $10m^3$ of fertilizer manure.

b- Add 250kg/fed of super phosphate, 15.5% P_2O_5 during soil-bed preparation.

c- Soil planning (furrow every 0.75 meter).

d- Pea seeds (Master-B) were planted on the, **17th Nov., 2004 and 10th Nov., 2005**.

2- Treatments:

a- irrigation treatments:

- Sprinkler irrigation system.
- Drip irrigation system**.**

b- Fertilization treatments:

- Traditional method of fertilization (broadcasting) using the recommended rate (60kg-N/fed). This amount was divided into three doses.
- Ferigation technique (venturi tube 1.5″ inlet and outlet) through irrigation systems with three rates of fertilization are: 100, 75 and 50% of recommended rate or (60, 45 and 30 kg-N/fed respectively, in form of ammonium nitrate, 33%N). These amounts of fertilizers were divided into 10 doses and applied injecting with irrigation water during the growing season.

3- Measurements and calculations:

3-1 - Plant measurements:

At harvesting total pea yield in ton per feddan was estimated for each treatment.

a - Plant height,cm.

b- No. of pods/ plant

c- Weight of pod, g/plant.

d- Total yield, ton/fed.

3-2- Determine the residual effect of the applied fertilizers (NPK) in the pea fruits.

3-3- Determine water use efficiency (WUE):

It was calculated according to the following equation (**Pene and edi, 1996**):

$$\text{WUE}\,(\text{kg/m}^3) = \frac{\text{Total yield}\,(\text{kg/fed})}{\text{Total applied water}\,(\text{m}^3/\text{fed})} \quad \text{.....(3)}$$

3-4- Determine fertilizer use efficiency (FUE):

It was calculated according to the following equation:

$$\text{FUE}\,(\text{kg/}k\text{g}) = \frac{\text{Total yield}\,(\text{kg/fed})}{\text{Total applied nitrogen}\,(\text{kg/fed})} \quad \text{..... (4)}$$

3-5- Cost analysis.

Fertigation costs = Irrigation cost + fertilization cost

A - Irrigation costs:

Capital cost for different irrigation systems and chemical application were calculated using current dealer prices (2005) for equipment and installation according to **Worth and Xin, (1983)** .

B- Fertilization cost:

Fertilization of pea crop carried out by fertigation system through irrigation water or traditional method of fertilization (broadcasting). Fertilization cost was calculated as follows:

$$Fr = (wf * \Pr) + Ac \text{.....(5)}$$

Where:

Fr = Fertilization cost, LE/fed.

Wf = Amount of fertilizers, kg/fed.

Pr = Fertilizers price, LE/kg

Ac = Application cost of fertilizers, LE/Fed.

RESULTS AND DISCUSSION

1-Effect of Fertigation treatments and irrigation method on growth parameters:

Data are illustrated in Figs. (2) indicate that there were not significantly effect to irrigation methods on the plant height, number of branches/plant and number of pods /plant.

Data are illustrated in Figs. (3) indicate that the plant height, No. of branches/plant and No. of pods/plant increased significantly by increasing fertigation rate from 30 to 60kg-N/fed under both drip and sprinkler irrigation systems.

Data are illustrated in Figs. (4) indicated that there was not significantly effect to fertilization method on the plant height, No. of branches/plant and No. of pods/plant.

2-Effect of fertigation treatments and irrigation methods on total yield:

Fig.(5) indicated that the pea yield increased from 0.36 to 2.46 ton/fed with increasing fertigation rate from 30 to 60 kg-N/fed under drip irrigation, while it increased from 0.26 to 1.98 ton/fed under sprinkler irrigation system.

Fig. (5) shows that drip irrigation system produced higher Pea yield compared to sprinkler irrigation system. In general, the highest yield of pea was obtained when using drip irrigation (2.46 ton/fed) by 19.5% compared to sprinkler irrigation (1.98 ton/fed). An increase in the yield under drip irrigation may be attributed to the short irrigation in case of drip irrigation which lead to the moisture content of the top layer of soil

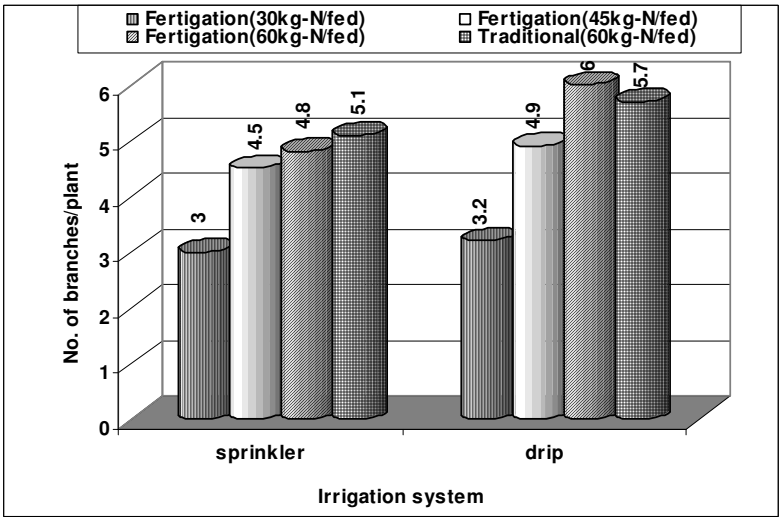

Fig.2 : Effect of fertilization treatments on plant height under drip and sprinkler irrigation systems (mean of two seasons).

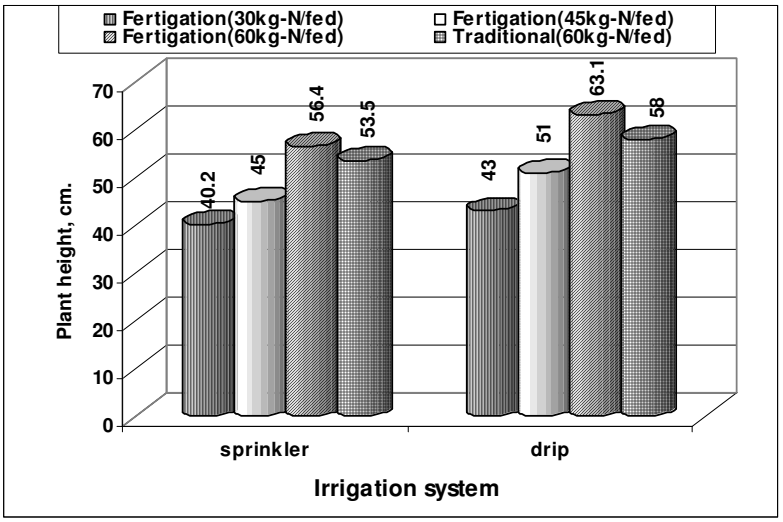

Fig. 3 : Effect of fertilization treatments on number of branches/plant under drip and sprinkler irrigation systems (mean of two seasons).

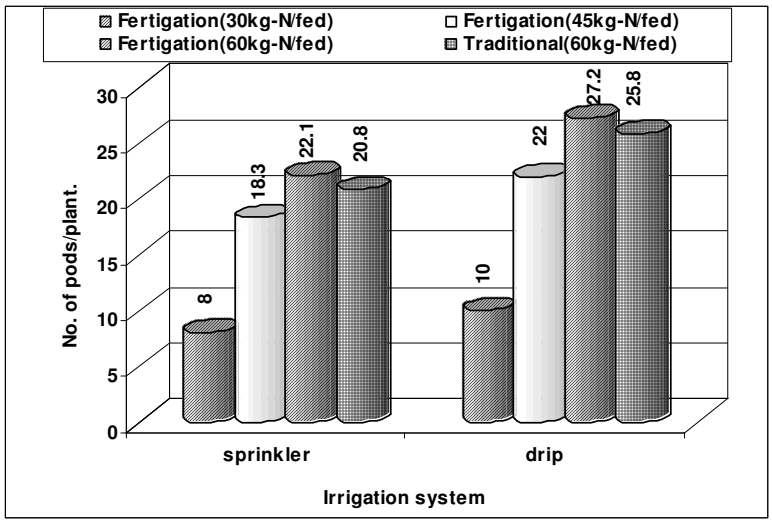

Fig. 4 : Effect of fertilization treatments on No. of pods per plant under drip and sprinkler irrigation systems (mean of two seasons).

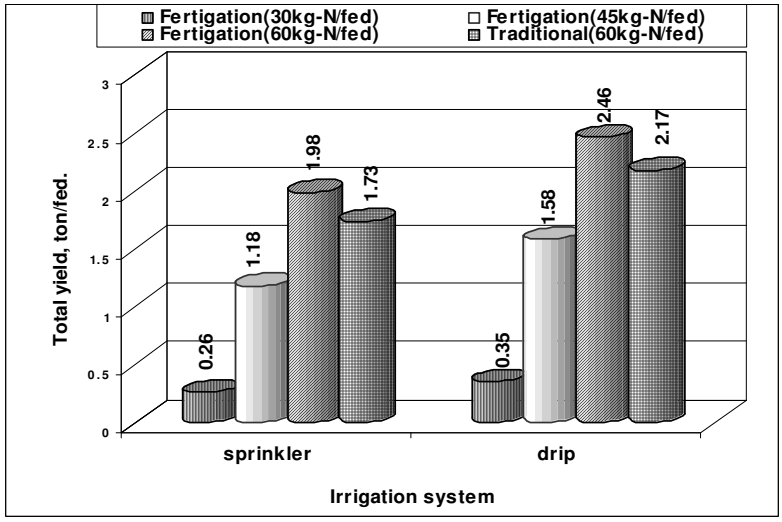

Fig. 5 : Effect of fertilization treatments on total pea yield under drip and sprinkler irrigation systems (mean of two seasons).

was higher in the drip irrigation fields than under sprinkler irrigation **(El-Gindy, 1988).**

Pea yield data illustrated in Fig. (5) indicated that the total yield increased by 11.79 – 12.36% under fertigation method comparing with the tradittional method of fertilization (broadcasting) under drip and sprinkler irrigation system respectively. The increase in yield may be due to the drip fertigation as attractive concept, as it permits application of nutrients directly at the site of a high concentration of active roots and as needed by the pea plants. However, following application through drip irrigation, mineral nutrients move into the wetted volume in a manner consistent with the flux of the water in the soil **(Bar-Yousef, 1977; Goldberg et al., 1971 and Papadouplos, 1985)**, while applying the fertilizers using conventional method causes non-uniformity distribution of fertilizer through the soil profile and consequently, decreasing fertilizer utilization efficiency and crops productivity **(El-Gindy, 1988).**

3- Effect of fertigation treatments and irrigation method on water and fertilizer use efficiencies:

Data are illustrated in Fig. (6) indicate that the water use efficiency under drip irrigation (2.69kg/m^3) was higher than that under sprinkler irrigation system (1.65 kg/m^3) by 38.7%. This due to the drip irrigation gives more concentrated wetted area around the roots of vegetable plants than sprinkler irrigation system and consequently higher the water use efficiency under drip irrigation system **(Badr, 1993).**

On the other hand, data are illustrated in Fig. (6) indicates that the water use efficiency increased with increasing fertigation rate under both drip and sprinkler irrigation system. The highest water use efficiency values were 2.69kg/m^3 and 1.65kg/m^3 under drip and sprinkler at high fertigation rate (60kg-N/fed) .

On the other hand, data are illustrated in Fig. (6) indicated that water use efficiency by the pea plants under fertigation method (2.69 and 1.65 kg/m^3) under drip and sprinkler irrigation was higher than that under the traditional method of fertilization (2.38 and 1.44 kg/m^3). This may be due to the high uniformity of fertilizer distribution and fertilizer elements already in solution become available to the plant roots faster than when placed dry in the soil.

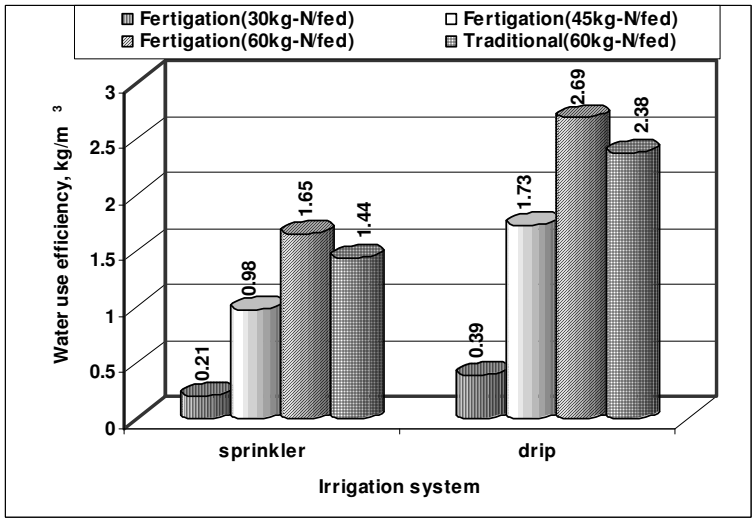

Fig.6 : Effect of fertilization treatments on water use efficiency under drip and sprinkler irrigation systems (mean of two seasons).

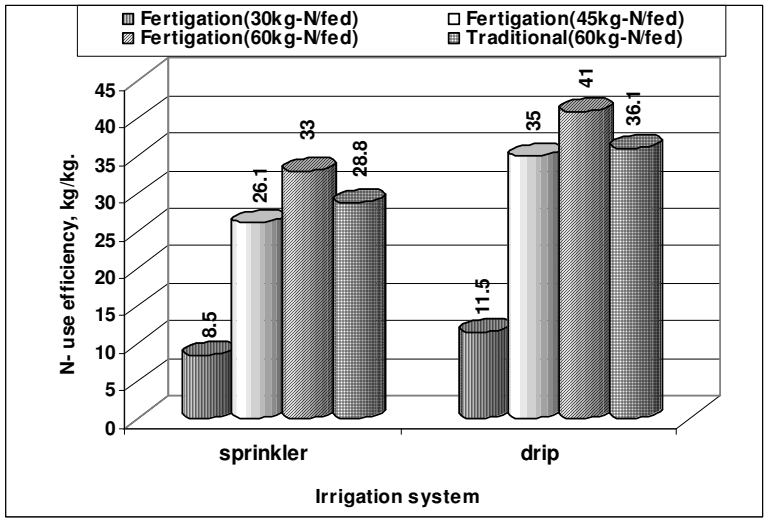

Fig.7 : Effect of fertilization treatments on nitrogen use efficiency under drip and sprinkler irrigation systems (mean of two seasons).

Fig. (7) shows that the fertilizer use efficiency under drip irrigation (41kg/kg-N) was higher than that under sprinkler irrigation system (33kg/kg-N). This due to high frequency application of nutrients under drip irrigation allows splitting of the fertilizers amount, so that the elements availability is fitted to nutritional needs of the crop.

Also, the fertilizer use efficiency increased with increasing fertigation rate under different irrigation systems as shown in Fig. (7). The highest fertilizer use efficiency values were 41 kg/kg-N and 33kg/kg-N under drip and sprinkler at high fertigation rate (60kg-N/fed).

Data illustrated in Fig. (7) indicated that fertilizer use efficiency by the pea plants under fertigation method (41 and 33 kg/kg-N)under drip and sprinkler irrigation) was higher than that under the traditional method of fertilization (36.1 and 28.8kg/kg-N). This may be due to the high uniformity of fertilizer distribution and fertilizer elements already in solution become available to the plant root faster than when placed dry in the soil.

4-Effect of fertilization treatments on NPK concentration in pea:

Data are presented in Table (5) showed that the NPK concentration in pea seeds increased by increasing fertigation rate from 30 to 60kg-N/fed under both drip and sprinkler irrigation system, but the increase in NPK under drip irrigation was higher than that under sprinkler irrigation.

Table (5): Effect of fertigation rates on NPK concentration in pea seeds under both drip and sprinkler irrigation system.

Irrigation system	Fertigation rate, kg/fed.	Nutrients concentration, %		
		N	P	K
Drip	30	2.17	0.39	2.07
	45	2.79	0.46	2.30
	60	3.20	0.51	2.35
	Mean	**2.72**	**0.45**	**2.27**
Sprinkler	30	2.12	0.39	2.01
	45	2.55	0.44	2.20
	60	2.87	0.50	2.32
	Mean	**2.51**	**0.44**	**2.18**

On the other hand, data are presented in Table (6) indicated that the nutrients concentration in pea seeds by using fertigation method was higher than that when using traditional method of fertilization (broadcasting) by 10.7, 2.22 and 1.32 % for N, P and K respectively under drip irrigation system, while the increase was 6.37, 6.82 and 5.97 % under sprinkler irrigation system.

Table (6): Effect of fertilization method on NPK concentration in pea seeds under drip and sprinkler irrigation system.

Irrigation system	Fertilization method	Nutrients concentration, %		
		N	P	K
Drip	Fertigation	2.72	0.45	2.27
	Broadcasting	2.43	0.44	2.24
Sprinkler	Fertigation	2.51	0.44	2.18
	Broadcasting	2.35	0.41	2.05

5- Cost analysis:

Data in Table (7) indicate that the lowest cost of pea production unit was 283.3LE/ton under drip irrigation system at fertigation rate of 60kg-N/fed, while the highest cost of pea production unit was 2100LE/ton under sprinkler irrigation system at fertigation rate of 30kg-N/fed.

On the other hand, the cost of pea production unit under fertigation was lower than that when using traditional method of fertilization (broadcasting) by 19.73% and 21.36% under drip and sprinkler irrigation systems at rate of 60kg-N/fed respectively.

Table (7): Pea production cost unit under different fertilization and treatments irrigation systems.

Irrigation systems	Fertilization treatments	Total yield, ton/fed.	Total cost, LE/fed.	Production cost unit, LE/ton
Drip	**Fertigation (30 kg/fed)**	0.35	585	1671.4
	Fertigation (45 kg/fed)	1.58	647	426.6
	Fertigation (60kg/fed)	2.46	697	283.3
	Broadcasting (60kg/fed)	2.17	736	339.2
Sprinkler	**Fertigation (30 kg/fed)**	0.26	546	2100
	Fertigation (45 kg/fed)	1.18	595	504.2
	Fertigation (60kg/fed)	1.98	645	325.8
	Broadcasting (60kg/fed)	1.73	684	395.4

CONCLUSIONS

Results could be summarized as follows:

1- There was not effect to irrigation method on the plant height, No. of branches/plant and No. of pods/plant.

2- Highest yield (2.46 ton/fed) was obtained under drip irrigation with sprinkler irrigation (1.98 ton/fed), by about 19.5% enhancement.

3- Water use efficiency under drip irrigation (2.69kg/m^3) was higher than that under sprinkler irrigation systems (1.65kg/m^3), by about 38.6% enhancement.

4- Total yield increased by 11.79 – 12.62% under fertigation method comparing with the traditional method of fertilization (broadcasting) under drip and sprinkler irrigation system respectively**.**

5- Pea yield increased from (0.35 to 2.46 ton/fed) and from (0.26 to 1.98 ton/fed) with increasing fertigation rate from 30 to 60kg-N/fed under both drip and sprinkler irrigation systems respectively.

6- NPK concentration in pea seeds increased by increasing fertigation rate from 30 to 60kg-N/fed under both drip and sprinkler irrigation system, but the increase in NPK under drip irrigation was higher than that under sprinkler irrigation system**.**

1- Cost of pea production unit under fertigation was lower than that when using traditional method of fertilization (broadcasting) by by 19.73% and 21.36%under drip and sprinkler irrigation systems at rate of 60kg-N/fed respectively**.**

REFERENCES

Abdel-Aziz, A. A. (1998). Evaluation of some modern chemigation techniques**. Ph.D. Thesis, Fac. of Agric., Ain Shams University: 92pp.**

Abuja, L. R.; K. W. Rojas and K. E. Johaso (1991). Modeling the behavior of fertilizers and pesticides in relation to chemigation. **Proc. of Expert Consultation on Fertigation/Chemigation. FAO, Cairo, Egypt. Sept. 8-11pp: 125-135.**

Agricultural climatologic profiles (2004-2006). Central Laboratory for Agricultural Climate - Agriculture Research Center, **Ministry of Agriculture and Land Reclamation.**

Agricultural Statistics, (2005). Economic Affairs Sector, Ministry of Agriculture. Vol. 1: 601pp.

Badr, A.E. (1993). Production of some vegetables under drip and sprinkler irrigation systems**, Misr J. Ag. Eng., 10(2) : 230-252**

Bar-Yosef, B. (977). Trickle irrigation and fertigation on tomatoes in sand dunes, Water, N and P distribution in soil and uptake by plants **Agron. J., 69:486-491 .**

Bhella, H. S. and G. E. Wilcus (1985). Nitrogen fertilization and muskmelon growth, yield and nutrition. **Proc. of 3rd Int. Drip/Trickle Irrigation Conf. Vol.(1): 339-345.**

Bianchi, M. I.; C. M. Burt and T. A. Ruhr (1985). Drip fertilization practices and soil permeability. **Proc. of 3rd Int. Drip/Trickle Irrigation Conf. Vol.(1): 357-363.**

Black.C A. (1982). Methods of soil analysis. Part 2. chemical and microbiological propertirs. **Am. Soco. Agron. Madison. Wisconsin, USA.**

Bravdo, B. A.; and Y. Hepmer, (1987). Management and fertigation to optimize grape composition and vine performance, **Acta Hort., 206:49-69 .**

Chandler, L. D.; H. R. Sumner, J. E. Mulrooney and C. C. Dowler (1992). Insecticide deposition in cotton using technology. **Trans ASAE. Vol. (1): 1-15.**

Chase, R. G. (1985). Phosphorus application through a subsurface trickle system. **Proc. of 3rd Int. Drip/Trickle Irrigation Conf. Vol.(1): 393-400.**

Davies, D. B.; D. J. Eagle and J. B. Finney (1993). Soil Management. **Fifth edition, Butler and Tanner Lid.**

Doorenbos, J. and W. O. Pruitt (1977). Guidelines for predicting crop water requirements, **FAO Irrigation and Drainage, Paper 24. Rome, Italy: 156pp.**

El-Gindy, A. M. (1988). Modern chemigation techniques for vegetable crops under Egyptian conditions. **Misr J. of Agric. Eng., 5(1): 99-111.**

FAO (1984). Guidelines for predicting crop water requirements. **FAO Irrigation and Drainage ,paper 24, Rome:144 pp.**

Goldberg, D.; B., Gornat; and B., Bar-Yousef (1971). Distribution of root, water and minerals as a result of trickle irrigation, **J.Amer. Soc. for Hort. Sci., 96:245-248 .**

Goyal, M. R.; L. F. Rivera; and C.L. Santiago, (1995). Nitrogen fertilization in drip irrigation. Microirrigation for a changing world, **conserving resources /preserving the environment, Clovis, CA. USA, 388-391.**

Hamdy, A., (1991). Fertigation : Prospects and problems, **FAO, Consultation on Fertigation/Chemigation, 8-11 Sept.,Cairo, Egypt :1-7.**

Papadouplos, I. (1985). Constant feeding of field grown tomato irrigated with sulphate water**, Plant and Soil, 88:231-236 .**

Pene, C.B.G., and G.K. Edi (1996). Sugarcane yield response to deficit irrigation at two growth stages. ***In***: Nuclear Techniques to Assess Irrigation Schedules for Field Crops**. IAEA, TECDOC 888, pp. 115-129, Vienna.**

Worth, B.and J. Xin (1983). Farm Mechanization for Profit, Granada Publishing.UK. p 269.

الملخص العربى

الرى التسميدى لتحسين إنتاجية محصول البسلة فى الاراضى حديثة الاستصلاح

أحمد أبوالحسن عبد العزيز **خالد فران طاهر الباجورى**

تم اجراء التجربة بالمزرعة الصحراوية التابعة لكلية الزراعة – جامعة عين شمس بمنطقة البستان، محافظة البحيرة (تربة رملية) المبنية على مشروع تعاون مع المجالس الإقليمية للبحوث والإرشاد الزراعي فى موسمى النمو (2004- 2005). بهدف تحسين إنتاجية محصول البسلة تحت نظامين للرى هما (الرى بالرش ، والرى بالتنقيط). التسميد مع مياه الرى بثلاث معدلات سمادية هى (30 ، 45 ، 60كج نبتروجين/فدان). التسميد بالطريقة التقليدية (نثرا على الارض) بمعدل 60كج نيتروجين/فدان للمقارنة.

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وكانت أهم النتائج المتحصل عليها هى:

1- حقق نظام الرى بالتنقيط أعلى انتاجية (2.46 طن/فدان) بالمقارنة بنظام الرى بالرش الذى حقق 1.98 طن/فدان(بزيادة 19.5%).

2- كانت كفاءة أستخدام المياه تحت نظام الرى بالتنقيط (2.69كج/م3) أعلى منها تحت نظام الرى بالرش (1.65كج/م3) (بزيادة 38.6%)..

3- زيادة أنتاجية المحصول بنسبة 11.97- 12.62% مع التسميد خلال نظامى الرى بالتنقيط والرش على الترتيب بالمقارنة بالطريقة التقليدية للتسميد(نثرا).

4- زيادة أنتاجية محصول البسلة بنسبة 213.5% ، 214.7% بزيادة معدل التسميد من 50 الى 100كج نيتروجين/فدان مع كل من نظامى الرى بالرش والتنقيط على الترتيب.

5- زيادة محتوى بذور البسلة من NPK بزيادة معدل التسميد من 30 الى60 كج نيتروجين/فدان مع كل من نظامى الرى بالرش والتنقيط، كانت الزيادة تحت نظام الرى بالتنقيط أكبر منها مع نظام الرى بالرش.

6- كانت تكاليف وحدة الانتاج فى حالة التسميد من خلال مياه الرى أقل بنسبة 19.73%، 21.36% بالمقارنة بالطريقة التقليدية للتسميد تحت نظامى الرى بالتنقسط والرش على الترتيب عند معدل تسميد 100كج نيتروجين/فدان.