

STUDY OF USING SOME PRESSURIZED IRRIGATION SYSTEMS FOR PRODUCING VEGETABLES ON RICE STRAW MEDIA

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ABSTRACT

This study was conducted to study and utilize some pressurized irrigation systems (drip and micro jet) on the non-traditional of agricultural media (rice straw media) for irrigating the tomatoes plants (super red) and radish crop in the weather of Egypt-Giza. The experiments were carried adding the irrigation water with percentage (50% - 75% & 100%) from water requirement for the plants in doses (one dose, two doses, three doses) for every treatment. Tomatoes was Planted in the rice straw bales on the surface. The radish plants were planted in semi cones shapes from rice straw in pots with the same management of water adding the crops on the rice straw bales. The important results: The productivity of growing crops in rice straw culture was a better than a productivity of plants that grown in sandy soil. All treatments that was watered on 3 batches gave productivity are better than the treatment that watered on 2 batches or 1 batch and the best production was in case of 100% of W. R on 3 doses per day. The best treatment concerning W.U.E was that watered 3 batches daily and with amount 75% from the water requirement by saving 25% from the water requirements that can be taking part for irrigating other growing areas.

INTRODUCTION

Globally, 140 billion metric tons of biomass is generated every year from agriculture. This volume of biomass can be converted to an enormous amount of energy and raw materials, (U N E P 2009).

Limitation of water resources and abundances of agricultural residues are considered two of the main constraints in the agricultural sector in Egypt.

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Whereas there are large areas of poor lands due to deface the chemical, physical properties to land as well as in spot of limitation of water resources and it quality to planting, a lot of scientific researches are going to wards to recycle these removes and wastes and to used it as primary materials therefore to verify an agricultural production by these poor lands, and so the system of vegetable growing on un-conventional mediums is considered one of systems which used to recycle these wastes and remains in these poor land regions. Therefore a great number of research works are done in Egypt for overcoming the limitation of water resources. Also, a great numbers of research works are done for recycling the agricultural residues and produce different types of raw materials for both the agricultural and the industrial sectors. Irreversibly, few number experiments are trying to utilize some types of the agricultural residues such as "rice straw" as a nontraditional media for growing some vegetables. Unfortunately, the needed technical knowledge dealing with the modern irrigation systems management such as water requirement, irrigation time, irrigation interval, and the ideal type of irrigation system" for growing vegetables on rice straw media is not found. Also, the needed knowledge dealing with the physical properties of rice straw media "such as bulk density, real density, porosity, moisture content distribution, and evaporation rate" is not found. Therefore, the main objective of this research work is to determine: The ideal type and the ideal management of the modern irrigation systems used for growing some vegetables on the rice straw media in high efficiency.

MATERIALS AND METHODS

1-Agricultural media: Two types of the agricultural media were used in this research work. However, some details dealing with the two types could be summarized as follows:

a. The non traditional media:

Rice straw bales were used for growing Tomatoes Crop with Varsity of "Super Red" through the summer season. Geometrically, the utilized bales

were found in rectangular shape. Commonly, the three dimensions of each bale are 150, 60, and 50 cm in average for length, wide, and high respectively. The total mass of each bale was found between 40 and 50 kg in average at the beginning time of the field experiments. Also, rice straw semi cones were used for growing Radish Crop with Variety of “Local Radish” through the winter season. The three dimensions of the rice straw semi cones are 25, 18, and 20 cm for the diameter of the upper base, the diameter of the lower base, and the distance between the two bases respectively. The rice straw semi cones were made by putting some quantity of the rice straw inside cultivation pots with same dimensions. The total mass of each cone was 1.0 kg in average at the beginning time of the field experiments. However, some types of physical properties for the utilized rice straw such as bulk density, moisture content, estimated were studied.

b. The traditional media:

Sandy soil was used for growing Tomatoes Crop “Super Red Variety” through the summer season. as a control. Also, afresh sandy soil was transported and graded with depth of 50 cm for growing Radish Crop “Local Radish Variety” in the winter season as a control.

METHODS

1- The Applied Experiments: Two experiments were carried out in the open field; some details and brief descriptions of the two experiments could be summarized as follows:

a-The First Experiment:

This experiment deals with production of Tomatoes Crop on rice straw media comparing with Sandy Soil as reference for comparison process. This experiment was carried out in Tahma villagune, El Aiyat, Giza Governorate, Egypt in the summer season of 2006. Statistically, this experiment was designed as factorial experiment randomized complete block design (RCBD). The total numbers of the applied treatments in this

experiment were 18 with three replicates for each one. The first nine treatments (from 1 to 9) were applied using drip irrigation system on both rice straw bales and sandy soil. The treatments (from 1 to 3) were managed to give 100 % of water requirement in one, two, and three doses. The treatments (from 4 to 6) were managed to give 75 % of water requirement in one, two, and three doses. The treatments (from 6-to 9) were managed to give 50 % of water requirement in one, two, and three doses. The second nine treatments (from 10 to 18) were applied using micro jet irrigation system on both rice straw bales and sandy soil. The treatments (from 10 to 12) were managed to give 100 % of water requirement in one, two, and three doses. The treatments (from 13 to 15) were managed to give 75 % of water requirement in one, two, and three doses. The treatments (from 15 to 18) were managed to give 50 % of water requirement in one, two, and three doses.

b-The Second Experiment: This experiment deals with production of Radish Crop on rice straw semi cones comparing with sandy soil as a control. This experiment was carried in Agric. Eng. Station in Aiyat Center, Giza Governorate, Egypt in winter season. Statistically, this experiment was designed as factorial experiment in randomized complete block design (RCBD) and with the same water management of treatments in the first experiment.

2-Irrigation system:

The utilized irrigation system in the first experiment: This system is considered a subsystem of a main system of privet farm and it consists of drip irrigation system. **Main line:** Fig. (1) Shows u.p.v.c pipes, ϕ 63 mm were used as a mainline in field experiments. The Technical specifications of the main line are: The outside diameter is 63mm, wall thickness is 1.9mm, the inside diameter is 61.1mm, the industry pressure is 6 bars, and the testing pressure is 9 bars.

. Laterals: Poly-ethylene (P.E) tubes were used as laterals in the field experiments. The technical specifications of the utilized P.E pipes were:

The outside diameter of laterals is 16 mm, wall thickness is 1.2mm, the inside diameter is 14.8 mm, the industry pressure is 4 bars, and the testing pressure is 6 bars. Laterals length was 15 m (ten bales).

Fertigation unit: Fertigation unit contains venture, valves, pressure gauge, and small scale filter were used for fertigation process in all treatments. The utilized venture is made of poly ethylene material. The water inlet, mix inlet, and the mix outlet of the utilized venture are 2, 2, and 0.5 inches respectively.

. **Emitters:** On line Pressure compensating emitters were used in specific treatment of the field experiments. The average discharge of the utilized emitters is 4 L/hr at 2 bars.

. **Sprinklers:** Imported micro jets were used in specific treatment in the field experiments. The average discharge of the utilized sprinkler is 20 liter per hour at pressure 2bar.

. **Valves:** 16" valves were used for managing water manually in each lateral according the schedule of the regulated treatments.

However, the deigned irrigation system for managing water resources for growing Tomatoes Crop on both rice straw bales and sandy soil are shown in fig.(1), deigned system for micro jet with the same of last design for drip irrigation system. Also, the second experiment was designed with the same system.

The utilized irrigation system in the second experiment:

Design of this system is approximately similar to the first experiment. However, the designed irrigation system for managing water resources in growing *Radish Crop* on both rice straw semi cones and sandy soil.

- The Cultivated Crops:

a-Tomatoes Crop: Super Red Varity of Tomatoes Crop was cultivated in the first experiment. The technical specifications of this verity are: Family, genus, kind, and certification name are Solanaceae,

Lycopersicon, Esculentum, and Lycopersicon esculentum Mill respectively. Tomatoes Crop was cultivated 50 cm apart as seedlings with age of 30 days. The seedlings were bought from a private Nursery in El Ayat center. **b- Radish crop:** Local Radish Variety of radish crop was cultivated. in the second experiment 10 plants were cultivated in each semi cone. The technical specifications of this variety are: Family, variety, and certification name are cruciferae, R. sativus var. radiculs., and Rphanus sativus L. respectively. Local Radish was cultivated as seeds. The seeds were bought from a private store in El Ayat center.

Measurements

Bulk density of rice straw culture: The applied procedure to determine the bulk density of rice straw culture could be summarized as follow: (1) Refined sample of rice straw culture at a sieve 2 mm mesh, (2) Taking a sample 50 gm. Bulk density = (Sample mass (gm)/ Bulk volume (cm³))

Density to rice straw culture: The applied procedure to determine the density of rice straw culture could be summarized as follow: (1) Taking 9 gm fully-dried from medium, (2) Filling a tube 50 Cm³ from irrigation water, (3) Adding the sample (10 gm) to the amount of water in a tube (50 Cm³). The volume = grade read after sample adding – grade read before adding.

$$\text{density} = \frac{\text{Fully - dried mass}}{\text{volume}} \quad g \, m / \, Cm^3$$

Porosity of rice straw culture: The applied procedure to determine the porosity of rice straw culture could be summarized as follow

$$\text{Porosity} = \frac{\text{Density}}{\text{Bulk density}}$$

Water holding capacity (WHC) for rice straw media: The applied procedure to determine the WHC of rice straw culture could be summarized as follow:

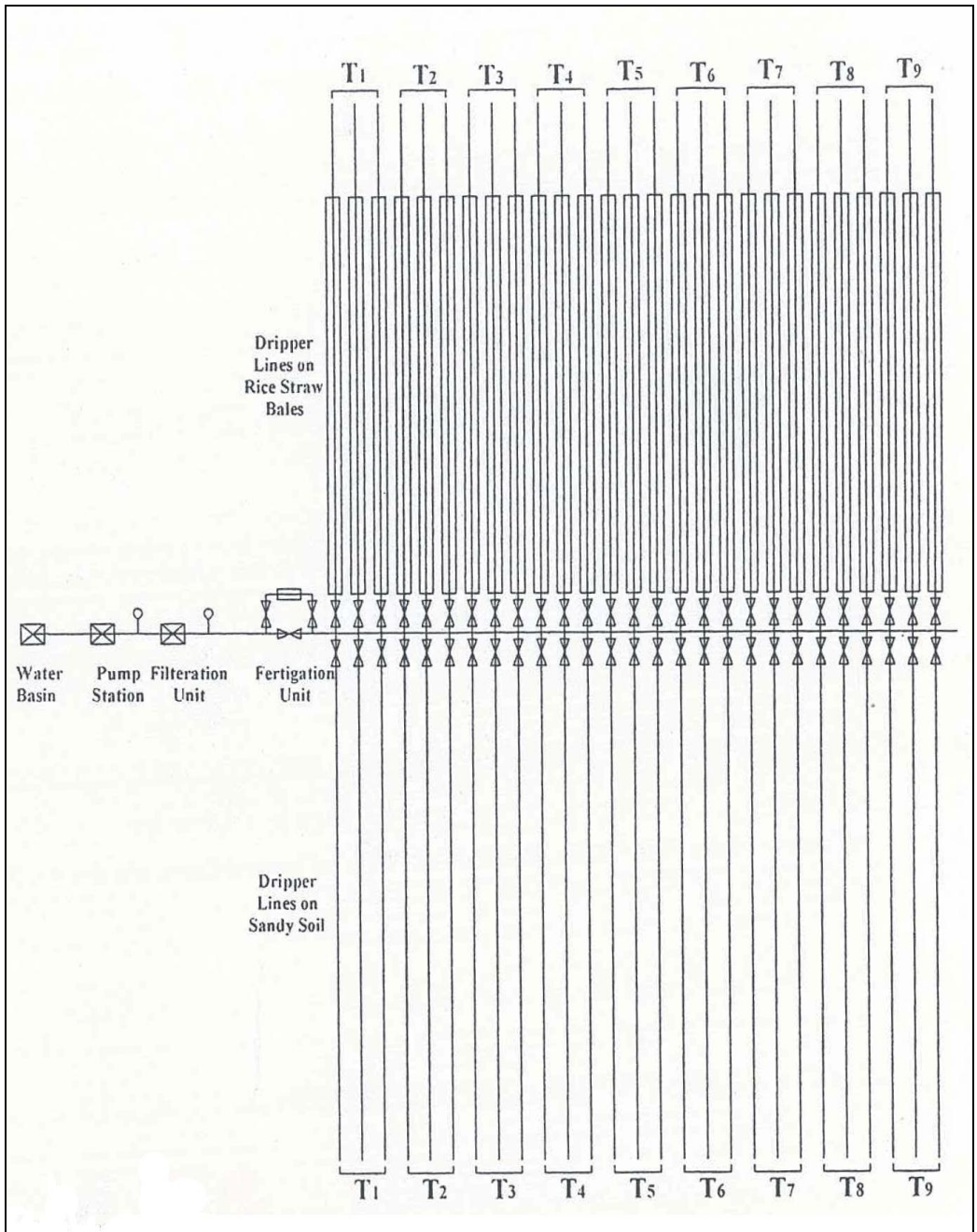


Fig. 1. Drip irrigation system design for growing Tomatoes crop on rice straw bales and sandy soil “First field experiment”

$$\text{WHC(Mass)} = \frac{\text{amount of water}}{\text{Wt. of sample}} \times 100$$

$$\text{WHC(Vol)} = \frac{\text{amount of sample water}}{\text{the bulk Vol. sample}} \times 100$$

Bulk density to the conventional soil by Klute method(1982): A sample has taken from soil (50 gm) and it in a gradually – tube:

- Bulk volume = 30 Cm³

$$\text{Bulk density} = \frac{\text{mass of sample(gm)}}{\text{bulk volume (Cm}^3\text{)}} \text{ gm / Cm}^3$$

Water holding capacity (WHC) for sandy soil: Added 50 Cm³ above a sand sample on a fill paper:

$$\text{WHC(Mass)} = \frac{\text{amount of sample water}}{\text{Wt. of sample(gm)}} \times 100$$

$$\text{WHC(Mass)} = \frac{\text{amount of sample water}}{\text{Bulk volume}} \times 100$$

Density for sandy soil:

$$\text{density for sandy soil} = \frac{\text{full - dried mass}}{\text{volume}} \text{ gm / Cm}^3$$

Porosity for sandy soil:

$$\text{Porosity} = \frac{\text{Denisty}}{\text{Bulkdensity}} = \frac{2.5}{1.66} = 1.5$$

4- Measuring Tools:

(1) Leaf surface Area of plant: Plane meter was used for measuring the Surface Area of plant leaf. (2) Diameter of plants stem: The vernier caliper was used for measuring the diameter of plants stem. (3) Plants length: Measuring tape was used for measuring the Plants length. (4) **pH meter, EC meter:** was used for measuring the pH and EC for irrigation water.

(5) **Drying Ovens:** was used for drying the rice straw semi cones.

(6) Digital Planimeter: Digital Planimeter was used for measuring the surface area of plant leaf.

(7) Vernier calipers: Vernier Caliper is used for measuring the physical dimension of roots, stem, and leaf of the cultivated Plants.

(8) Measuring tape: Measuring tape is used for measuring the length of the root, and stem of the cultivated Plants. Also, it is used for measuring dimensions for the pots in second experiment.

RESULTES AND DISSCUTION

1. First experiment: Growing Tomatoes crop on Rice straw.

a. Effects of water management on Tomatoes plant length

Fig. (2a) shows two groups of diagrams, the black diagrams deals with the arithmetic means of Tomatoes plants length growing on rice straw bales and the white diagrams deals with the arithmetic means of Tomatoes plants length growing on sandy soil. This figure shows distinction of Tomatoes plants length growing on rice straw bales and its value on sandy soil.

Table (1a) shows the results of the statistical analysis test (LSD) for studying the effects of water management on Tomatoes plants physical properties growing on rice straw bales under drip irrigation system. Generally, this table shows the general mean for all treatments in Tomatoes plant properties growing on rice straw bales are bigger than its values on sandy soil. The difference between the two values is considered significant, due to the critical value for comparison at alpha equal 0.05 (probability 5%) is equal ($F_1 = 3.6182$). Also, the value of this difference is bigger than the critical value for comparison at 0.05.

Internally among the doses of water management on rice straw bales under drip irrigation system, the difference between the means of the two and the three doses is insignificant. Since the values of the means of all treatments in the two and the three doses is insignificant. Deeply, depending on the results of the statistical analysis test (LSD) the best rank

for the significant treatments of water management of Tomatoes plants growing on rice straw bales under drip irrigation system for the two significant means is 75% of water requirement at three doses, 75% of water requirement at two doses, and 100% of water requirement at three doses. This is due to the differences among these treatments are insignificant. This is due to the critical value for comparison at alpha equal 0.05 (probability 5%) is equal ($F_1F_2F_3=10.855$).

Table (1a): Statistical analysis test (LSD) outputs for studying the effects of water management on the studied properties of the growing plants under the utilized irrigation system in rice straw bales

Variables	Tomatoes plants means								
	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉
Length of Tomatoes plants (cm)	148.67*	146	153.33*	143.44	155*	157*	146*	144.62	146
Leaf surface area of Tomatoes plants(cm ²)	195.8*	180.7*	159.4	177.3*	192.9*	183.3*	163.6*	198.3*	174.3*
Fruits number on Tomatoes plant	50	34	57	92	162*	52	93	49	156*
Fruits weight on Tomatoes plant(gm)	200.33	153.33	150	132*	120	97	104.67	100	50
Diameter of Tomatoes plant stem (cm)	1.01*	1.083*	1.116*	1*	0.983*	1.083*	0.883	1.033*	1.066*
Production of Tomatoes	1400	1487.5	1505*	1300	1387.5	1485	730	780	802.5
WUE	47.1	50	51.4	59.1	63	63.5	48.7	52	53.6

Table (1a): Continue

Variables	Tomatoes plants means								
	T ₁₀	T ₁₁	T ₁₂	T ₁₃	T ₁₄	T ₁₅	T ₁₆	T ₁₇	T ₁₈
Length of Tomatoes plants (cm)	110*	115.67*	118*	100.33	105	110.67*	88	90	90.33
Leaf surface area of Tomatoes plants(cm ²)	185.17*	196.5*	210.03*	164.7*	186.5*	182.27*	114.27	119.83	129.17
Fruits number on Tomatoes plant	45	52*	61*	40	51	59*	38	43	57.66*
Fruits weight on Tomatoes plant(gm)	99	148	197*	100	102.33	196*	142	134	98
Diameter of Tomatoes plant stem (cm)	0.8667*	0.9*	0.8333*	0.8333*	0.8667*	0.9*	0.85*	1*	0.733
Production of Tomatoes	357.5	372.5	407.5*	327.5	347.5	372.5	190	197.5	207.5
WUE	12	12.5	13.6	14.8	15.8	16.9	16.6	13.2	13.8

Table (1b): Statistical analysis test (LSD) outputs for studying the effects of water management on the studied properties of the growing plants under the utilized irrigation system in sandy soil.

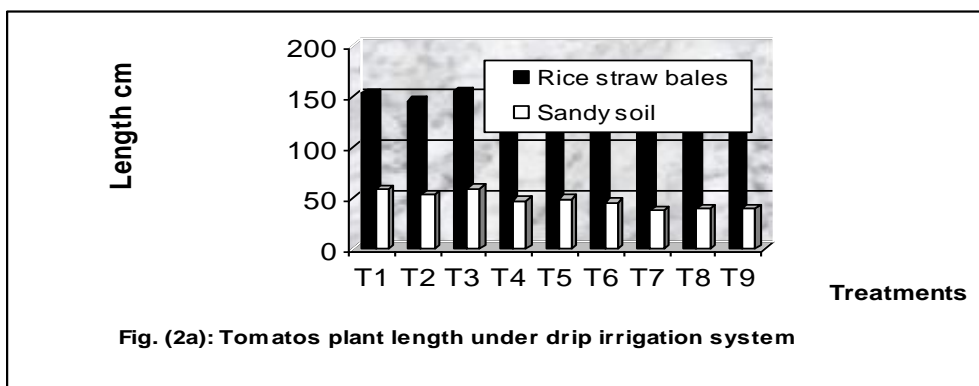
Variables	Tomatoes plants means in sandy soil								
	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉
Length of Tomatoes plants (cm)	58.67	53.56*	59.33	47.67	49	46	37.67	40	41.33*
Leaf surface area of Tomatoes plants(cm ²)	110	115.67	118	100.33	105	110.67	88	90	90.33
Fruits number on Tomatoes plant	31.67	31.67	40.33	13.67	20.67	19	13	20.67	19
Fruits weight on Tomatoes plant(gm)	46	134	122	56	146	107	153	50	56
Diameter of Tomatoes plant stem (cm)	1*	1.0333*	1.05*	0.8833	0.9667*	1.033*	0.8667	1.0333*	0.9667
Production of Tomatoes	357.5	372.5	407.5	327.5	347.5	372.5	190	197.5	207.5
WUE	12	12.5	13.6	14.8	15.9	16.9	12.6	13.2	13.8

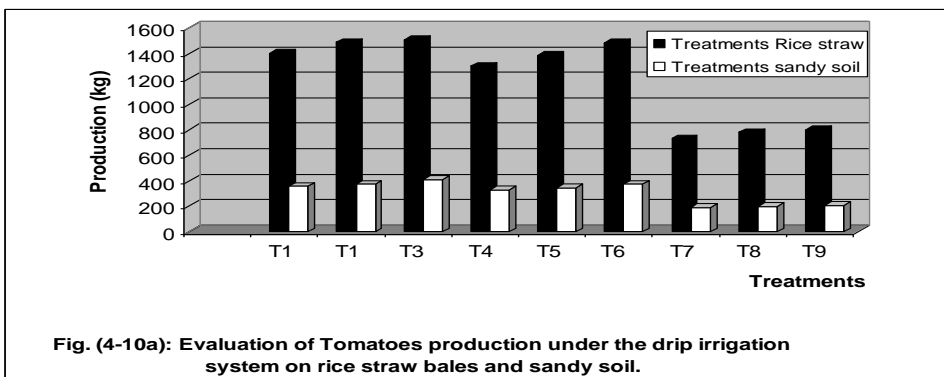
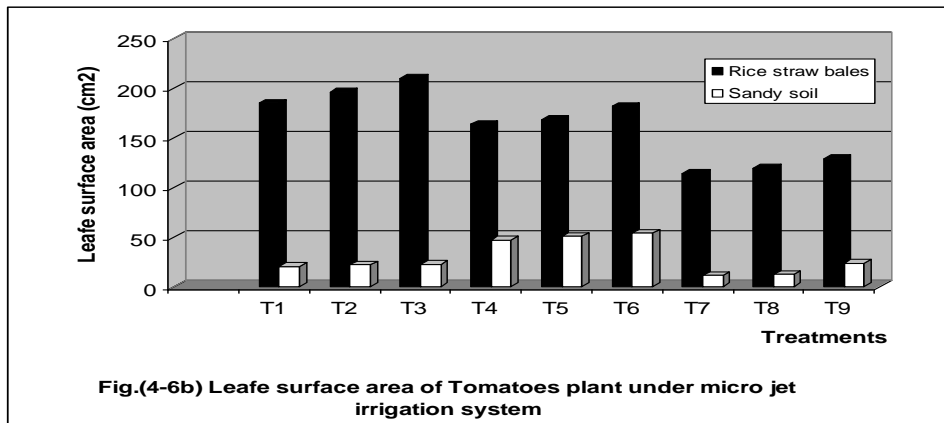
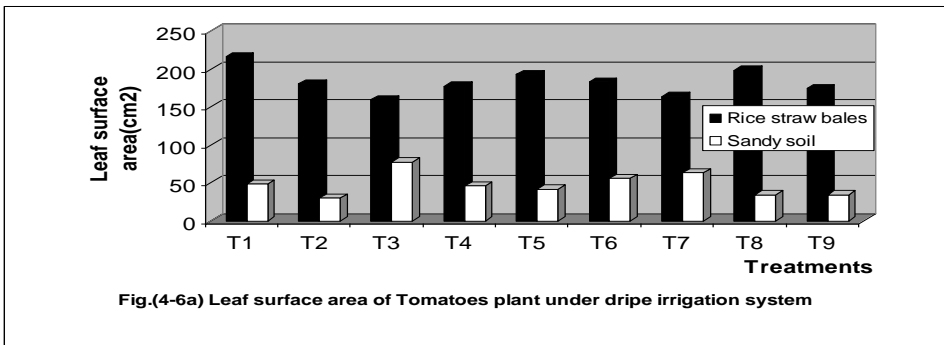
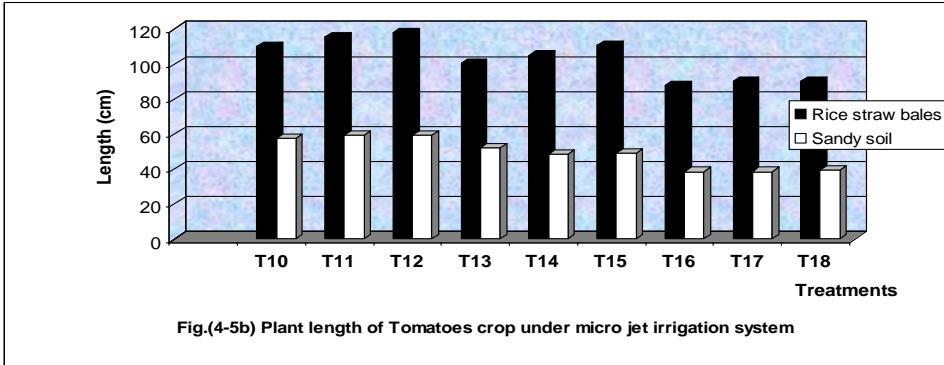
Table (1b): Continue

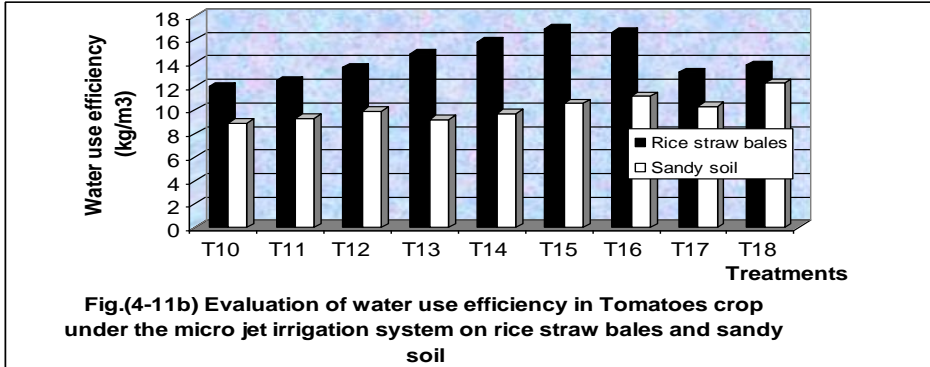
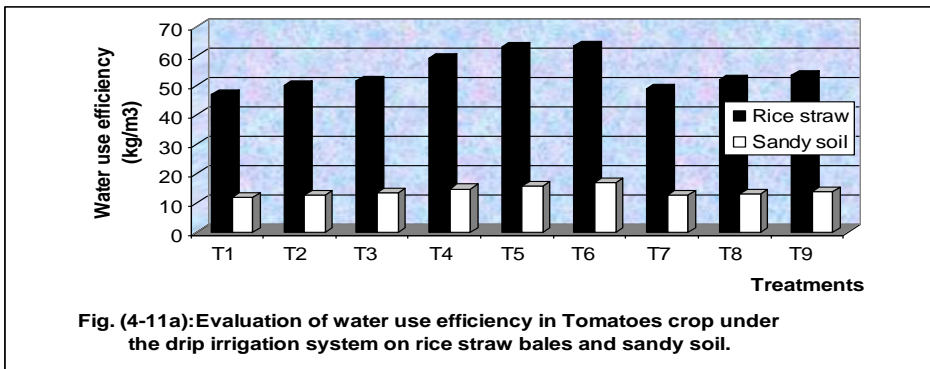
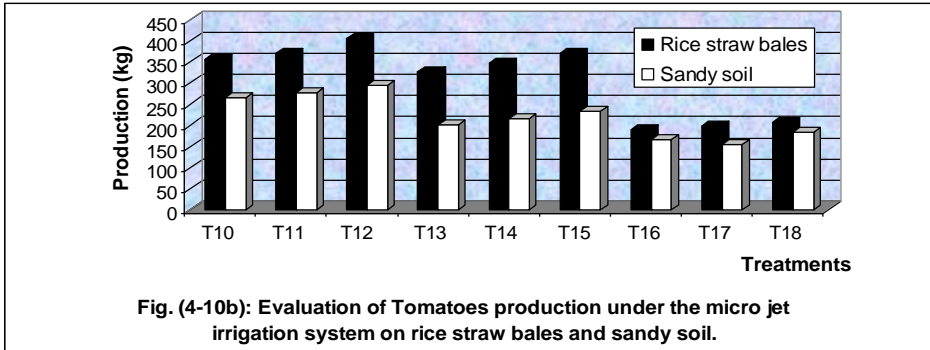
Variables	Tomatoes plants means								
	T₁₀	T₁₁	T₁₂	T₁₃	T₁₄	T₁₅	T₁₆	T₁₇	T₁₈
Length of Tomatoes plants (cm)	57.67	59.33	59.33	52	48.67	49	38.67	38.67	39.33
Leaf surface area of Tomatoes plants(cm²)	20.4	22.1	22.4	47.3	50.8	53.8	11.4	12.3	23.6
Fruits number on Tomatoes plant	33	15	13.66	14	16	8	18.66	23.33	15.66
Fruits weight on Tomatoes plant(gm)	48.33	75	95	66	57	103	78	50	56
Diameter of Tomatoes plant stem (cm)	0.75	0.5667	0.5167	0.4338	0.55	0.4333	0.5833	0.65	0.6333
Production of Tomatoes	265	277.5	295	202.5	215	235	167.5	155	185
WUE	8.9	9.3	9.9	9.2	9.7	10.6	11.2	10.3	12.3

Table (2): Statistical analysis (LSD) outputs for studying the effects of water management on the studied properties of the growing plants under the utilized irrigation system in rice straw and sandy soil.

Variables	Tomatoes plants means					
	Drip			Micro jet		
	Rice straw	Sand	F ₁	Rice straw	Sand	F ₁
Length of Tomatoes plants (cm)	184.89*	48.15	3.6182	103.11*	49.19	3.0013
Leaf surface area of Tomatoes plants(cm ²)	180.64*	103.11	12.869	165.32*	29.34	18.325
Fruits number on Tomatoes plant	82.77*	23.29	8.6092	49.63*	17.48	3.2315
Fruits weight on Tomatoes plant(gm)	123.04*	96	5.4058	135.15*	69.81	4.6599
Diameter of Tomatoes plant stem (cm)	1.0289*	0.9815*	0.0745	0.8648*	0.5685	0.0676
Production of Tomatoes	1208.6*	308.9	4.8864	308.89*	221.94	1.9802







SUMMARY AND CONCLUSION

The whole results of this study could be summarized in two main groups. The first group deals with the first field experiment "water management of growing Tomatoes Crop under both drip irrigation and micro jet system on rice straw bales". The second group deals with the second field experiment "water management of growing Radish Crop under the same irrigation system on rice straw semi cons ".

- Water management for growing Tomatoes Crop on rice straw bales.

- Statistical analysis results of the field experiment for growing Tomatoes Crop revealed that:
 - (a) The value of mean of Tomatoes Crop Weight on the rice straw bales was bigger than its value on the sandy soil. Also, the difference between the mean of Tomatoes Crop Weight on the rice straw and sandy soil is significant at probability of 5%.
 - (b) The value of mean of Tomatoes Crop Weight on the rice straw bales under drip irrigation system was bigger than its value under micro jet irrigation system. The difference between the mean of Tomatoes Crop Weight on the rice straw under drip irrigation system and its value under micro jet irrigation system was significant at probability of 5%.
 - (c) The value of mean of Tomatoes Crop Weight on the rice straw bales under drip irrigation system at 100% of water requirement on three doses was the best treatment. The differences between the mean of Tomatoes Crop Weight at this treatment and the other treatments were significant at probability of 5%.
- Numerical analysis results of the field experiment for growing Tomatoes Crop revealed that the value of Water Use Efficiency indicator on the rice straw bales under drip irrigation system at 75% of water requirement on three doses was the best treatment.

Water management for growing *Radish Crop* on rice straw semi cones.

- Statistical analysis results of the field experiment for growing Radish Crop revealed that: (a) The value of the mean of Radish Crop Weight on the rice straw semi cones was bigger than its value on the sandy soil. Also, the difference between the mean of Radish Crop Weight on the rice straw semi cones and sandy soil was significant at probability of 5%. (b) The value of mean of Radish Crop Weight on the rice straw semi cones under drip irrigation system was bigger than its value under micro jet irrigation system. The difference between the mean of Radish Crop Weight on the

rice straw semi cones under drip irrigation system and its value under micro jet irrigation system was significant at probability of 5%. (c)The value of mean of Radish Crop Weight on the rice straw semi cones under drip irrigation system at 100% of water requirement on three doses is the best treatment. The differences between the mean of Radish Crop Weight at this treatment and the other treatments were significant at probability of 5%.

- Numerical analysis results of the field experiment for growing Radish Crop revealed that the value of Water Use Efficiency indicator on the rice straw semi cones under drip irrigation system at 50% of water requirement on three doses is the best treatment.

CONCLUSION

- 1-To minimize the evaporation rate "mm/day" from the rice straw bales a plastic cover must be used.
- 2- To maximize Crop Weight from Tomatoes must be used rice straw bales as a media. Since the difference between the mean of Tomatoes Crop Weight on the rice straw and sandy soil is significant at probability of 5%.
- 3- To maximize Crop Weight from Tomatoes, on the rice straw bales, drip irrigation system must be used as a pressurized irrigation system. Since, the difference between the mean of Tomatoes Crop Weight on the rice straw under drip irrigation system and its value under micro jet irrigation system was significant at probability of 5%.
- 4- To maximize Crop Weight from Tomatoes, the drip irrigation system must be managed to apply 100% of water requirement on three doses. Since, the differences between the mean of Tomatoes Crop Weight at this treatment and the other treatments were significant at probability of 5%.
- 5- To maximize Water Use Efficiency indicator for growing Tomatoes Crop on the rice straw bales under drip irrigation system, the drip irrigation system must be engineering managed to

apply 75% of water requirement on three doses was the best treatment.

- 6- To maximize Crop Weight from Radish, the drip irrigation system must be engineering managed to apply 100% of water requirement on three doses. Since, the differences between the mean of Radish Crop Weight at this treatment and the other treatments were significant at probability of 5%.
- 7- To maximize Water Use Efficiency indicator for growing Radish Crop on the rice straw bales under drip irrigation system, the drip irrigation system must be engineering managed to apply 50% of water requirement on three doses was the best treatment.

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الملخص العربي

دراسة استخدام بعض نظم الري لانتاج الخضر على بيئة قش الأرز

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الهدف الرئيسي للبحث هو دراسة استخدام نظامى الري بالتنقيط والميكروجيت لرى نباتات الطماطم المنزرعة فى بيئة غير تقليدية (بيئة قش الأرز) ومحصول الفجل كمحصول ورقى على نفس البيئة الغير تقليدية. ولهذا الغرض أجريت تجربتان حقليتان بهدف دراسة تأثير اضافة مياه الري من خلال نظامى الري وبنسب (٥٠%، ٧٥%، ١٠٠%) من الاحتياجات المائية للنباتات فى اليوم بحيث تم اضافة كميات المياه الى النباتات على دفعات (دفعه واحده - دفعتين- ثلاث دفعات) لكلا المحصولين لكل معاملة على حدة. وتمت الزراعة فى بالات قش الأرز مباشرة فى

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شكل مصاطب فوق سطح الأرض، بينما تم زراعة الفجل على أشباه مخاريط من بيئة قش الأرز. وكذلك تمت معاملات مشابهة على تربة رملية ككنترول وبنفس الادارة للمياه.

أهم النتائج المتحصل عليها في النقاط الآتية:

١- انتاجية النباتات المنزرعة في بيئة قش الارز تحت نظامى الري المستخدمين كانت أفضل من انتاجية النباتات التى تمت زراعتها فى التربة الرملية.

٢- تميزت النباتات المزروعة على بيئة قش الأرز فى مواصفاتها المحصولية فى حالتى الطماطم كمحصول ثمرى والفجل كمحصول ورقى عن مثيلاتها المزروعة فى تربة رملية اتبع فيها نفس ادارة مياه الري المستخدمة فى التجارب السابقة.

٣- نظام الري بالتنقيط كان أفضل من نظام الري بالميكروجيت حيث أن أنتاجية النباتات والمواصفات المحصولية كانت أعلى.

٤- جميع المعاملات التى كانت تروى على ثلاث دفعات كانت انتاجيتها أفضل من المعاملات التى تم فيها الري على دفعتين أو دفعة واحدة وكانت أعلاهم انتاجا هى المعاملة التى تم فيها الري بنسبة تعادل ١٠٠% من الاحتياجات المائية للنبات فى اليوم على ثلاث دفعات).

٥- كانت أفضل المعاملات من حيث كفاءة الأستخدام المائى هى المعاملة التى يتم فيها الري على ثلاث دفعات يوميا وبكمية مياه تعادل ٧٥% من الاحتياجات المائيه للنبات)على الرغم من ان انتاجيتها كانت اقل من المعاملة التى يتم فيها الري على ثلاث دفعات يوميا وبكمية مياه تعادل ١٠٠% من الاحتياجات المائيه للنبات حيث أن هناك توفير ٢٥% من الاحتياجات المائية للنباتات التى يمكن استغلالها لرى مساحة زراعية أخرى.

٦- اتضح من نتائج الدراسة مناسبة نظام الري بالتنقيط أكثر من غيره من نظم الري الضغطى فى الزراعة على بيئات تربة غير تقليدية (مثل قش الأرز) لتركيز المياه المضافة فى بيئة الجذور بأقل درجة من فواقد المياه المضافة.