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IMPROVING THE SURFACE IRRIGATION SYSTEM IN THE FACULTY NEW ESTABLISHED FARM IN KALABSHO AND ZAYAN AREA

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ABSTRACT

This paper represents one of the outcomes from a project financed by *Al-Mansoura University Research unit* *. Due to the rapid expansion of building new faculties and facilities on the Agriculture Faculty farm of the main campus, the total area of the farm decreased vigorously down to approximatley 5 Faddans! The Dakhlia Governrate specified 150 Faddans north at the coast of the Mediterranean sea (2 km off shore) to be used as the new faculty farm. The main general objective was to improve the surface irrigation system in the faculty new established farm. Where the laser technique was used at three slope levels. Three irrigation systems were assembled (gated pipes, perforated pipes and siphon pipes). The necessary soil and water analyses were carried out. Wheat and squash crops were planted. Experimental treatments were applied.

The project outcomes may be summarized as follows:

1) Level 5 Faddans of the faculty new farm using laser technique and three slopes(0.1 % - 0.15 % - 0.20 %).
2) Esablish three extension learning fields to assist in practical classes as well as training students. These fields uses three irrigation systems; gated, perforated and siphon pipes.
3) Results of field experiments showed that land leveling treatment of 0.2 % had the highest significant effect on crop yield either with wheat crop and/or squash crop. Stream size treatments had no significant effect on wheat and squash crop yield. Cut-off irrigation treatment of 90 % had the highest effect on crop yield either with wheat crop and/or squash crop. Similar consistent results were obtained with water use efficiency factor.

Keywords: gated – perforated – siphon – surface irrigation – laser technique

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INTRODUCTION

Water resources management should be concerned with careful and intensive use of relatively limited water supplies i.e. matching more closely irrigation volumes with crop water requirements in time and magnitude.

Preliminary studies of the farm showed that it is very near to the Mediterranean sea (2 Km) and sea water intrusion is marking the farm soil area and the EC of irrigation water is very high; 7.1 dSm^{-1} . The water table is very high; 50 cm. In some places salt patches were noticed accumulated on soil surface. Sodium Adsorption Ratio (SAR) values are very high too; > 3.0 . So, the salinity hazard is very high. Needless to say that modern irrigation systems are not the most suitable systems to use. Therefore, The decision here was to choose three types to improve surface irrigation systems; Gated, perforated and siphon systems to compensate for the huge amount of leaching requirements. Needless to say that sprinkler and trickle systems are not the most suitable systems to improve the irrigation process under these conditions. Where the gated pipes, perforated pipes as well as the siphon pipes associated with manipulated strips areas and long furrows were applied to improve the irrigation efficiency. The laser technology was used to smooth the ground level at certain values. Factors and variables related to the irrigation system and irrigated area, likewise, soil bed preparation, ground slope, stream size and run length cutoff time were studied considering conserving water and energy and increasing crop production and/or irrigation system efficiency.

Land preparation and precision land leveling are considered the main factors affect the irrigation efficiencies of surface irrigation systems. Many studies were carried out to increase irrigation efficiencies to achieve the economic use of water.

El-Gindy *et al.* (1996) concluded that precision land leveling with 0.03% slope along with seed bed preparation by two passes with a chisel plough. One pass with a disk harrow had the following advantages: 1- water saving of 20% for wheat and 22% for maize. 2- Increased application efficiency of 28% for wheat and 27% for maize. 3-Increased yield of 30% for wheat and 47% for maize. 4- Increased water use efficiency of 44% for wheat and 59% for maize and 5- Reduced irrigation time by 35% for wheat and 33% for maize.

Omara (1997) found that the irrigation application efficiency and irrigation distribution efficiency increased to 72.5 percent and 92 percent respectively by using gated pipe system through furrow irrigation.

Hassan (1998) said that The use of gated pipe system is claimed to be one of the ways to improve the efficiency of surface irrigation method. He also found that the maximum water uniformity distribution along the 6 inch (150 mm) perforated pipe, is obtained from the 18 meter length, 0.81 area ratio, 118 slenderness ratio and pump unit discharge 100 m^3/h at positive slope.

Awad and Goma (2004) evaluated long strips and long furrows of three lengths of 50, 100 and 150 m, laser leveled field compared with traditional land leveling. In clay soil, they found that: 1- The amount of the applied water increased when the furrow or strip length increased for the same discharge rate. 2-the water application efficiency decreased by increasing the furrow length at constant flow rate. The 50 m furrow length for laser land leveling had the best water application efficiency of 82.9%. 3-water use efficiency (WUE) of maize increased by laser leveling, furrowing and 50 m furrow length in both seasons.

Kassem and El-Khatib (2000) found that the maximum crop yield of corn occurred for the 0.1% soil surface slope and 2.1 L/S discharge rate for furrow length 100 m and 150 m, while it occurred for the 1.4 L/S for the 50 m furrow length the application efficiency and water distribution efficiency increased by increasing the discharge rate and soil surface slope and by decreasing the furrow length.

El-Tantawy et al. (2000) reported that using perforated pipes have appositive effect on increasing agricultural production by increasing yield per unit area, and through saving water in order to irrigate more area.

Gamal *et al.* (2002) showed that the land leveling treatments highly significantly affected the ear length, ear diameter and the number of kernels/row. The 0.1% slope treatments recorded the highest values on yield components. While, traditional land leveling recorded the lowest ones. Land leveling treatments had a significant effect on maize grain yield. The 0.1% ground surface slope and zero level treatments increased maize grain yield.

Imara *et. al.,* 2003 studied the effect of different leveling and planting methods on yield and water requirements for sugar beet crop. They reported that the laser leveling methods increased the water use efficiency, the effective field capacity, field efficiency, planting costs and root and/or sugar yield.

El-Raie *et. Al.,* 2004 carried out an experiment under the conditions of Fayoum Governorate where they aimed to choose the most suitable precision laser land leveling to increase the sunflower yield and decrease the amount of water and energy cost per unit area. They examined five land leveling (traditional, 0, 0.01, 0.02 and 0.03 %). They reported that the 0.03% treatment used the lowest irrigation water quantity (1166 m^3/fed) where the 0.02 % achieved the highest water use efficiency (80 kg/ m^3). The highest yield being 987 kg/fed was obtained with the 0.02 % slope. The lowest energy requirement was 30.33 kw.h/fed at 0.03 % slope.

Meleha (2000) stated that yield of cotton was not affected significantly by furrow length treatments. It was noticed that increasing irrigation run length led to decrease the mean values of cottonseed yield.

El-Mowelhi *et al*. (1999-c and d) summarized that maize crop (as a furrow system) achieved the highest values of crop water use efficiency and field water use efficiency followed by wheat crop (as a border system). It could be concluded, under the condition of this study that precision land leveling of 0.1 % ground surface slope, 100 m irrigation run length, 10 m of irrigation width and 4 *l*/s/m of stream size achieved the highest values of irrigation efficiencies. The highest values of water consumptive use efficiency were accompanied with the highest values of maize yield, less amounts of water consumed and lowest amount of irrigation water delivered.

El-Mowelhi *et al*. (1999-a) carried out a study to suggest the suitable design of border strips (lengths and widths, different stream sizes and leveling practices). The results showed that the maximum amounts of water losses were achieved from combination between border width of 5 m, stream size of 2 *l*/s and irrigation run length of 200 m under traditional land leveling. The ideal optimum condition case was detected from the combination treatment, stream size of 4 *l*/s and border length of 100 m under precision land leveling.

Raghuwanshi and Wallender (1998) observed that, for a given set of field and crop conditions furrow inflow rate and cutoff time are the decision variables. The goal is to minimize seasonal irrigation cost for a prescribed irrigation adequacy of 80% at cutoff time by optimizing inflow rate for each irrigation events during the cropping season.

The project objectives may be summarized as follows:

A. Leveling part of the college new established farm in the "Kalabsho and Zayan" area using laser technique.

B. Establish a research learning extension fields serve the educational process for undergraduates and postgraduates. (i.e. one for Gated pipes, one for perforated pipes and one for siphon pipes) to serve the educational process.

C. Study the effect of land preparation and laser leveling treatments on crop yield and water use efficiency (WUE).

MATERIALS AND METHODS

The project team made several contacts with local agents in order to ensure selection of the most suitable set of equipment for the project.

1. **Gated pipes*:***

A complete 36 meter set of gated pipes was purchased. The set consisted of 6 aluminum pipes. Each pipe is 6 inches in diameter and has 8 plastic gates spaced at 75 cm apart. The plastic gates are to be adjusted to control the flow. A 6 inches gated valve with accessories were purchased to connect the gated pipes irrigation line with the main irrigation supply line established in the college farm.

2. Perforated pipes:

A complete 24 meter set of perforated pipes was purchased. The set consisted of 4 aluminum pipes. Each pipe is 4 inches in diameter and has 8 gates spaced at 75 cm apart. The gates have constant openings to give constant flow. A 4 inches gated valve with accessories was purchased to connect the perforated pipes irrigation line with the main irrigation supply line established in the college farm.

3. Siphon pipes:

A hundred and twenty meters of plastic pipes (2 inches in diameter and 3.9 mm wall thickness) were purchased to form the siphon pipes. These plastic pipes were then cutted down into 2 meters lengths giving a total of 60 pieces. Each length was plugged at one end and the pipes were then filled with sand. The other pipe end was plugging too. A gypsum template was prepared to form

The final shape of siphons. Each pipe was then heated to a suitable temperature. Then it was placed in the gypsum template and cooled down using a piece of wet clothes. When the final form of siphons were established, the pipes were emptied from hot sand and washed thoroughly in a basket of water.

The gated pipes as well as the perforated pipes were installed in the specified areas in the college farm. The necessary ditches were dugged to connect these irrigation systems to the farm main irrigation supply line. A special canal was prepared to be used with the siphon pipes.

Field Experiments

The experimental areas were ploughed using the rotary plough in two directions. The laser equipment was then used.

Two field experiments were carried out during the winter seasons at the college new established farm in Kalabsho and Zayan area.

1. Soil physical and chemical analysis:

Soil samples were taken from the soil profiles marked as: 0-20, 20-40, and 40-60 cm. Three samples were then analyzed to obtain the particle size distribution, soluble cations and anions, cation exchange capacity, pH, organic matter, total carbonate and electric conductivity (EC). The international method was used to obtain the particle size distribution of soil samples (Piper, 1950). The chemical analyses of soil samples were carried out according to Jackson (1967). Soil mechanical analysis, chemical and physical properties of the experimental sites are presented in Tables (3.1) and (3.2). Table (3.3) shows the chemical analysis of the irrigation water.

Table 3.1 Soil mechanical properties of the experimental site.

Soil depth, cm	Mechanical analysis				Soil texture	Organic matter %
	Sand %		Silt %	Clay %		
	coarse	fine				
0 – 20	77.96	12.80	3.87	5.37	Sandy	0.72
20 – 40	77.94	12.82	3.86	5.38	Sandy	0.71
40 - 60	77.95	12.81	3.85	5.39	Sandy	0.71

The soil field capacity, wilting point and available water (W/W %) were estimated by using the core method before planting and after harvesting. The field capacity and wilting point were determined using pressure extractor with regulated air pressure, Garcia (1978). It is of great importance to mention that sea water intrusion is marking the farm soil area and the EC of irrigation water is very high (7.1 dSm^{-1} , Table 3.3). The water table is very high; 50 cm. In some places salt patches were noticed accumulated on soil surface. SAR values are very high too. So, the salinity hazard is very high.

2. Experimental treatments:

The dimensions of each experimental plot were 50 m in length and 6 m in width.

Land leveling treatments:

Three treatments of land leveling were established as follows:

a) 0.1 % ground surface slope (10 cm/100 m)

b) 0.15 % ground surface slope (15 cm/100 m)

c) 0.2 % ground surface slope (20 cm/100 m)

Stream size treatments:

Two levels of stream size were used as follows:

a) Stream size of 2ℓ/s/m width strip

b) Stream size of 3ℓ/s/m width strip

Cutt-0ff stream of irrigation treatments:

Two levels of cut-off stream were used as follows:

a) Shut down irrigation systems whenever the advance reaches 80% of strip length

b) Shut down irrigation systems whenever the advance reaches 90% of strip length

3. The experimental design:

A strip strip plot design in three replicates was implemented in this study only with the gated pipes extension field. The main plots were devoted to land leveling treatments, while subplots were devoted to stream size treatments, and sub-subplots were specified to cut off irrigation stream treatments. The dimensions of each experimental plot were 50 m in length and 6 m in width.

Furrow irrigation system was tested with squash crop (Eskandarany variety), where Wheat crop (Giza 68 variety) was planted on traditional flat bed surface. All agricultural operations such as fertilization, weed and insects control were the same as recommended for all treatments.

The necessary observations on wheat and squash growth were carried out. Squash crop was tested with the gated pipes irrigation system.

4. learning extension fields:

One of the project objectives is to prepare learning extension fields to serve the educational process for undergraduates and postgraduates. Therefore three learning extension fields were established. One was for the gated pipes irrigation system. The second used the perforated pipes irrigation system and the third was for the siphon pipes irrigation system.

5. Experimental measurements:

5.1 Wheat experiments:

The following measurements were taken under the gated, perforated and siphon irrigation systems:

1. Grain yield (ton/faddan)
2. WUE for wheat grain (kg/m^3)

5.2 Squash experiments:

The following measurements were carried out under the gated pipe irrigation system:

1. Squash fresh yield (Kg/faddan)
2. WUE for Squash (kg/m^3)

RESULTS AND DISCUSSION

1. Wheat experiments:

1.1 Grain yield:

Table 3.4 shows means and significance of wheat grain yield for the interaction between land leveling and stream size treatments. The land leveling treatments affected significantly (P >= 0.99) the wheat grain yield. Nevertheless, the stream size treatments had no effect on grain yield. The highest grain yield was attained with the 0.2 % slope.

Table 3.5 shows means and significance of wheat grain yield for the interaction between land leveling and cut-off irrigation treatments. Both treatments of land leveling and cut-off irrigation affected significantly (P >= 0.99) the wheat grain yield. The results of the highest grain were consistent where the highest value was obtained with the 0.2 % slope.

Table 3.6 shows means and significance of wheat grain yield for the interaction between cut-off irrigations and stream size treatments. The cut-off irrigations treatments affected significantly (P >= 0.99) the wheat grain yield. However, the stream size treatments had no effect on grain yield. The highest grain yield was attained with the 90 % cut-off treatment.

Table 3.4 Means and significance of wheat grain yield (kg/faddan) for the interaction between land leveling and stream size treatments

**** Highly significant at 1% level**
NS Not significant

Treatments	Stream size		significance
	2 ℓ/s/m	**3 ℓ/s/m**	
Land leveling			
0.1 % slope	1824	1824.33	NS
0.15 % slope	1895.33	1896	
0.2 % slope	1969.67	1969	
Significance	**		

Table 3.5 Means and significance of wheat grain yield (kg/faddan) for the interaction between land leveling and cut-off irrigation treatments

Treatments	**cut-off at**		**significance**
	80%	**90%**	
Land leveling			
0.1 % slope	1781.33	1820.67	**
0.15 % slope	1853	1891	
0.2 % slope	1940.67	1971	
Significance	**		

**** Highly significant at 1% level**

Table 3.6 Means and significance of wheat grain yield (kg/faddan) for the interaction between stream size and cut-off irrigation treatments

Treatments	**cut-off at**		**significance**
	80%	**90%**	
Stream size			
2 ℓ/s/m	1860.67	1891.33	**
3 ℓ/s/m	1861.33	1891	
Significance	NS		

**** Highly significant at 1% level**
NS Not significant

1.2 Water use efficiency (WUE):

Table 3.7 shows means and significance of wheat water use efficiency for the interaction between land leveling and stream size treatments. The land leveling treatments affected significantly (P >= 0.99) the water use efficiency. Nevertheless, the stream size treatments had no effect on WUE. The highest WUE was attained with the 0.2 % slope.

Table 3.7 Means and significance of water use efficiency (kg grain/m^3) for the interaction between land leveling and stream size treatments

Treatments	Stream size		significance
	2 ℓ/s/m	3 ℓ/s/m	
Land leveling			
0.1 % slope	0.804	0.804	NS
0.15 % slope	0.833	0.834	
0.2 % slope	0.837	0.838	
Significance	**		

**** Highly significant at 1% level**
NS Not significant

Table 3.8 shows means and significance of wheat water use efficiency for the interaction between land leveling and cut-off irrigation treatments. Both treatments of land leveling and cut-off irrigations affected significantly (P >= 0.99) the wheat water use efficiency. The results of the highest WUE were consistent where the highest value was obtained with the 90 % cut-off treatments.

Table 3.8 Means and significance of water use efficiency (kg grain/ m^3) for the interaction between land leveling and cut-off irrigation treatments

Treatments	cut-off at		significance
	80%	90%	
Land leveling			
0.1 % slope	0.801	0.804	**
0.15 % slope	0.807	0.810	
0.2 % slope	0.814	0.816	
Significance	**		

**** Highly significant at 1% level**

Table 3.9 shows means and significance of wheat water use efficiency for the interaction between cut-off irrigations and stream size treatments. The cut-off irrigations treatments affected significantly (P >= 0.99) the wheat WUE. However, the stream size treatments had no effect on grain WUE. The highest WUE was obtained with the 90 % cut-off treatment.

2. Squash experiments:

2.1 Squash yield:

Table 3.10 shows means and significance of squash yield for the interaction between land leveling and stream size treatments. The land leveling treatments affected significantly (P >= 0.99) the squash yield.

Nevertheless, the stream size treatments had no effect on squash yield. The highest yield was attained with the 0.2 % slope.

Table 3.9 Means and significance of water use efficiency (kg grain/ m^3) for the interaction between stream size and cut-off irrigation treatments

Treatments	cut-off at		significance
	80%	90%	
Stream size			
2 ℓ/s/m	0.806	0.808	**
3 ℓ/s/m	0.805	0.808	
Significance	NS		

**** Highly significant at 1% level**
NS Not significant

Table 3.10 Means and significance of squash yield (kg/faddan) for the interaction between land leveling and stream size treatments

Treatments	Stream size		significance
	2 ℓ/s/m	3 ℓ/s/m	
Land leveling			
0.1 % slope	2570.67	2571	NS
0.15 % slope	2600.67	2601	
0.2 % slope	2632.67	2631.33	
Significance	**		

**** Highly significant at 1% level**
NS Not significant

Table 3.11 shows means and significance of squash yield for the interaction between land leveling and cut-off irrigations treatments. Both treatments of land leveling and cut-off irrigations affected significantly (P >= 0.99) the squash yield. The results of the highest yield were consistent where the highest value was obtained with the 0.2 % slope.

Table 3.11 Means and significance of squash yield (kg/faddan) for the interaction between land leveling and cut-off irrigation treatments

Treatments	cut-off at		significance
	80%	90%	
Land leveling			
0.1 % slope	2530.67	2560.33	**
0.15 % slope	2565.33	2600	
0.2 % slope	2600	2634.67	
Significance	**		

**** Highly significant at 1% level**

Table 3.12 shows means and significance of squash yield for the interaction between cut-off irrigations and stream size treatments. The cut-off irrigations treatments affected significantly (P >= 0.99) the squash yield. However, the stream size treatments had no effect on squash yield. The highest yield was attained with the 90 % cut-off treatment.

Table 3.12 Means and significance of squash yield (kg/faddan) for the interaction between stream size and cut-off irrigation treatments

Treatments	cut-off at		significance
	80%	**90%**	
Stream size			
2 ℓ/s/m	2600	2601	**
3 ℓ/s/m	2599.33	2600.67	
Significance	NS		

**** Highly significant at 1% level**
NS Not significant

2.2 Water use efficiency (WUE):

Table 3.13 shows means and significance of squash water use efficiency for the interaction between land leveling and stream size treatments. The land leveling treatments affected significantly (P >= 0.99) the water use efficiency. However, the stream size treatments had no effect on WUE. The highest WUE was attained with the 0.2 % slope.

Table 3.13 Means and significance of water use efficiency (kg squash/ m^3) for the interaction between land leveling and stream size treatments

Treatments	Stream size		significance
	2 ℓ/s/m	**3 ℓ/s/m**	
Land leveling			
0.1 % slope	1.019	1.020	NS
0.15 % slope	1.025	1.024	
0.2 % slope	1.029	1.028	
Significance	**		

**** Highly significant at 1% level**
NS Not significant

Table 3.14 shows means and significance of squash water use efficiency for the interaction between land leveling and cut-off irrigation treatments. Both treatments of land leveling and cut-off irrigations affected significantly (P >= 0.99) the squash WUE. The results of the highest WUE were consistent where the highest value was obtained with the 90 % cut-off treatments.

Table 3.15 shows means and significance of squash water use efficiency for the interaction between cut-off irrigations and stream size treatments. The cut-off irrigations treatments affected significantly (P >= 0.99) the squash WUE. However, the stream size treatments had no effect on squash WUE. The highest WUE was obtained with the 90 % cut-off treatment.

Table 3.14 Means and significance of water use efficiency (kg squash/ m^3) for the interaction between land leveling and cut-off irrigation treatments

Treatments	cut-off at		significance
	80%	90%	
Land leveling			
0.1 % slope	0.977	0.981	**
0.15 % slope	0.988	1.000	
0.2 % slope	1.000	1.012	
Significance	**		

** Highly significant at 1% level

Table 3.15 Means and significance of water use efficiency (kg squash/ m^3) for the interaction between stream size and cut-off irrigation treatments

Treatments	cut-off at		significance
	80%	90%	
Stream size			
2 ℓ/s/m	0.974	1.000	**
3 ℓ/s/m	0.975	0.998	
Significance	NS		

** Highly significant at 1% level
NS Not significant

CONCLUSIONS

The work outcomes may be summarized as follows:

1) Level 5 Faddans of the faculty new farm using laser technique and three slopes(0.1 % - 0.15 % - 0.20 %).
2) Esablish three extension learning fields to assist in practical classes as well as training students. These fields uses three irrigation systems; gated, perforated and siphon pipes.
3. Results of field experiments showed that land leveling treatment of 0.2 % had the highest significant effect on crop yield either with wheat crop and/or squash crop. Stream size treatments had no significant effect on wheat and squash crop yield. Cut-off irrigation treatment of 90 % had the highest effect on crop yield either with wheat crop and/or squash crop.
4. Similar consistent results were obtained with water use efficiency factor.

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تحسين نظام الري السطحي بمزرعة كلية الزراعة الجديدة بمنطقة قلابشو وزيان

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نظرا لتوسعات انشاء مباني الكليات الجديدة في الحرم الجامعي بمدينة المنصورة فقد تقلصت مساحة مزرعة الكلية لحساب المنشآت الجديدة ، ومن ثم فقد خصصت محافظة الدقهلية مساحة قدرها ١٥٠ فدان شمالا علي ساحل البحر الأبيض المتوسط بمنطقة قلابشو وزيان. وخلال الفترة السابقة شاركت الأقسام العلمية في تحديد خصائص هذه المزرعة من حيث نوعية التربة ومياه الري وطبيعة المحاصيل التي يمكن زراعتها ..الخ والاستغلال الأمثل لهذه المزرعة. وقد تم رفع مناسيب هذه المساحة ووجد أن هناك فرق مناسيب يتراوح من ٢٠ سم وحتي ٢ ، ٣ متر في بعض المناطق ، كما أن الأرض رملية ملحية (٧ < pH < ٨) تبعد عن ساحل المتوسط حوالي ٢ كم وتتداخل مياه البحر(٤٠٠٠٠ جزء في المليون) مع المياه الجوفية ليصل ارتفاع منسوب هذه المياه الجوفية الي ٥٠ سم في بعض المناطق ، كما أنها في البعض الآخر عبارة عن سياحات من الملح. كما أن مصدر مياه الري خليط من مياه النيل مع الصرف الزراعي(مصرف رقم ٢ جمصه) وتتذبذب ملوحة هذا المصدرمن ١٠٠٠-٣٠٠٠ جزء في المليون علي مدار العام ، وتتراوح نسبة ادمصاص الصوديوم من ٤-١٠ طبقا لقياسات معمل الملوحة الأمريكي, وأمام تحدي هذه الطبيعة والإصرار علي استغلال هذه المساحة في تدريس الدروس العملية وتدريب الطلاب فقد تم تخصيص جزء تعليمي للري بالرش وآخر للري بالتنقيط والباقي ري بالغمر. حيث أن المحاصيل تموت بفعل الملوحة والذي يصح تكون انتاجيته قليلة جدا ، وغني عن الذكر أن الري الحديث باستخدام الرش أو التنقيط لايعتبرا أنسب الخيارات في هذه الحالة . لذا فقد تقدمنا بمشروع لتحسين نظام الري بالمزرعة وذلك بتمويل من وحدة البحوث بالجامعة بمبلغ عشرون ألفا من الجنيهات لتحقيق الأهداف التالية:

١) تسوية مساحة خمسة أفدنة من مزرعة كلية الزراعة الجديدة بمنطقة قلابشو وزيان تسوية دقيقة باستخدام أشعة الليزر مع عمل الميول المناسبة لسطح التربة بما يتلائم مع نظام الري السطحي المحسن الذي سوف يتم استخدامه.

٢) تجهيز المساحة الخاصة بالمشروع كحقل ارشادي نموذجي لتحسين نظام الري السطحي بالمزرعة(ري بالشرائح – ري بالخطوط) باستخدام الأنابيب ذات البوابات والأنابيب ذات الفتحات وأنابيب السيفون. وذلك لاستخدامه في التدريس والتدريب.

٣) دراسة تأثير معاملات التسوية الدقيقة بالليزر وبعض معاملات الري علي انتاجية بعض المحاصيل وكفاءة استخدام مياه الري.

حيث قام الفريق البحثي بمراجعة الدراسات السابقة والخاصة بمجال البحث ، وكذلك تحديد مواصفات الأجهزة والمواد المراد شراؤها. ثم تم اعداد موقع التجارب بمزرعة كلية الزراعة التي أنشأت حديثا بمنطقة قلابشو وزيان. وقد تم اعداد الأرض وحراثتها بالمحراث الدوراني في اتجاهين متعامدين ، ثم تمت تسويتها الدقيقة باستخدام تقنية الليزر علي ثلاثة مستويات لانحدار التربة (١و٠ % - ١٥و٠ % - ٢و٠ %). والقيام بتركيب أجهزة الري التي تمثلت في نظاما

للري باستخدام الأنابيب المبوبة ، ونظاما للري باستخدام الأنابيب المثقبة ، ونظاما للري باستخدام أنابيب السيفون . كما تم إجراء تحليلات التربة والمياه في هذه المنطقة. وبداية التجارب حيث تم زراعة محصولي القمح والكوسة. وتطبيق معاملات التجارب ومراقبة عمليات الإنبات والنمو .

يمكن تلخيص أهم نتائج هذا البحث في النقاط التالية:

١) بينت نتائج التجارب أن هناك فروق معنوية جدا (احتمالات ٩٩ %) في الانتاجية وكفاءة استخدام المياه بين معاملات التسوية وكذلك معاملات ايقاف عملية الري تبعا لتقدم جبهة المياه ، أما بالنسبة لمعاملات الري ٢ ، ٣ لتر/ث/م من عرض الشريحة فلاتوجد فروق معنوية ولم تؤثر سواء علي الانتاجية أو كفاءة الاستخدام.

٢) أثرت معاملات التفاعل بين عوامل الدراسة بطرق مختلفة علي الانتاجية وكفاءة استخدام المياه. حيث حققت معاملة التسوية ٢و٠ % ، ومعاملة ايقاف الري عندما تصل جبهة تقدم المياه الي ٩٠ % من طول الشريحة أعلي الانتاجية وأعلي كفاءة لاستخدام مياه الري مع المحاصيل قيد الدراسة (القمح – الكوسة).

شكر: يشكر قسم الهندسة الزراعية - كلية الزراعة – جامعة المنصورة وحدة البحوث بالجامعة علي تمويل عمليات تحسين الري بمزرعة الكلية الجديدة