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PERFORMANCE OF LOCALLY DEVELOPED SURFACE IRRIGATION IN SUGARCANE PRODUCTION.

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ABSTRACT

The experimental fieldwork was conducted in sugarcane production areas in Upper- Egypt as Qena and Aswan Governorates. The objectives of this work were studying the performance of developed surface irrigation system (DSIS) in different areas with different dimensions by using local components. The performance indicators were, land losses, amount of irrigation water, irrigation time, fuel consumption and capital investment. The tested areas were about 5, 10, 20 and 35 feddans, each with different dimensions in three cases, since the field length is the effective parameter.

The results indicated that by using developed surface irrigation system:

1- The saved agricultural land through different treatments ranged from about 6% to 12 % which were occupied by the channels and ridges.

2 - Applied irrigation water was decreased and the savings ranged from 30.54% to 37.37% under different treatments compared with traditional irrigation system. Data also showed that the applied water increased with increasing field length. It ranged from 7120 to 8132 m^3/fed/year, while in case of traditional irrigation system (TIS) it ranged from 10250 to 12974 m^3/fed/year.

3 - The irrigation time decreased by decreasing field length by 28% to 38.82% under different treatments compared with traditional irrigation system.

4 - The same trend was shown for the fuel consumption of pumping units in case of the developed surface irrigation system. It was saved by 27.27% to 34.70%.

5 - The capital investment using the developed surface irrigation system increased by increasing field length and decreased area.

Keywords: Surface irrigation – Perforated pipe – Geometrical land shapes - Agricultural land losses - Water applied - Irrigation time – Fuel consumption – Capital investments.

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INTRODUCTION

Egypt is mainly an agricultural country, in which agricultural and irrigation technologies play an important role in supporting national economy. Irrigation water consumes about 80% of the water budget for cultivating approximately 7.1 million feddans with an annual crop area of about 12 million feddans. About 5.05 million feddans is old land irrigated by surface irrigation methods. In Egypt, fluctuation of surface elevations in agricultural fields is plus or minus 15 cm from a smooth plane.

General Administration of Agricultural Economics (1997-2004) reported that sugarcane is considered a highly water consuming crop in Egypt, especially under the conventional irrigation method. The applied irrigation water for sugarcane is estimated to be 12000 to more than 16000-m^3/ fed./ year. The total sugarcane area in Egypt is about 300 thousand feddans.

Developed surface irrigation system was necessary for water management in sugarcane areas. It uses perforated pipes in which the conventional head ditch and precision land leveling are used in furrow irrigation on sugarcane in Upper Egypt.

Early in 1970, Hanna and Elawady estimated land saving by over 10 % due to using developed surface irrigation by long furrows.

Kholeif et al. (1997) showed that modern irrigation systems in sugarcane under Upper Egypt conditions gave highest cane yield and quality. Also, they reported improved surface irrigation in strips as it was less in initial investment, easily managed and suits the skills in the sugarcane area. Water saving was 31 % compared with conventional method. Smathers et al. (1995) summarized developed surface irrigation systems in furrow irrigation are five: These systems include: siphon tube system with concrete and earthen head ditches, a gated pipes system, a surge flow gated pipes system, and a cablegation pipes system. The advantage of gated pipes is that it may be temporarily removed to eliminate restrictions on equipment travel. Gated pipes can also be located at intermediate locations within a field to reduce furrow lengths and increase application uniformity and efficiency. Morcos et al. (1994) and Hassan (1998) stated that the use of perforated tubes is claimed to be one of the ways to improve the efficiency of surface irrigation methods (borders and furrows). The perforated pipes system is a simplified type of gated pipes system. It is mainly constructed of a portable line, which could be handled in the field. The pipeline usually has uniformly spaced outlet and usually of aluminum or P.V.C pipe. El-Yazel et al. (2002) reported that the perforated pipes have a positive effect on increasing agricultural production by increasing yield per unit area and saved water in order to irrigate more areas. Hassan (2004) reported that the water application efficiency for gated pipes system increased because the gated pipes facilitate control of size stream delivered and get fairly uniform distribution discharge along the border width. El-Tantawy et al. (2000) reported that in clay soil to evaluate surface irrigation method under different discharges of perforated pipes compared with traditional irrigation on sugarcane crop, the crop yield increased with percentages of (9.0 %, 11.2% and 13.1%) and (14.9%, 17.3% and 19.0%) under different discharges of 0.6, 0.8 and 1.0 l/s per single orifice. Also sugar percentage increased by (3.01%, 6.27% and 8.27%) and (14.56%, 17.18% and 21.72%) under different discharges 0.6, 0.8 and 1.0 l/s per single orifice, compared with traditional irrigation in two seasons 1998/1999 and 1999/2000 respectively.

Smathers et al. (1995) reported that capital investment costs per acre for the irrigation systems are inversely proportional to the length of the field runs. With longer runs, total investment is spread over a greater number of acres. This may be economic incentive to increase run lengths, but physical factor such as field shape, soil type, slope, and performance factors such as application uniformity; leaching, runoff and erosion should also be addressed. Capital requirements for the gated pipes system ranged from $202.60 per acre for the 660-foot (201 m) run to $101.3 for the 1320-foot (402 m) run. Hoffmann and Willett (1998) stated that the capital investment required to purchase and install a complete system ranged from a low of $27,217 ($340 per acre) for the PVC gated pipes to a high of $98,530 ($1,095 per acre) for the linear move. When compared four systems (gated pipes 80 acres – wheelline 80 acres – center pivot 130 acres – linear move 90 acres). Hoffmann (1998) and Smathers et al. (1995) advised that operating costs include maintenance, labor, water, power, and interest, also ownership cost including depreciation, interest property taxes, and insurance. Osman (2002) stated that the economic efficiency for capital investment in improved surface irrigation using gated pipes in a cotton crop, wheat, corn and rice increased by 109.5%, 90.4%, 156.2% and 67.2% respectively as compared with 21.6%, 38.2%, 19.1% and 18.1% respectively in case of traditional method. The economically efficiency, for water use in developed surface irrigation using gated pipes in a cotton crop, wheat, corn and rice increased by 97%, 82.3%, 70.5% and 15.6% respectively as compared with 14.4 %, 22.8%, 7.3% and 3.3% in traditional irrigation respectively.

Smathers et al. (1995) and Elebaby (1986) concluded that effective units on capital investment costs are well, pump and irrigation system components. The capital investment costs per unit area can be calculated according to the following formula:

$$I_n / feddan = \frac{1}{A}\left(p_1 + p_2 + x\right) \quad .....(1)$$

Where:

I_n = Total investment per feddans to establish an irrigation system (L.E/fed).

A = Irrigation area in feddans. P_1 = Well costs (L.E)

P_2 = Pump costs (L.E) x = Irrigation system components cost (L.E)

There is a wide variation of sugarcane production areas in Upper Egypt with different geometrical shapes, accordingly the inheritance system between families there. The objectives of this work were studying the performance of developed surface irrigation system (DSIS) in different areas with different dimensions by using local components.

MATERIALS AND METHODS

The field experimental work was conducted in sugarcane areas in Upper-Egypt (Qena and Aswan Governorates) during the growing seasons 2001 to 2004. To realize the objective of this work, twelve cases were considered as the following treatments, 5, 10, about 20 and about 35 feddans, each in three locations with different dimensions and regular rectangular (geometrical shapes). Fig.(1, 2, 3 and 4), table (1) show the details of dimensions in three cases of each area.

Table (1) The details of dimensions (width X length) and ratio (width/length) in three cases in each area.

Area, feddan	Case 1		Case2		Case3	
	Dimensions	Ratio	Dimensions	Ratio	Dimensions	Ratio
5	46.5 X 450	1/9.7	70 X 300	1/4.3	140 X 150	1/1.1
10	70 X 600	1/8.6	93 X 450	1/4.8	280 X 150	1.9/1
About 20	100 X 790	1/7.9	176 X 450	1/2.5	532 X 150	3.5/1
About 35	240 X 600	1/2.5	320 X 450	1/1.4	480 X 300	1.6/1

The following work was carried out in each case:

1 – Planning and designing each area in the three cases of dimensions.

2 - Determination and estimation of the land losses in each case before use developed surface irrigation system.

3 - Determination of amount of irrigation water, irrigation time and fuel consumption of the used pumping unit.

4 – Estimation of the capital investment under the different treatments.

The considered parameters in all cases were as follow:

Irrigation block length (run) was 150 m, soil-leveling slope was 0.1% using laser technique, and all materials and components were local and DSIS network from Aluminum pipes.

Developed surface irrigation system, specifications: -

A) The discharge side of the pumping unit was equipped with a priming valve, pressure gauge, and pressure manometer to measure flow head and pumping head. The specifications of the pumping unit, (pump and engines) are shown in table (2)

Table (2) The specifications of the pumping unit in different areas.

Area	Type of pump	Type of engine	Engine speed RPM	Motor power, hp	Max. discharge, m^3/h	Max. operating pressure. bar
5 and 10 fed.	Centrifugal, 6/6\\	Local-Diesel Shobra	1460	7.8	130	1.0
19 fed.	Centrifugal, 6/8\\	Diesel Shobra	1500	16	240	2.0
35 fed.	Centrifugal, 8/10\\	Diesel Helwan	1500	60	400	2.5

B) Main and sub-main lines were all Φ 6\\, 4 bars with aluminum equipped couplers to facilitate the connection on the surface.

C) Lateral lines were all Φ 6\\, 4 bars. Perforated orifices were circular shapes 25-mm diameter i.e. (4.9 cm^2 area) and 0.75 m spacing according to the sugarcane furrows. Manifolds were connected to perforated pipelines using group valve consisting of double or single unit 6\4\\. The specifications of these pipes are shown in table (3).

The sugarcane variety was Giza/Taiwan 54/C9 planted in rows, 0.75 meter spaces. The pilot areas were leveled using laser technique with 0.1% slope, The length of run (furrow) was 150m.

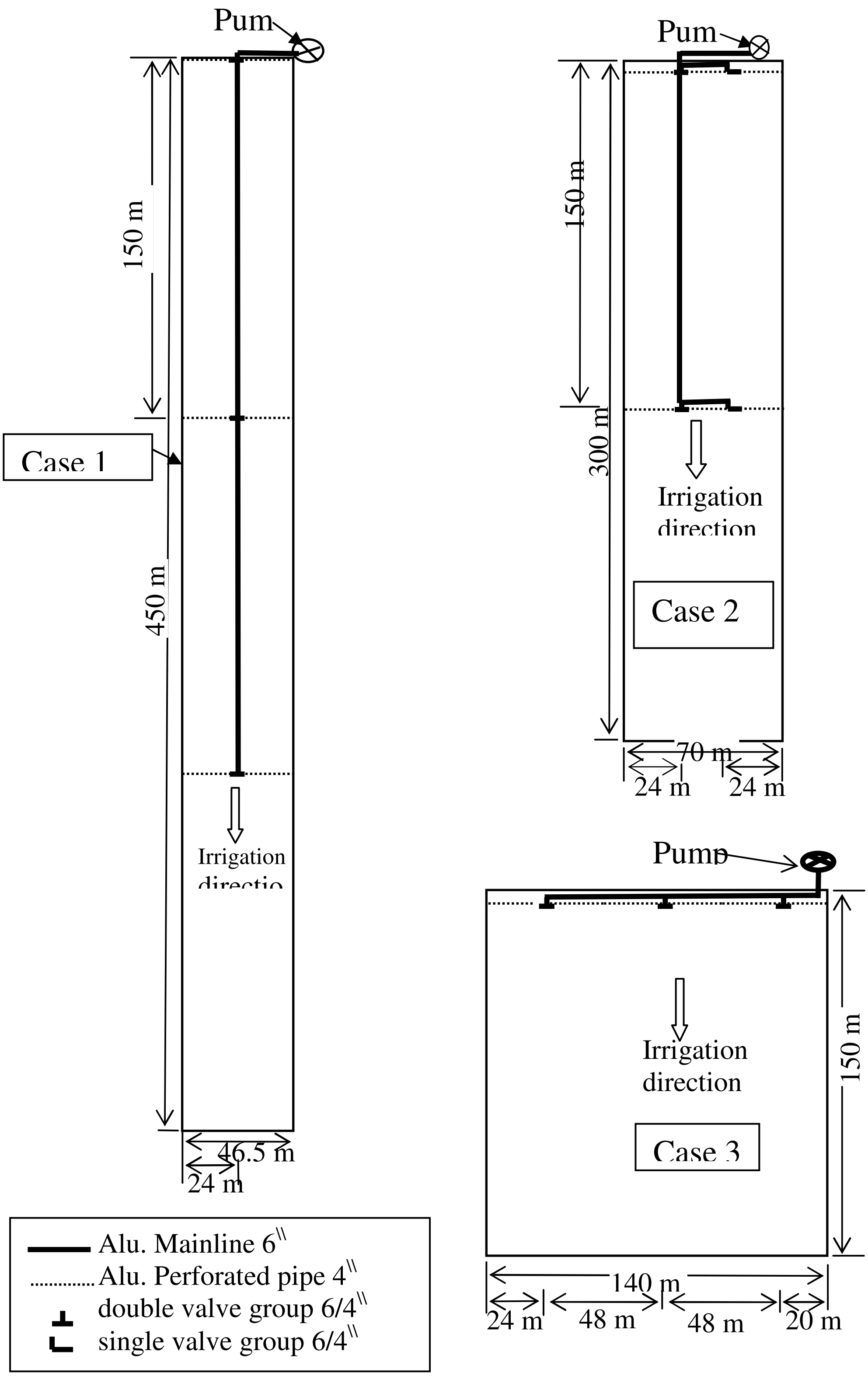


Fig. (1) Layout of developed surface irrigation systems (perforated pipes) design for sugarcane production with different dimensions of area 5 fed.

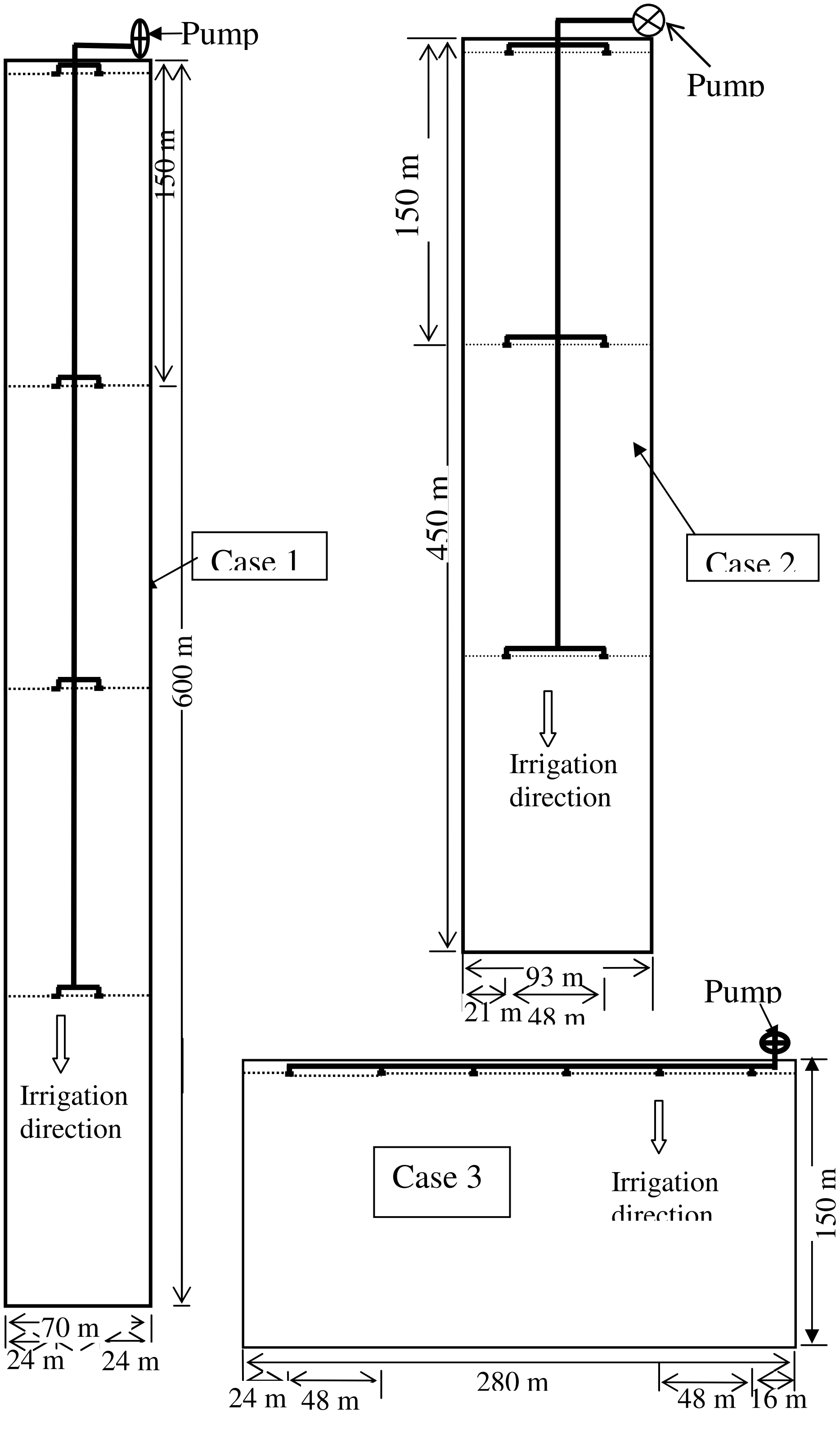


Fig. (2) Layout of developed surface irrigation systems (perforated pipes) design for sugarcane production with different dimensions of area 10 fed.

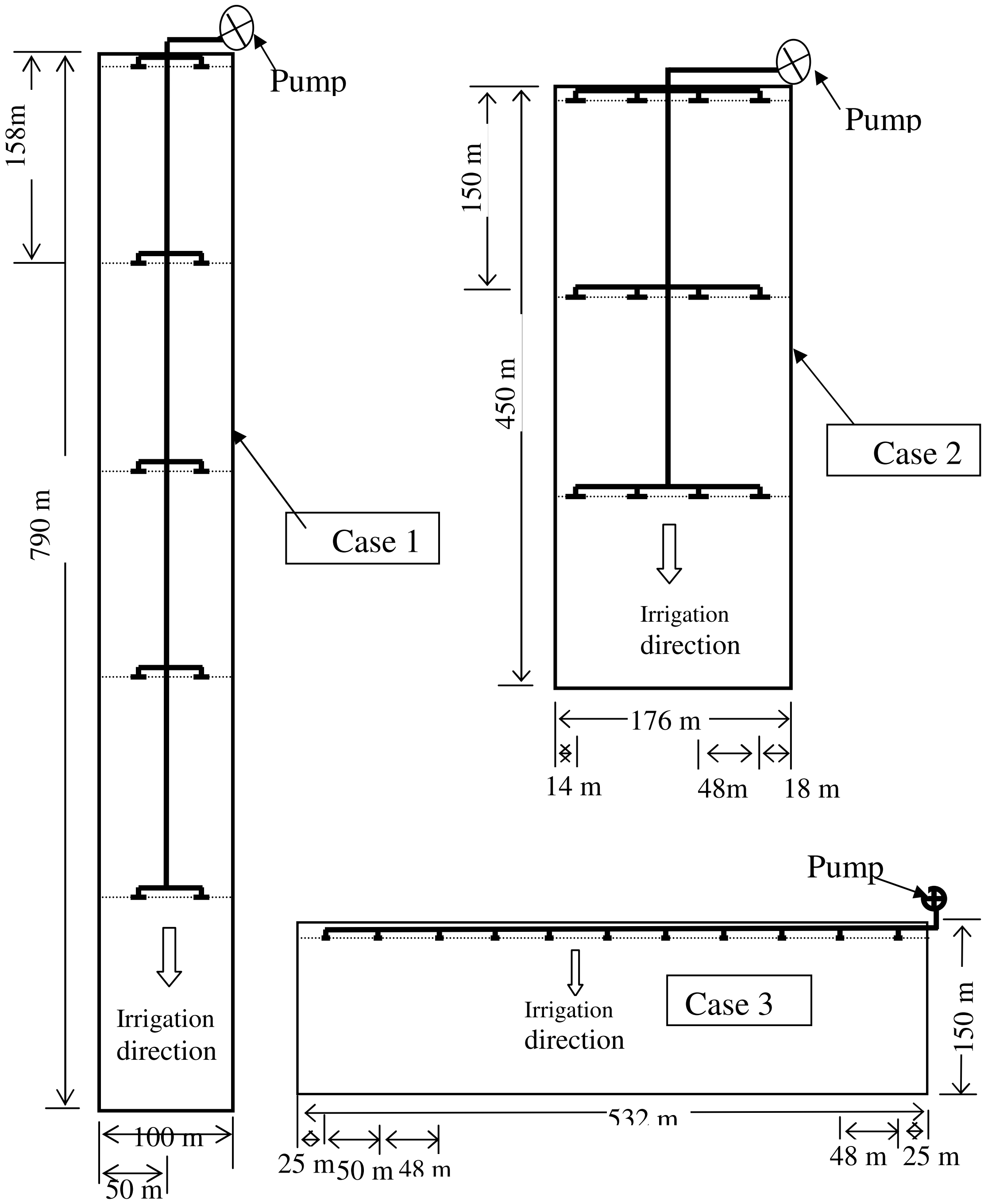


Fig. (3) Layout of developed surface irrigation systems (perforated pipes) design for sugarcane production with different dimensions of area 19 fed.

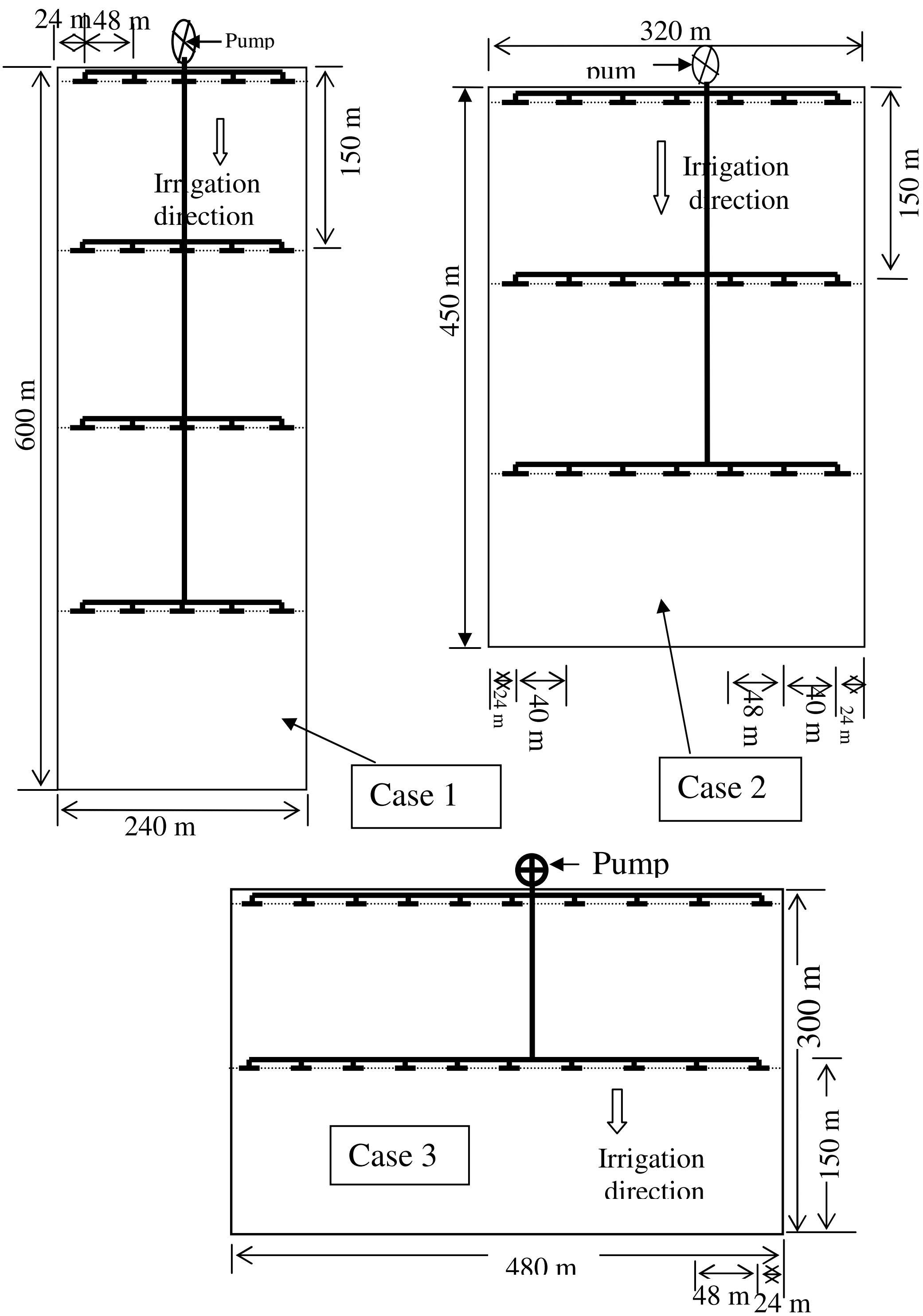


Fig. (4) Layout of developed surface irrigation systems (perforated pipes) design for sugarcane production with different dimensions of area 35 fed.

Table (3) The specifications of the pipes.

Material type	Pipe unit length, m	Outside diameter, mm	Inside diameter, mm	Thickness, mm	Max. operating head, bar
Aluminum	6.0	154	150	2	4
Aluminum	6.0	103	100	1.5	4

The physical and mechanical analyses of the soil samples were conducted at Soil and Water Research Institute, Agricultural Research Center, Giza. According to Black et al., 1965. The soil samples were taken until depth 60 cm to calculate the physical and mechanical properties such as, field capacity, wilting point and density. The results of each depth in all treatments indicated clay soil as shown in table (4).

Table (4) The physical and mechanical analyses of the soil. (Case 1— 5 fed.)

Depth, cm.	Mechanical analysis				Soil Type	Field capacity, %	Wilting point, %	Bulk density, g/cm^2	$CaCO_3$
	Clay	Silt	Sand						
			F.S.	C.S.					
0-15	56.71	19.53	16.20	7.56	Clay	36.50	17.60	1.12	3.00
15-30	58.24	20.42	15.13	6.21		37.20	18.40	1.15	3.50
30-45	55.90	22.06	16.00	6.04		35.51	19.52	1.16	2.98
45-60	60.02	21.04	14.42	4.52		35.64	18.67	1.17	2.56

Auxiliary equipments:

The auxiliary equipment utilized in the present work are as follows:

1- Land losses estimated with the traditional irrigation system, which occupy the channels and ridges by measuring length and width using tape in each area. Land losses (%)= (areas occupied by channels and ridges / total area) X 100.

2- The pump discharge and the irrigation time were determined by using flow meter and stopwatch.

3- Fuel consumption of each pump, was estimated of each case through refilling the engine tank after each irrigation.

Fuel con. (L/h) = volume of fuel consumption / irrigation time.

Fuel con. (L/fed.) = volume of fuel consumption / irrigated area.

4- Capital investments were estimated with eq. (1)

RESULTS AND DISCUSSION

1 - Planning and designing:

Data in table (5) show the components of the DSIS for different treatments. The number of the pipes 6\\ or 4\\ and the group valve units extrusive proportionally with areas, while inversely varied with decreasing field length, fittings system decreased per feddan by increasing area. The numbers of pipes 6\\ were 54, 39 and 22 as in cases 1, 2 and 3 respectively for 5 fed. area, while they were 204, 188 and 170 in cases 1, 2 and 3 respectively for 35 fed. area. In general, the components of the DSIS are proportional with the area and the field length. Figs. (1, 2, 3 and 4) show the layout of DSIS for different treatments.

2- Agricultural Land losses:

Data presented in table (6) and fig. (5) show the land losses in all treatments of traditional irrigation system (before applying the DSIS). Data show that the land losses increased by increasing the length of the field, while the land losses percentage decreased by increasing the area. It is clear that the increase in the DSIS area increased the saved area percentage in the small areas than the big ones. In general, for this reason the application of the DSIS has priority in the small areas then in big areas. In the private individual holdings, the saved land percentage ranged from about 6% as in case 3 for 35 fed. area up to 11.6% as in case 1 for 5 fed. area, while this percentage reached to 12% for collecting small holdings in case 1 for 35 fed. area. The application of the DSIS in accumulated areas is preferable to increasing the agricultural saved land. We can conclude that saved agricultural land through different treatments ranged from about 6% to 12 % (1.4 to 2.88 kirat/fed.) which occupy the channels and ridges. This agrees with the estimation of Hanna and Elawady (1970) who sized the land saving by more than 10%.

Table (6) Agricultural land losses percentage before applying the DSIS for different treatments.

Area, feddan	Case 1	Case 2	Case 3
5	11.62	10.59	9.40
10	10.94	9.94	8.10
About, 20	10.45	9.56	7.89
About, 35	12.0	6.66	5.99

3 - Amount of irrigation water:

Concerning the amount of applied water for different treatments, table (7) and figs. (6, 7, 8 and 9) show the amount of applied irrigation water for both traditional and developed surface irrigation systems. In the tested areas, the annual quantity of applied water per feddan decreased with decreasing the length of the field and this trend may be due to the decreased losses of water along the field (percolation and evaporation).

It is clear that this quantity increased with increasing the tested area, it was 10250 m^3/fed./year in case 3 for 5 fed. area while it was 10560 m^3/fed./year in case 3 for 10 fed. area. On the other hand, the results in table (7) and fig. (6, 7, 8 and 9) show that the quantity of applied water per feddan by using the DSIS was less than the use of traditional irrigation methods in all cases at different tested areas. The saved irrigation water in all treatments ranged from about 30% in case 3 for 5 fed. area up to 37% in case 1 for 10, 20 and 35 fed. area.

It is noted that the saved irrigation water percentage by using the DSIS increased by increasing the field length, it was about 35% in case 1 of 5 fed. area while it was about 30.5% in case 3 of 5 fed. area and the percentage was about 37.3% in case 1 of 20 fed. area while it was 31.7% in case 3 of the same area. In general, the amounts of applied irrigation water per fed. ranged from 7120 up to 8132 m^3/fed./year.

4 - Irrigation time:

According to the above discharge, the irrigation time (h/fed/year) is considered the clearest indictor for the saved irrigation water percentage. Concerning traditional surface irrigation systems, the maximum irrigation time was 160 h/fed/year in case 1 of 10 fed areas while the minimum time was 50 h/fed/year in case 3 of 35 fed area. The required irrigation time for one feddan is decreased with the decreased length of the field, it was 150, 141 and 126.5 h/fed/year in cases 1, 2 and 3 of 5 fed area respectively and it was 160.5 in case 1 of 10 fed area, while it was 137.7 in case 3 of the same area. On the other hand, the results in table (7) and figs. (10, 11, 12 and 13) show that the irrigation time per feddan by using the DSIS was less than in the traditional irrigation methods in all cases at different areas tested. The irrigation time was 100, 96 and 90 h/fed/year in cases 1, 2 and 3 of 5 fed area, while it was 39, 37.5 and 36 h/fed/year in cases 1, 2 and 3 of 35 fed area. We can conclude that developed surface irrigation system reduced irrigation time compared with traditional irrigation system and saved 28% to 35.8% of the irrigation time.

5 - Fuel consumption:

Concerning the fuel consumption (L/fed/year) was measured after executing all irrigations. In general, fuel consumption depends on pumping unit type and its specifications. The results in table (7) and figs. (14-17) show the fuel consumption for both traditional and developed surface irrigation systems. In the tested areas, the annual fuel consumption per feddan decreased with decreasing the length of the field. The 5 fed. area table (7) and fig.(14) show saving in the fuel consumption. It was 29.4%, 28.86% and 27.27% in cases 1, 2 and 3 respectively, compared with traditional irrigation system. For the 10 fed area, table (7) and fig.(15) show that saving in the fuel consumption was 33.93%, 31.73% and 30.64% in cases 1, 2 and 3 respectively compared with traditional irrigation system, i.e. with the same pumping unit, the value of fuel consumption saving per feddan increased with the irrigated area (5 and 10 feddan). For the 19 fed area, table (7) and fig.(16) show that saving in the fuel consumption was 34.70%, 33.66% and 30.77% in cases 1, 2 and 3 respectively compared with traditional irrigation system. For the 35 fed area, table (7) and fig.(17) show that saving in the fuel consumption was 31.98%, 30.06% and 27.48% in cases 1, 2 and 3 respectively compared with traditional irrigation system. That means using developed surface irrigation system has saved pumping unit fuel consumption compared with traditional irrigation system.

6– Capital investments:

The capital investment of purchasing and installing different irrigation systems using prices of 2001 appears in table (5). The capital needed for the mainline, laterals, installations were calculated for each treatment. The capital investment per feddan increased by increasing the length of the field, while it is decreased by increasing irrigated area. For the 5 fed area, table (5) and fig.(18) show that the capital investments (L.E/fed) were 1938.6, 1669.0 and 1262.6 in cases 1, 2 and 3 respectively. For the 10 fed area it was shown that the capital investments (L.E/fed) were 1854.3, 1563.1 and 1205.9 in cases 1, 2 and 3 respectively. Also, for the 19 fed the capital investments (L.E/fed) were 1592.9, 1520.7 and 1179.7 in cases 1, 2 and 3 respectively. For the 35 fed area, the capital investments (L.E/fed) were 1327.8, 1288.75 and 1217.9 in cases 1, 2 and 3 respectively.

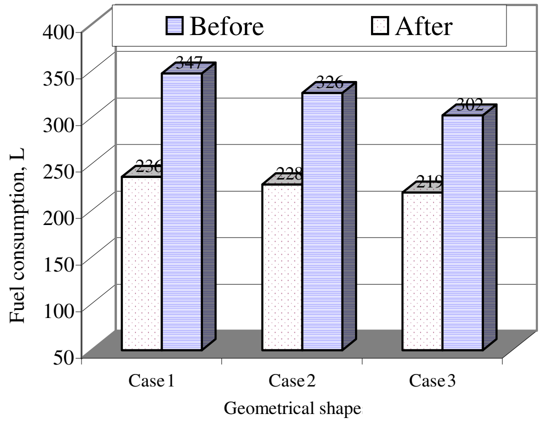
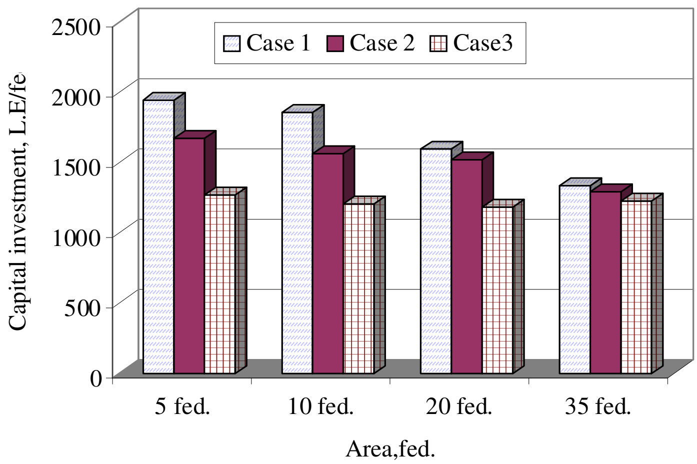


Fig. (17) Total fuel consumption before and after using developed surface irrigation in area 35 fed under different geometetric shapes for sugarcane crop during the season 2001/2002.



Fige (18) The capital investments (L.E./fed) for different dimensions and different areas.

CONCLUSION

From the previous results and discussions, it can be concluded that:

First:

Priority is given to use of the DSIS in large areas with less field length to get the maximum benefit from:

1 – Low capital investments used for execution, to cover more area.

2 – Saved areas which were occupied by channels and ridges.

3 – The reduction in the amount of irrigation water per feddan, and consequently in increased saving in water losses.

Second:

The research has encouraged the application of the DSIS for combined areas for a number of farmers rather than its application in equal private individual areas. This helps in applying the system in these areas with appropriate dimensions to gain the required benefits (more saved areas which occupy the channels and ridges – controlling the lengths of the fields in which we applied the system to enlarge the amount of applied water savings).

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الملخص العربي

أداء نظام الري السطحي المطور بمكونات محلية في إنتاج قصب السكر

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يعتبر قطاع الزراعة هو المستهلك الرئيسي للمياه في مصر حيث تقدر نسبة المياه المستهلكة بحوالي ٨٠% من الموارد المائية. وعملا بسياسة ترشيد المياه في مصر فقد اتسع انتشار تطبيق نظام الري السطحي المطور في مناطق إنتاج محصول القصب والمتمثل في التسوية الدقيقة للأراضي باستخدام تقنية الليزر مع توزيع المياه باستخدام الأنابيب المثقبة أو الأنابيب المبوبة لما له من فوائد عديدة أهمها ترشيد استخدام المياه.

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وتنفيذا لاستراتيجية الدولة في تشجيع التصنيع المحلي للمعدات والمهمات الزراعية بما فيها مكونات شبكات الري، وتمشيا مع واقع تفتيت الحيازات الناشئ من قوانين التوريث واختلاف أبعاد القطع وأشكالها الهندسية فقد هدف البحث إلى:

دراسة آداء نظام الري السطحي المطور في مناطق مختلفة المساحة ومختلفة الأبعاد باستخدام مكونات شبكات ري سطحي مطور محلية الصنع.

المنهج العلمي:

١ – تم اختيار ٤ مساحات ٥، ١٠، حوالي ٢٠(١٩)، حوالي ٣٥(٣٤,٣) فدان بثلاث أشكال مستطيلة لكل مساحة (جدول ١) مع اعتبار أن جميع المساحات تم إعدادها وتسويتها بتقنية الليزر بشكل واحد.

٢ – انحدار الأرض ثابت ١٠ سم/١٠٠متر (٠,١%)

٣ – طول شريحة الري في جميع المساحات المختبرة ١٥٠م.

٤ – ثبات نوعية وحدة ضخ المياه لمساحة ٥ و ١٠ فدان بينما في المساحات الأخرى تختلف باختلاف المساحة.

٢ – التصرف الموصي به ٢ لتر/ثانيه/متر عرض.

٦ – عرض شريحة التشغيل للمحبس الواحد يتراوح ما بين ١٨ – ٢٤ متر (٢٤ – ٣٢ فتحة).

لتحديد وإقرار أداء نظام الري السطحي المطور في المساحات المختبرة المذكورة اخذ في الاعتبار المؤشرات التالية:

١ – كميات المواسير والمشتملات المستخدمة في نظام الري السطحي المطور لوحدة المساحة في كل حالة طبقا للتخطيط وتصميم كل مساحة.

٢ – مساحة الأرض الموفرة والتي كانت مشغولة في النظام التقليدي بالقنوات والبتون في كل حالة.

٣ – حجم المياه المضاف م^3/فدان/سنة.

٤ – زمن الري للفدان ساعة/فدان/سنة.

٥ – استهلاك وقود وحدات الضخ المستخدمة لتر/فدان/سنة.

٦ – الاستثمارات المالية المستخدمة في نظام الري المطور جنيه/فدان.

حيث أن القياسات والحسابات استمرت علي هذه المساحات في مناطق إنتاج محصول قصب السكر في صعيد مصر ونفذت في أرض طينية القوام خلال الفترة من ٢٠٠١ إلى ٢٠٠٤و أخذت متوسطات لها **فقد توصلت الدراسة إلى أهم النتائج التالية:**

١ – يزداد عدد المواسير ٦" مع زيادة طول الحقل لنفس المساحة بينما ثبتت المشتملات تقريبا، ويتناسب عدد المواسير والمشتملات تناسبا طرديا مع المساحة.

٢ – زيادة المساحة المنزرعة بنسبة مئوية تتراوح ما بين ٦ – ١٢ % (١,٤ – ٢,٨٨ قيراط/فدان) والتي كانت مشغولة بالقنوات والبتون في الري التقليدي وتختلف النسبة حسب أبعاد الأرض ومساحتها حيث تتناسب هذه النسبة طرديا مع زيادة طول الحقل أو نقص مساحة الأرض باستثناء الحالة الثالثة لمساحة الأرض ٣٥ فدان راجع لتفتت الحيازات الزراعية والتي تتكون منها هذه الحالة.

٣ – زيادة كميات مياه الري المضافة للفدان في نظام الري التقليدي عن الكميات المضافة عند استخدام النظام المطور وذلك تحت كل المعاملات وهذا راجع إلى تحسين إضافة وتوزيع مياه الري وزيادة فواقد مياه الري في الري السطحي التقليدي. حيث تراوحت كمية المياه المضافة من خلال النظام ما بين (٧١٢٠ - ٨١٣٢ م^{3}/فدان/سنة) بينما في الري التقليدي تتراوح ما بين (١٠٢٥٠ – ١٢٩٧٤ م^{3}/فدان/سنة).

٤ – أوضحت النتائج أن كمية المياه المضافة في معاملات الري السطحي المطور تزداد مع زيادة طول الحقل لضرورة تعدد شرائح الري لتغطية المساحة المراد ريها.

٥ – يقل زمن الري بقصر طول الحقل أدي ذلك إلى وفر في عدد ساعات التشغيل عند استخدام نظام الري السطحي المطور بالمقارنة بالري السطحي التقليدي في جميع المعاملات. ويتراوح الوفر في ساعات التشغيل ما بين ٢٨% إلى ٣٥,٨% بالمقارنة بالري السطحي التقليدي.

٦ - يقل استهلاك الوقود عند استخدام الري السطحي المطور عن الري السطحي التقليدي بمقدار يتراوح ما بين ٢٧,٢٧% إلي ٣٣,٦٦%. وكذا قل استهلاك الوقود عند قصر طول الحقل عنه في المساحات الأكبر طولا.

٧ – أثرت المساحات المطبق فيها نظام الري السطحي المطور وأبعادها علي قيمة الاستثمارات المالية المطلوبة للتنفيذ بشكل واضح حيث تراوحت ما بين ١٩٣٨,٦، ١٢٦٢,٦ جنيه/فدان عندما كانت النسبة بين عرض الأرض إلى طولها ٩,٨/١، ١,١٠/١ في مساحة ٥ فدان، بينما كانت ١٢١٧,٩ جنيه/فدان للمساحة ٣٥ فدان عند النسبة ١/١,٦ وكذلك ١١٧٩,٧جنيه/فدان للمساحة ٢٠ فدان عند النسبة ١/٣,٥ .

التوصيات:

أولا: إعطاء أولوية لتنفيذ الري السطحي المطور للمساحات الأكبر في القيمة والأقصر في طول الحقول للاستفادة من:

١ – نقص الاستثمارات المالية المطلوبة في تنفيذه بما يمكن تغطية لمساحات أكبر.

٢ – زيادة في المساحات المتوفرة التي كانت مشغولة بالقنوات والبتون.

٣ – نقص في قيمة كمية المياه المضافة في وحدة المساحة وبالتبعية زيادة وفر المياه المفقودة.

ثانيا : تشجع الدراسة تنفيذ نظام الري السطحي المطور في المساحات المجمعة لعدد من المزارعين عن تطبيقه علي نفس المساحات الخاصة الفردية لتحقيق (زيادة اكبر في المساحات التي كانت مشغولة بالقنوات والبتون – مع التحكم في طول الحقول المنفذ بها النظام لتعظيم ترشيد الماء المضاف).