

EFFECT OF FRAGMENTATION ON IRRIGATION, AREA LOSSES, AND YIELD OF SOME CROPS IN SOHAG GOVERNORATE

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ABSTRACT

Fragmentation is a problem which has affective role on adoption of new agriculture technology Field experiments were conducted at Gihena, Sohag governorate in season 2008/2009 to study the effect of fragmentation on irrigation, area losses, some agriculture operation. This study has a major to improve the work establishment and crop management in fragmentation to increase the yield and quality. The total area at Gihena center Sohag governorate was 1062 faddan divided into 12 plots. The owners' fields were 1666 farmer, the average area for every farmer between less than 6 kerat and 72 kerat.

The data indicated that:

The percent of owners for every were, 24.79 %have area less than 6 kerat, 31.57% have area less than 11 kerat, 25.45% have area less than 23 kerat, 9.12% have area less than 35 kerat, 3.84% have area less than 47 kerat, 2.40% have area less than 59 kerat, 0.60% have area less than 71 kerat and 2.22% have area more than 72 kerat.

The area losses decreased by increasing field area, area losses were 13, 12.50 and 12 % for field area 24, 48 and 72 kerat respectively.

The irrigation water decreased by increasing field size for yields wheat, faba bean and clover, the quantity of irrigation water for wheat was decreased by 1.44, 3.61 and 7.12 % when the field size increased from 6 kerat to 24, 48, 72 kerat respectively.

The yields were affected by fields size, the yield of wheat per feddan increased by 6.82, 9.10 and 18.18 % when the field size increased from 6 kerat to 24, 48, 72 kerat respectively. Also the yield of faba bean had the same trend, the seed yield increased by 10.91, 20.00 and 23.64 % when the field size increased from 6 kerat to 24, 48, 72 kerat respectively. The weight of clover cuts per feddan increased by increasing the field size, (1 faddan = 4200m² = 24 kerat , 1 kerat = 175m²).

Key word: fragmentation, irrigation, area losses wheat, faba bean.

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INTRODUCTION

Egypt is mainly an agricultural country in which agricultural and irrigation technologies are important role in supporting national economy. Agricultural growth depends greatly on productivity improvement. Production resources can be increased through infrastructural development, appropriate technology, new farming methods and farm management improvement. Countries with traditional agricultural structures face small and fragmented plots, cultivation is carried on to non- geometric small- scale plots which limit application of farm machinery, mechanization development, and putting to practice new cultivation methods.

Early in (1970), Hanna and El- Awady estimated land saving by over 10 % due to using developed surface irrigation by long furrows. Therefore, application of modern technology. Aimed at increasing yield and reducing production costs, has a direct relationship with land consolidation and optimum size of cultivation. Arsalanbod, M.R., (2000) concluded that, in irrigation wheat, one percent of increase in farm size causes a 0.4 percent decrease in cost, and one percent decrease in fragmentation causes a 0.44 percent decrease of costs. Also Haidari, G.R (1996) showed that land consolidation causes a 20 percent increase in yield. Soltani, G. R., (1978) said that with increasing population pressure and more efficient technology, they are coming under increasing strain. In the long run, they may be not adaptive at all. Therefore, for an economic crop production it is necessary to execute land consolidation programs that can provide appropriate living standards for farmers. According to some studies, the optimum farm size for economic crop production should be at least 12 ha. El- Berry et. al. (2006) indicated that the saved agricultural land through different treatments ranged from about 6 to 12 % which were occupied by the channels and ridges.

Elaph (2006) studied the land fragmentation and mentioned that the fragmentation in south Egypt was greater than it in north Egypt the avarege of farm size 2.2 feddan in south Egypt but it was 4.4 feddan in north Egypt throuth year 2000/2001. Also the percent of size farm less than feddan was 47.2 % from total area in the south Egypt but it was 30.70% from total area in the north Egypt. On the other hand the percent

increased to 82% and 65.6 % for size less than 3 feddan in the south and north Egypt respectively. It added the disadvantage for land fragmentation were losses in agriculture area, change in uses of agriculture land, difficult of use new technology in agriculture, increases in crops costs and losses in irrigation water. El – Qousy (2008) showed that the true problem for Egyptian agriculture now and in the future it is the land fragmentation; it was less than one feddan. This will causes weakly in water management and yield. We need to a way can be collected the small size farm.

MATERIALS AND METHODS

Small size area compared with total area:

The total small size area at Jihena center Sohag governorate was 1062 feddan divided into 12 plots. The plots were:

- 1- El gazra plot
- 2- Abo raway plot
- 3- sglat abd el-hamid plot
- 4- sglat el- mashaygh plot
- 5- El-karb el- bahary plot
- 6- El-karb el-kably plot
- 7- El-kerat plot
- 8- Maswel el- gharby plot
- 9- Maswel el-sharky plot
- 10- Ghrsa kzaza plot
- 11- El-ghars el- bahary plot
- 12- El-ghars el-kably plot.

The area losses were measured and determined for each size of field. The water applied m^3 /fed was measured by flow gage on pump, for every irrigated for each size field. Wheat seeds (Giza 168) was planted in 27/11/2008 and received 6 irrigations. Faba bean seeds (Giza 674) was planted in 14/11/2008 and clover seeds (Giza 4) was planted in 25/10/2008 the yields received the same agricultural practices as usual in the area.

RESULTS AND DISCUSSION

1 - The percent of small size area compared with total:

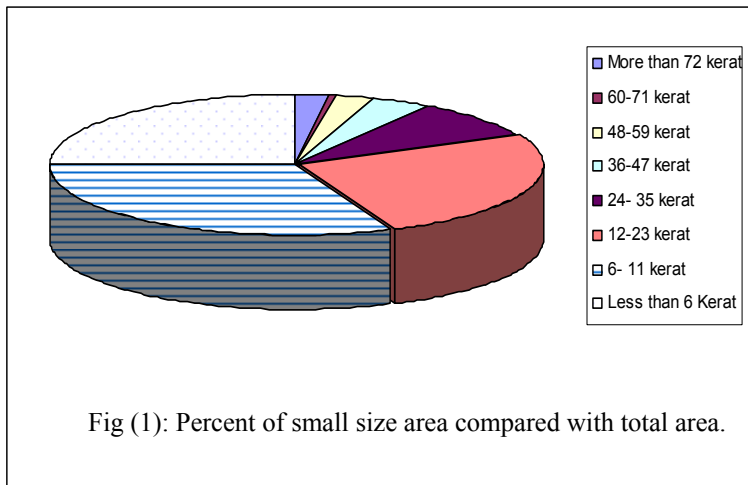
Surfing data presented in table (1) and Fig. (1) indicate that, Jehina center area was 1062 feddan divided into 12 plots, (feddan = 4200m²&kerat = 175 m² &1 feddan = 24 kerat), the total owner farmer were 1666 person. Also data indicated that 94.78% of farmers have less than 2 feddan this percentage divided into 24.79 % have less than 6 kerat, 31.75 % have more than 6 kerat and less than 12 kerat(0.5 feddan), this means that 56.54 % of owner farmers have less than 0.50 feddan.

Table (1): The percent of owners' fields and their area size compared with total area.

Area Plot	< 6 Kerat	6- 11 kerat	12-23 kerat	24- 35 kerat	36-47 kerat	48-59 kerat	60-71 kerat	< 72 kerat	total
El gazra plot	18	18	9	9	1	3	3	3	64
Abo raway plot	76	70	52	9	5	1	--	1	214
Sglat abd el-hamid plot	17	64	60	27	10	3	1	2	184
Sglat el-mashaygh plot	31	55	49	19	7	4	2	2	169
El-karb el-bahary plot	26	41	36	17	6	7	1	--	134
El-karb el-kably plot	32	41	45	10	3	1	1	3	136
El-kerat plot	83	72	37	6	1	2	--	1	202
Maswel el-gharby plot	38	43	21	17	7	--	--	4	130
Maswel el-sharky plot	4	24	26	6	6	2	--	3	71
Ghrsa kzaza plot	33	35	43	10	12	4	1	--	138
El-ghars el-bahary plo	21	35	29	15	5	5	--	9	119
El-ghars el-kably plot	34	28	17	7	1	8	1	9	105
total	413	526	424	152	64	40	10	37	1666
% of owners fields and their area size.	24.79	31.57	25.45	9.12	3.84	2.40	0.60	2.22	

* Total area 1062 feddan Feddan = 24 kerat = 4200 m² kerat = 175 m²

Also 25.45 % have more than 11 kerat and less than 24 kerat (1 feddan), 9.12 % have more than 23 kerat and less than 36 kerat and 3.84 % have more than 35 kerat and less than 48 kerat (2feddan). On the other hand only 2.22% of owner farmers have more than 3 feddan in Jehina center Sohag Governorate and 3 % have more than 47 kerat and less than 72 kerat (3 feddan).



2- Effect of fragmentation on area losses %:

Data presented in table (2) and Fig. (2) indicated that, the estimated area losses area less than 6 kerat (1 kerat = 175 m²) losses area was 147 m² (for 6 kerat) it is equal 14 % from total area (1050 m²) also from data presented in table (2) it is clear that the area losses decreased by increasing field area, area losses were 13, 12.50 and 12 % for field area 24, 48 and 72 kerat respectively. These losses area were in divided field into small basins to control on irrigation water and field ridges.

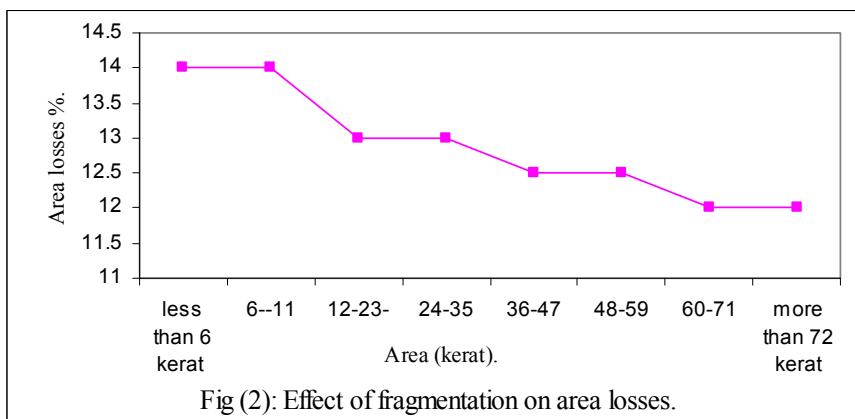
3-Effect of fragmentation on irrigation quantity m³/fed:

The effect of fragmentation on irrigation water quantity m³/fed are presented in table (2) and Fig. (3) from the data it is clear that the irrigation water decreased by increasing field size for yield of wheat, faba bean and berseem, the quantity of irrigation water for wheat was decreased by 1.44, 3.61 and 7.12 % when the field size increased from 6 kerat to 24, 48, 72 kerat respectively. Also the quantity of irrigation water

for one feddan faba bean decreased by 2.20, 3.78 and 6.49 % when the field size increased from 6 kerat to 24, 48, 72 kerat respectively. Also the berseem had the same trend the irrigation water for one feddan decreased by 1.47, 2.99 and 9.52 % when the field size increased from 6 kerat to 24, 48, 72 kerat respectively. These increasing in water may be due to the small size field not leveled by laser or manual scraper and there was not a modified surface irrigation.

4- Effect of fragmentation on yield of wheat, faba bean and Barseem:

The effect of fragmentation on yields of wheat, faba bean and barseem are presented in table (2) and Fig. (4). It is clear that the yields were affected by field size, the yield of wheat per feddan increased by 6.82, 9.10 and 18.18 % when the field size increased from 6 kerat to 24, 48, 72 kerat respectively. Also the yield of faba bean had the same trend, the seed yield increased by 10.91, 20.00 and 23.64 % when the field size increased from 6 kerat to 24, 48, 72 kerat respectively. Also from the data it is clear that the weight of barseem cuts per feddan increased by increasing the field size, the weight of barseem cuts increased by 0.28, 1.41 and 3.66 % when the field size increased from 6 kerat to 24, 48, 72 kerat respectively. These decreased in yield may be due to small area has a high percent of area losses and it is a adoption of using agricultural machinery.



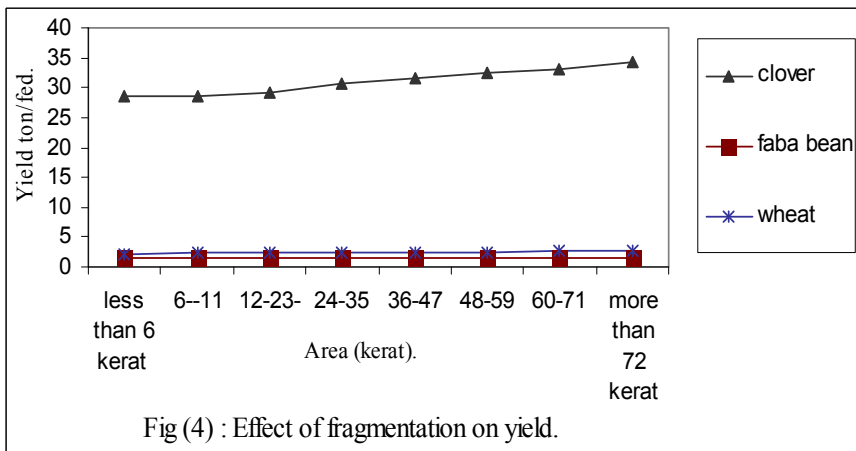
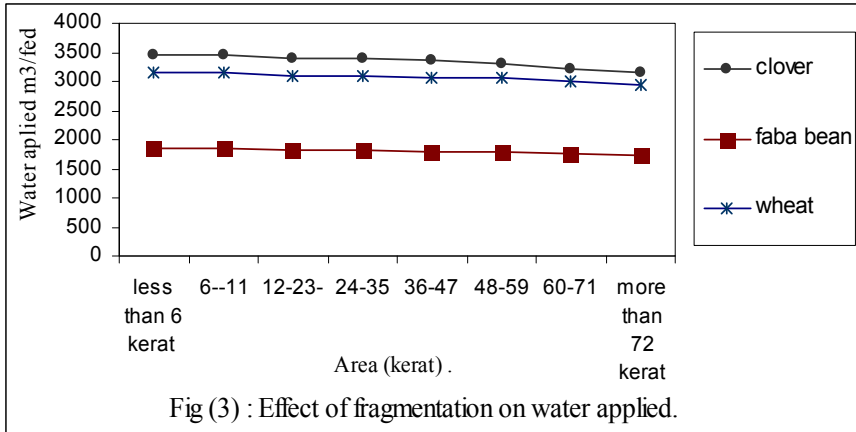


Table (2): Effect of fragmentation on area losses, irrigation and yield for barseem, faba bean and wheat.

	Area losses, %	Irrigation quantity m ³ / fed.			Yield Ton / fed.		
		Barseem	Faba bean	wheat	Barseem	Faba bean	wheat
< 6 Kerat	14.00	3450	1850	3160	28.50	1.40	2.20
6- 11 kerat	14.00	3450	1850	3160	28.60	1.45	2.30
12-23 kerat	13.00	3400	1810	3100	29.30	1.46	2.35
24- 35 kera	13.00	3400	1810	3100	30.65	1.48	2.35
36-47 kerat	12.50	3350	1790	3070	31.55	1.50	2.40
48-59 kerat	12.50	3300	1780	3050	32.50	1.51	2.40
60-71 kerat	12.00	3200	1750	3000	33.10	1.52	2.60
> 72 kerat	12.00	3150	1730	2950	34.40	1.53	2.60

CONCLUSION

The results obtained can be summarized as follow:

The percent of owners for every were, 24.79 %have area less than 6 kerat, 31.57% have area less than 11 kerat, 25.45% have area less than 23 kerat, 9.12% have area less than 35 kerat, 3.84% have area less than 47 kerat, 2.40% have area less than 59 kerat, 0.60% have area less than 71 kerat and 2.22% have area more than 72 kerat.

The area losses decreased by increasing field area, area losses were 13, 12.50 and 12 % for field area 24, 48 and 72 kerat respectively.

We need to find a law to be collected the small size farm and not divided the area by the inheritance system between families.

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المخلص العربي

تأثير تفتت الحيازة الزراعية على المساحة المفقودة، كمية مياه الري، الإنتاجية لبعض المحاصيل الزراعية في محافظة سوهاج.

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تعتبر تفتت الحيازة من المشاكل التى تحد من استخدام التكنولوجيا الحديثة فى الزراعة وقد تم حصر المساحة وعدد الحائزين فى مركز جهينة- محافظة سوهاج موسم 2009/2008

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- 1- أستاذ الهندسة الزراعية - كلية الزراعة - جامعة عين شمسز شبرا الخيمة - مصر.
 2- باحث أول معهد بحوث الهندسة الزراعية - مركز البحوث الزراعية - وزارة الزراعة - مصر .
 3- باحث معهد بحوث الهندسة الزراعية - مركز البحوث الزراعية - وزارة الزراعة - مصر.

وذلك لدراسة تأثير تفتت الحيازة وصغر المساحات على إجراء العمليات الزراعية وكمية المياه المستخدمة في الري والمساحات المفقودة في المساقى والبتون والحدود الفاصلة بين المساحات وتأثير هذه العوامل على المحصول. القمح المزروع صنف (جيزة 168) زرع فى 2008/11/27 والبقول البلدى صنف (جيزة 3) زرع فى 2008/11/1 والبرسيم صنف (جيزة 4) زرع فى 2008/10/25. كل المحاصيل تم معاملتها زراعيًا كما هو متبع فى هذه المنطقة.

وأوضحت النتائج التالى:-

المساحة الكلية 1062 فدان (القدان 24 قيراط - القيراط 175 متر مربع) وعدد الحائزين 1666 حائز. وكانت نسبة الحائزين حسب حيازتهم كالتالى:

نسبة الحائزين على مساحة أقل من 6 قيراط 24.79 % ونسبة الحائزين على مساحة (من 6 قيراط الى 11 قيراط) 31.57 % ونسبة الحائزين على مساحة (من 12 الى 23 قيراط) 25.45 % ونسبة الحائزين على مساحة (من 24 الى 35 قيراط) 9.12 % ونسبة الحائزين على مساحة (من 36 الى 47 قيراط) 3.84 % ونسبة الحائزين على مساحة (من 48 الى 59 قيراط) 2.40 % ونسبة الحائزين على مساحة (من 24 الى 35 قيراط) 9.12 % ونسبة الحائزين على مساحة (من 60 الى 71 قيراط) 0.60 % ونسبة الحائزين على مساحة أكبر من 72 قيراط 2.22 %. ويتضح من البيانات أن 97.78 % يحيزون أقل من ثلاثة أفدنة.

تقل المساحة المفقودة كلما زادت مساحة الحيازة حيث كانت 13، 12.5، 12 % للمساحات 24، 48، 72 قيراط على التوالى. تقل كمية المياه المستخدمة فى رى القدان بزيادة مساحة الحيازة لكل من محاصيل القمح والبقول البلدى والبرسيم.

تأثرت كمية المحصول بزيادة مساحة الحيازة ، بالنسبة لمحصول القمح زاد بمقدار 6.82، 9.10، 18.18 % عندما زادت المساحة من 6 قيراط الى 24، 48، 72 قيراط على التوالى كما زاد محصول البقول البلدى بمقدار 10.91، 20.0، 23.64 % عندما زادت مساحة الحيازة من 6 قيراط الى 24، 48، 72 قيراط على التوالى. كذلك زاد وزن حشة البرسيم للقدان بزيادة مساحة الحيازة.

التوصيات:

نحن بحاجة لعمل تشريع (قوانين) لتشجيع المزارعين ذو الحيازات الزراعية الصغيرة علي تجميع حيازاتهم بدلا من تفتيتها والنتيجة عن التوريث.