



An Economic Study for the Effect of Agricultural Land Reclamation on Agricultural development (Case Study on Beni Sweif Governorate)

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Abstract: The research is interested in studying the effect of land reclamation on agricultural development in one of the governorates of Egypt, represented in Beni-Suef Governorate. Beni-Suef governorate is featured by cultivated many crops such as: wheat, maize, sugar beet, and tomato. The net revenue for fed. of the actual crop pattern is estimated by 9038 L.E / fed, increased by about 8%, reaching about 9776 L.E / fed. in the proposed crop pattern. The net revenue of water for the actual crop pattern is estimated by 2.62 L.E / m³, and it is increased by 14%, to reach about 2.97 L.E / m³ for the proposed crop pattern. The purchase price of fed after reclamation fed. in the Beni-Suef Governorate is estimated by 54.794 thousand L.E in Ahanasia, 54.292 thousand L.E in Samasta, and 53.312 thousand L.E and Beni-suef. Finally, the highest net revenue of water unit were (clover then maize) Rotation in the three Districts in Beni-Suef Governorate.

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1. Introduction:

Land reclamation in Egypt is an effective tool to achieve agricultural development, which can effects on comprehensive development in the Egyptian rural, The reclamations is not only increase the cultivated area but also it is saving food which a goal of food security, as well as it is reducing the desertification and creating work opportunities for alleviation of unemployment.

Therefore, by achieving these economic and developing objectives will reduce the internal migration to Valley and Delta, Moreover, Increasing the agricultural area is one of the 2030 agricultural strategy goals, by building a new societies in a way that enables them to create a more effective agricultural sector capable of magnetize investments. Also it will restructure the agricultural production to produce an irregular crops to be exported or used in Agricultural manufacturing. by studding the area of reclaimed land noticed that it is increased from about 14.7 thousand fed in 2010 to about 59.2 thousand fed. in 2018, an increase of about 302.7%⁽¹⁾ all over the government of Egypt.

Problem of research:

Egypt is feature by its limited land and water resources, the Egyptian physical land resources are

estimated by 256 million fed. (or about one million square kilometers), This area is not appropriate with the population growth, which affected on increasing the food gab. So the cultivate area is not proportionate with the population growth, which results in increased food gab and insufficient production of agricultural crops, The inequity between the population increase rate and the crops area increase rate is an important indicator that we need to add new horizontal expansion of agricultural land. Since we took the Beni-Suef Governorate as a case study so the problem of the study can be summarized on in the following questions:

- What is the size of the cultivated areas and the cultivable areas in Beni-Suef Governorate?
- What is the current and expected cropping pattern in the new lands in Beni-Suef Governorate?
- What are the investment and operational costs and economic returns from reclaiming new lands in Beni-Suef Governorate?
- What are the indicators of the efficiency of using the irrigation water in new lands in sample Districts in Beni-Suef Governorate?

- What is the return on the proposed alternative
- Rotations in the new lands in the study sample?

Objectives of the research:

This research is focused on study the effect of the land reclamation on agricultural development in one of the Egyptian governorates as a case study, which is Governorate. That is by studding the increasing of cultivated and cultivable areas in Beni-Suef during the period (2013-2017) by achieving the following objectives.

- Study the cropping pattern of new lands in Beni-Suef Governorate during the period (2010-2017).
- An Economic analysis of investment and operational costs and economic returns from reclaiming new lands in Beni-Suef Governorate.
- Study the indicators of efficiency of irrigation water use in new lands in the sample Districts in Beni-Suef Governorate.
- Recognize the net water unit revenue for the alternative agricultural Rotations proposed in the new lands in the study sample.

2. Research method:

The research depended on descriptive and quantitative analysis, such as the goal programming to reach to the crop pattern proposed to the new lands in Beni-Suef Governorate that can maximize the net return and reduce water needs which one goal of the agricultural development strategy 2030, in addition to compute some of the economic indicators and also computing irrigation water use efficiency for the key crops which are planted in the sample of the study (Wheat, Clover, Sugar beet, Maize).

1-Description of goal Programming Model (8,9):

Net return maximization function

$$Max G1 = \sum_{i=1}^n X_i R_i$$

X_i Cropped Area for crop i

R_i net return L.E./fed. for crop i

Water requirements minimization function

$$Mini G2 = \sum_{i=1}^n X_i W_i$$

X_i Cropped Area for crop I

W_i Water requirements m^3 /fed. for crop i

Constraints:

- Constraint of land resource: They include constraint for the winter, summer, and Nile agricultural area of Beni-Suef Governorate.
- Constraint of water resources: It includes one constraint that expresses the total amount of water

used to irrigate the crops of the study. Human resource constraint: it includes the total number of workers.

- Other constraints: Minimum and maximum limits have been set for the area cultivated for each crops of the study so that they do not exceed the largest area in which they were cultivated during the aforementioned period, and not less than the least area they were cultivated.

2- Indicators of efficient of irrigation water use in new lands in Beni-Suef Governorate Districts for sample crops:

- Water unit productivity (tons / 1000 m^3) = yield for fed+ rated water.
- Water needs per ton (m^3 / ton) = rated water /yield for fed (ton).
- Net water unit revenue (L.E/ 1000 m^3) = net revenue /rated water.

3- Productive and economic efficiency of irrigation water in new lands in Beni -Suef Governorate Districts for sample crops:

- The ratio of the cost of irrigation water of variable costs% = Irrigation water cost / variable costs * 100
- The ratio of the cost of irrigation water to the total costs% = the cost of irrigation water / total costs * 100

Data sources:

The research depends on two sources of data, The First source is the secondary data published by the Ministry of Agriculture and Land Reclamation (MALR), the Ministry of Irrigation and Water Resources (MIWR), and unpublished data of The Directorate of Agriculture in Beni-Suef New Land Administration Statistics Department. The Second source is the primary data obtained through a research sample in Beni-Suef Governorate to study the effect of land reclamation on agricultural production in the governorate, where a random sample estimated at about 90 items was collected from farmers.

• Selecting the sample of Study:

In the framework of the Agricultural development strategy (5), Beni-Suef Governorate is one of the three governorates of North Upper Egypt Region (Fayoum, Beni-Suef, Minya). It is also the closest governorate to Cairo Governorate with urban weight and a high concentration in services and economic activities. Minya and Matrouh governorates come in the first and second places in terms of the cultivable land, and each of them falls within the plan of the national project to reclaim one million and a half million fed (West West Minya project and Al-Mughara project), where they are estimated at 45%,

27%, respectively. While Beni-Suef Governorate comes in the third place in terms of the area of cultivable land with a rate of 10%, So Beni-Suef Governorate was chosen.

- **Selecting the administrative Districts from Beni-Suef Governorate:**

Beni-Suef Governorate consists of 7 administrative Districts. 3 administrative Districts of them were Chosen according to the relative importance of the total area of new lands in the

governorate. The total new land area in Beni-Suef Governorate was estimated at 95.5 thousand fed. The first is Beni-Suef District the new land was estimated about 30.7 thousand fed, followed by the Ahnasia District where the new land was estimated about 22.1 thousand fed. The third District is Samasta of the Districts that were chosen, as its new land area was estimated at 14.1 thousand fed., representing about 32.12%, 23.19% and 14.8% of the total area of the new lands, respectively as it shows in Table (1).

Table (1) Total area, cultivated and cultivable area in new lands in Beni-Suef Governorate Districts 2018/2019

Districts	The total area of the new lands (1000 fed.)	cultivated area (1000 fed.)	cultivable area (1000 fed.)	relative importance from the total area of new lands %	relative importance from cultivated area
Al- Wasta	5.124	31.725	1.951	5.37	8.06
Naser	12.523	1.794	10.729	13.11	4.56
Ban-Suef	30.677	3.897	26.780	32.12	9.90
Ahnasia	22.142	7.667	14.476	23.19	19.48
Beba	1.941	1.243	0.698	2.03	3.16
Sumasta	14.100	13.964	0.136	14.76	35.48
Al Fashn	8.992	7.615	1.377	9.42	19.35
Average	95.499	39.352	56.147	100	100

Source: Beni-Suef Agricultural Directorate -New Lands management Statistics Department- Unpublished data.

3. Results and Discussions:

- **Water resources in Beni-Suef Governorate:**

The governorate's water resources can be divided into 3 resources, the first is Nile water that it depends basically on and the second is rain water, where the average amount of rain water is about 14.9 mm/year, and third resource is the underground reservoir water.

- **Agricultural land resources in Beni-Suef Governorate:**

Beni-Suef governorate is one of the most important rural governorates in the Upper Egypt region, its land characterized by high fertility and productivity. The Beni- Suef governorate also notable by cultivated many crops such as (wheat, maize, sugar beet, tomato, onion, garlic) in addition to some medicinal and aromatic plants which cultivated in reclaimed land. The average of the cultivated area of new lands was estimated at 38.226 thousand fed., representing about 47.5% of the new lands average area in Beni-Suef, which is 80.514 thousand fed. During the period (2010-2018), but the average

cultivable area for new lands is estimated at 42,088 thousand fed. As in table No. (2).

- **The current crop pattern in the new lands of Beni-Suef Governorate:**

Table No. (3) Shows that the crop pattern of the new lands in Beni-Suef Governorate is consist of 16 crops, including 9 winter crops and 7 summer crops. The average area cultivated by winter crops estimated by 33.020 thousand fed, it represents about 53.7% of cropped Area that estimated by 61.525 thousand fed. While, the average of cultivated area with summer crops was estimated at 22.881 thousand fed, it represents about 37.2% of the cropped area. Finally, the average fruit area was estimated at 5.624 thousand fed, it represents about 9.1% of the cropped area, during the period (2010-2017).

The average agricultural intensification factor for the estimated by 1.56 during the same period, which indicates an increase in the agricultural utilization of the new land area in Beni-Suef Governorate.

Table (2) cultivated and cultivable area areas in Beni-Suef governorate during the period (2010-2018).

Years	Total area of new lands (1000 fed.)	Cultivated area in new lands (1000 fed.)	Cultivable area in new lands (1000 fed.)
2010	70.395	36.880	33.514
2011	70.645	36.580	34.064
2012	70.645	36.597	34.047
2013	70.645	37.934	32.710
2014	70.645	38.145	32.500
2015	70.645	36.934	31.710
2016	95.260	40.431	54.829
2017	95.260	40.052	55.208
2018	95.260	39.591	55.669
2019	95.738	39.113	56.625
Average	80.51	38.22	42.08

Source: Beni-Suef Agricultural Directorate – New Lands management Statistics Department- Unpublished data.

Crops pattern of the proposed scenario in the new lands of Beni-Suef:

Table No. (4) Shows the indicates for the proposed crops pattern, which includes the area of winter, summer crops and perennials is the same as the actual cropping area, which estimated by 61.5 thousand fed. The net revenue for the proposed crops pattern is estimated by 601.5 million LE, it represents

about 108.1% of the net revenue of the actual crops pattern which estimated by 556.4 million LE. While the water needs of the proposed crop pattern were estimated by 202.2 million m³, it represents about 95% of the actual crop pattern water needs that estimated by 212.7 million m³ in the new lands in Beni-Suef Governorate.

Table No. (3) Crop pattern in New Lands in Beni-Suef Governorate (2013-2017)

Crop	2013	2014	2015	2016	2017	Average
Clover	1963	1963	2759	2722	9869	3855
Wheat	11519	9311	11674	10912	8563	10396
Barley	130	-	65	60	50	76
Broad Beans	40	41	123	-	25	57
Onion	5274	7341	6759	8086	7507	6993
Garlic	90	30	64	45	275	101
Sugar Beet	2259	2168	9443	2093	2451	3683
Potatoes	164	150	130	-		148
Tomato	9384	7766	6530	7595	7709	7797
Total of Winter	30823	28770	37547	31513	36449	33020
Maize	13920	15110	13510	14109	16365	14603
Sorghum	269	751	651	489	273	487
Corn	600	1020	1210	450	158	688
Peanuts	1208	1153	920	810	623	943
Sesame	1828	2281	2789	2029	1813	2148
Sunflower	18	260	210	360	34	176
Tomato	3258	3741	5296	2870	4020	3837
Total of summer	21101	24316	24586	21117	23286	22881
Total of Permanent	5729	6021	5650	5356	5362	5624
Cultivated Area	36552	34791	43197	36869	41811	38644
Cropped Area	57653	59107	67783	57986	65097	61525
Condensation coefficient	1.58	1.70	1.57	1.57	1.56	1.59

Condensation coefficient = (cropped area / cultivated area)

Source: Ministry of Agriculture and Land Reclamation, Economic Affairs Sector, Central Administration for Agricultural Economics, Agricultural Economics Bulletin. Various numbers

Table No. (4) Results of the proposed crop pattern scenario in the new lands in Beni-Suef Governorate

Crop	Actual Cropping	Proposed Cropping Pattern	% From Actual	% From Season
Clover	3855	6869	178.17	18.64
Wheat	10396	11563	111.23	31.38
Barley	76	25	32.79	0.07
Broad Beans	57	170	296.94	0.46
Onion	6993	5474	78.27	14.85
Garlic	101	275	272.82	0.75
Sugar Beet	3683	4093	111.14	11.11
Tomato	7797	8384	107.53	22.75
Total of Winter	32958	36853	111.82	100
Maize	14603	12710	87.04	68.50
Sorghum	487	269	55.28	1.45
Corn	688	158	22.98	0.85
Peanuts	943	623	66.08	3.36
Sesame	2148	1813	84.40	9.77
Sunflower	176	18	10.20	0.10
Tomato	3837	2963	77.22	15.97
Total of summer	22881	18554	81.09	100
Total of Permanent	5729	6122	106.86	100

Source: Results of the statistical analysis of the computer using the WINQSB program

Table No. (5) Shows that the Comparison between the net return for fed, and the net return for the water unit, for both proposed and actual crops pattern in the new lands in Beni-Suef Governorate. IT shows that the net yield per fed for the actual crop pattern is estimated by 9038 L.E/ fed, and it's

increased by 8%, and it is reached to 9776 L.E/ fed for the proposed crop pattern. While the yield of the water unit for the actual crop pattern is estimated by 2.62 L.E/ m³, which increased by 14%, and it is reached to 2.97 L.E/ m³ for the proposed crop pattern.

Table No. (5) Shows the Comparison between the net return per fed and the net return per the water unit in the new land in Beni-Suef

Items	Actual cropping	Proposed cropping pattern	From Actual%
Cropped Area (Thousand fed.)	61.5	61.5	100
Net revenue (Million L.E)	556.4	601.5	108
Water needs (Million m ³)	212.7	202.2	95
Net revenue (L.E/fed.)	9038	9776	108
Net water revenue (L.E/m ³)	2.62	2.97	114

Source: Results of the statistical analysis of the computer using the WINQSB program

The capital costs needed to reclaim new lands in Beni-Suef Governorate:

Capital costs which required for land reclamation in Beni-Suef:

Land reclamation is the process by which desert lands are prepared for potential use in agriculture, these costs are used in various reclamation processes, including leveling the soil, establishing the

infrastructure to create a stable agricultural community, by constructing roads, habitats, paving, and treating the desert land for agriculture according to the available resources. ⁽³⁾

Table No. (6) Shows items of capital costs that is necessary to reclaim a Fed of new lands in the sample Districts in Beni-Suef Governorate. The table shows that the highest investment cost on a Fed is in the

District of Ahnasia, which is estimated at 27.738 thousand, while Samasta District ranked as second in terms of the investment cost, which is estimated at 25.988 thousand LE. and Beni-Suef District came in the last place in terms of investment costs, which was estimated at 25.242 thousand LE, while the largest District in terms of the average cost for drilling a well and its attachments was the Samasta District, followed

by the Beni-Suef District and then the Ahnasia District at an estimated cost of 26.499 thousand LE, 26.482 thousand LE and 25.319 thousand LE, respectively. Finally, the average total reclamation costs for each fed unit in the Ahnasia District, the Samasta District and the Beni-Suef District were estimated at 54,794 thousand LE, 54,292,000 LE and 53,312 thousand LE.

Table No. (6) Average costs of reclamation for fed of new lands in the study sample in Beni-Suef Governorate, season 2018/2019

Items	Average cost of reclamation (L.E) per fed								
	Ahnasia District			Samasta District			Beni -Suef District		
	Al-Ansar	Al-Shorouq	District Average	Mazurah	C. Sulaiman	District Average	Bani-Sfue	Snores	District Average
Determining and windbreak	1202	1712	1457	1501	2292	1896	1199	2794	1996
Leveling	429	488	458	490	472	481	490	503	497
Irrigation and internal drainage network	4892	8438	6665	3432	3487	3459	2568	2406	2487
Housing	9480	10548	10014	7594	10982	9288	7594	13310	10452
Indoor lift stations	2375	2154	2265	7232	6581	6906	2265	6364	6798
Irrigation devices and equipment	6499	5972	6236	3709	2618	3163	6236	2274	2616
Washing	700	587	643	350	1237	794	643	442	396
Capital costs	25577	29899	27738	24306	27670	25988	27738	28093	25242
Cost of one reclamation cultivation	1043	1165	1104	820	1503	1162	1104	1145	982
The difference between revenue and cost in reclamation	677	590	633	505	782	644	633	686	606
costs and revenue of restorative agriculture	1720	1755	1737	1325	2285	1805	1737	1830	1588
Well drilling costs	22251	23161	22706	21600	22631	22115	22706	22631	22115
Irrigation and drainage facilities	2439	999	1719	3333	3500	3417	1719	3500	3417
Electricity transmission and distribution costs	718	1069	894	733	1200	967	894	1150	950
Well drilling costs and accessories	25408	25229	25319	25667	27331	26499	25319	27281	26482
Price of buying acres before reclamation	6934	6200	6567	6878	6157	6517	6567	7469	6770
Total reclamation costs	52705	56883	54794	51299	57286	54292	54794	57204	53312

Source: collected and calculated from the data of the research sample

Economic indicators for water efficiency use to irrigating some field crops in new land in Beni-Suef Governorate:

Table No. (7) Shows the measures of two economic indicators which are the irrigation cost ratio to the total costs, and the ratio of the irrigation cost to the variable costs for crops (clover, wheat, Sugar beet, and maize).

- **The ratio of irrigation costs to total costs**

Table No. (7) illustrates that the ratio of irrigation cost to total costs ranges between 21.87% as a maximum value which is for the clover crop and 11.89% as a small value for the wheat crop, which indicates that the ratio of irrigation costs to the variable costs of the wheat crop is less than the ratio Irrigation costs to the total costs of the clover crop, which reflects the economic efficiency of the wheat crop.

- **The ratio of irrigation costs to variable costs**

Table No. (7) shows that the ratio of irrigation cost to variable costs ranges between 32.27% as a maximum value for the sugar beet crop and 14.74% as

a small value for the wheat crop, which indicates that the ratio of irrigation costs to the variable costs of the wheat crop is less than the ratio Irrigation costs to the variable costs of the sugar beet crop, which reflects the economic efficiency of the wheat crop.

Table No. (7) Economic Indicators for Water Efficiency in Irrigation of some Field Crops in New Lands in Beni-Suef Governorate During the 2018-2019 season

Items	Clover crop			Average	Wheat crop			Average
	Ahnasia	Samasta	Beni-Suef		Ahnasia	Samasta	Beni-Suef	
Average total costs (L.E)	23910	25600	24000	24503	28400	29300	30969	29556
Average variable costs (L.E)	17910	19600	19000	18837	22400	24300	24969	23890
Average irrigation costs (L.E)	5320	5450	5300	5357	3900	3400	3200	3500
Average total return (L.E)	35700	38200	36100	36667	33600	35000	36034	34878
Average revenue (L.E)	11790	12600	12100	12163	5200	5700	5065	5322
Ratio of irrigation costs to total costs %	22.25	21.29	22.08	21.87	13.73	11.60	10.33	11.89
Ratio of irrigation costs to variable costs %	29.70	27.81	27.89	28.47	17.41	13.99	12.82	14.74
items	Sugar beet crop			Average	Corn crop			Average
	Ahnasia	Samasta	Beni-Suef		Ahnasia	Samasta	Beni-Suef	
Average total costs (L.E)	17416	16953	17062	17144	16470	17465	17200	17045
Average variable costs (L.E)	11416	11953	11062	11477	10470	11465	13200	11712
Average irrigation costs (L.E)	3470	3900	3738	3703	3000	3750	3250	3333
Average total return (L.E)	23983	25750	23172	24302	20380	21520	21310	21070
Average revenue (L.E/ fed)	6567	8797	6110	7158	3910	4055	4110	4025
Ratio of irrigation costs to total costs %	19.92	23.00	21.91	21.61	18.21	21.47	18.90	19.53
Ratio of irrigation costs to variable costs %	30.40	32.63	33.79	32.27	28.65	32.71	24.62	28.66

Source: collected and calculated from the data of the research sample

Indicators efficiency productive of a water unit to irrigation of some field crops in new lands in Beni-Suef Governorate:

- **Productive efficiency of (m³) of irrigation water:**

Table No. (8), shows that the clover crop ranks as the first in terms of water unit productivity estimated by 12.03 tons / m³ in new lands in Beni-Suef Districts, it is follows by the water productivity of sugar beet crop that is estimated by 11.53 tons / m³. While the wheat and maize crops rank as the third and fourth positions of the productivity of water unit which are estimated by 1.15 tons / m³ and 1.15 tons / m³, respectively. This reflects an increase in the efficiency of water use.

Clover and sugar beet crops are the most beneficial crops for using the irrigation water but wheat and maize crops are the least beneficial for using the irrigation water.

- **Net revenues of water unit:**

Table No. (8) Also indicates that the clover crop achieved highest net revenue of water unit which estimated by 4.40 L.E/m³, while the sugar beet come

in the second degree which achieved 57 L.E/m³. However the wheat achieved net revenue of water unit estimated by 2.05 L.E/m³. And Finally, Maize scored the lowest net revenue water unit that is estimated by 1.16 L.E/m³, which reflects low economic efficiency of corn as compared with other crops.

The net revenues of water unit for some field crops for the proposed agricultural Rotations in the new lands in Beni-Suef Governorate Districts:

Table No. (9) indicates that the Rotation that achieved the highest net revenues of water unit was (clover then maize) Rotation in the three Districts in Beni-Suef Governorate, where recorded about 2.70 L.E/ m³, 2.69 L.E/ m³ and 2.38 L.E/ M³ for the Beni-Suef, Samasta and Ahnasia District respectively, followed by the (sugar beet then maize) Rotation, where recorded about 2.35 L.E/ m³, 1.92 L.E/ m³ and 1.85 L.E/ m³ for Samasta, Ahnasia and Beni-Suef District, respectively. Finally, (wheat then maize) Rotation recorded about 1.61 L.E/ m³, 1.57 L.E/ m³ and 1.43 L.E/ m³ for Samasta, Ahnasia and Beni-Suef District, respectively.

Table No. (8) Indicator of water Production efficiency of cubic meters of irrigation water unit to irrigating some field crops by New lands in Beni-Suef Governorate during season 2018/2019

Items	clover			Average	Wheat			Average
	Ahnasia	Samasta	Beni-Suef		Ahnasia	Samasta	Beni-Suef	
yield	33.3	33.3	33.3	33.3	2.91	3.04	3.01	2.99
Rating water m ³	3107	2740	2520	2789	2863	2611	2350	2608
Net revenue per fed (L.E)	11790	12600	12100	12163	5200	5700	5065	5322
tone needs of water (m ³ /ton)	93.29	82.28	75.68	83.75	983.68	858.88	780.73	874.43
Water unit productivity (ton/m ³)	10.72	12.15	13.21	12.03	1.02	1.16	1.28	1.15
Net revenue of water unit (L.E/ m ³)	3.80	4.60	4.80	4.40	1.82	2.18	2.16	2.05
Items	Sugar beet			Average	Maize			Average
	Ahnasia	Samasta	Beni-Suef		Ahnasia	Samasta	Beni-Suef	
yield	24	23	22.4	23.13	4.20	4.00	3.81	4.00
Rating water m ³	1979	2010	2035	2008	3489.5	3450	3480	3473
Net revenue (L.E/ fed)	6567	8797	6110	7158	3910	4055	4110	4025
tone needs of water (m ³ /ton)	82.46	87.39	90.85	86.90	830.83	862.50	913.39	868.91
Water unit productivity (ton/m ³)	12.13	11.44	11.01	11.53	1.20	1.16	1.09	1.15
Net revenue of water unit (L.E/ m ³)	3.32	4.38	3.00	3.57	1.12	1.18	1.18	1.16

Source: collected and calculated from the data of the research sample

Table No. (9) Net revenue of water unit for some field crops of the suggested agricultural Rotations for season 2018/2019

Cash revenue from the suggested Rotation in Ahnasia District							
suggested Rotation	Average total return (L.E)	Average total costs (L.E)	Average cash net revenue (L.E)	Rated Water M3/ fed	Irrigation water cost L.E/ Fed	Cost of m3/ fed (L.E))	Net revenue of water unit
clover then maize	56080	40380	15700	6596	8320	1.26	2.38
Wheat then maize	53980	44870	9110	6352	6900	1.09	1.43
sugar beet then maize	44363	33886	10477	5469	6470	1.18	1.92
Cash revenue from the suggested Rotation in Semesta District							
suggested Rotation	Average total return (L.E)	Average total costs (L.E)	Average cash net revenue (L.E)	Rated Water M3/ fed	Irrigation water cost L.E/ Fed	Cost of m3/ fed (L.E))	Net revenue of water unit
clover then maize	59720	43065	16655	6190	9200	1.49	2.69
Wheat then maize	56520	46765	9755	6061	7150	1.18	1.61
sugar beet then maize	47270	34418	12852	5460	7650	1.40	2.35
Cash revenue from the suggested Rotation in Beni-Suef District							
suggested Rotation	Average total return (L.E)	Average total costs (L.E)	Average cash net revenue (L.E)	Rated Water M3/ fed	Irrigation water cost L.E/ Fed	Cost of m3/ fed (L.E))	Net revenue of water unit
clover then maize	57410	41200	16210	6000	8550	1.43	2.70
Wheat then maize	57344	48169	9175	5830	6450	1.11	1.57
sugar beet then maize	44482	34262	10220	5515	6988	1.27	1.85

Source: collected and calculated from the data of the research sample

Recommendations:

1- Expanding in reclamation and cultivation new lands in Beni-Suef Governorate Because of the high net revenue expected from them.

2- Increasing the area cultivated by winter crops (wheat, clover, sugar beet) in the new lands in Beni-Suef Governorate Because of the high economic efficiency of them. Thus, saving these areas in old lands to cultivate by other crops.

3- Farmers are recommending applying the agricultural Rotation (clover then maize), (sugar beet then maize) since it is achieving the highest net revenue of water.

References:

1. Central Agency for Public Mobilization and Statistics - Annual Bulletin of Land Reclamation, 2018.
2. Enas Mohamed Abbas Saleh, (Doctor), Efficiency of Water Irrigation Use in the Surface Irrigation System in the Arab Republic of Egypt, Egyptian Journal of Agricultural Economics, Volume 23, No1, March 2013.
3. Ali Ibrahim Mohamed (Doctor), Horizontal Agricultural Expansion Policy and Land Reclamation in Egypt, Lectures of the Agricultural Economics Research Institute, 2013.
4. Amr Abdel Hamid Refaat (Doctor), Hussein Mohamed Tohamy (Doctor), the economic return of one of the land reclamation projects in Wadi Al-Nughra, Aswan Governorate, Egyptian Journal of Agricultural Economics, Volume 21, No. 3, June 2011.
5. Mohamed Kamel Ibrahim Rihan (Doctor), Abdullah Mahmoud Abdel Maksoud (Doctor), using the mathematical models of goals numerous to determine the crop yields best suited to Egyptian agriculture in light of different scenarios of available and expected water and land resources, The Egyptian Journal of Agricultural Economics, Volume 23, No 2, June 2013.
6. Ministry of Agriculture and Land Reclamation, Central Administration of Agricultural Economics, Agricultural Economy Bulletins, Various Issues.
7. Ministry of Agriculture and Land Reclamation, Sustainable Agricultural Development Strategy until 2030, March 2009.
8. K. G., Murty, Operations Research Deterministic Optimization Models, USA: Prentice- Hall, Inc, 1995, p. 280.
9. S. H. Mirkarimi1, R. Joolaie, F. Eshraghi and F. Shirani Bid Abadi, Application of Fuzzy Goal Programming in Cropping Pattern Management of Selected Crops in Mazandaran Province (Case Study Amol Township), International Journal of Agriculture and Crop Sciences. 2013.

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