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Effect of Fertilization, Soil Quality and Culture System on the Economic Viability of Three Different Fish Farms in Egypt

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ABSTRACT

Three different fish farms were studied for their soil type and were economically evaluated according to their yield produced from fertilized and unfertilized ponds with two culture systems. The pond soils were clayey, clay-sandy, and sandy in three different locations in Egypt. The fish ponds were fertilized with organic fertilizers (compost) and inorganic fertilizers with rate of 500 kg/feddan/week and 14 (nitrogen: phosphorus with ratio of 4:1) kg/feddan/week, respectively. Nile tilapia *Oreochromis niloticus* was reared with initial body weight of 5.31g in monoculture system with density of 22,000 fish/feddan, and with grey mullet *Mugil cephalus* with initial body weight of 9.88g in polyculture system fed on commercial diet (25% crude protein) for 240 days. Yields from clayey soil ponds showed best operating ratio, return on sales, return on costs and payback period with values of 57.6%, 42.4%, 167.9%, 7.1 months, respectively. However, yields from sandy soil showed the lowest operating ratio, return on sales, return on costs and payback period with values of 66.2%, 33.5%, 134.2%, 8.75 months, respectively. Also, the results revealed that the operating ratio, return on sales, return on costs and payback period for fertilized ponds were significantly higher than unfertilized ponds for the three soil types. The same pattern was observed for polyculture system revenues when compared to monoculture. Thus, the results of economic evaluation indicated that fertilized ponds were more profitable than unfertilized ponds irrespective to location and culture system, and polyculture system was more profitable than monoculture irrespective to location and fertilization.

Keywords: Economic evaluation, soil quality, monoculture, polyculture, Nile tilapia, grey mullet, revenues, fish farms.

INTRODUCTION

Fish farming is the principal form of aquaculture and it involves raising fish commercially in tanks or enclosures and ponds, usually for human consumption. Fish species raised by fish farms include salmon, catfish, tilapia, cod, carp, trout and others (Nelson 2006). Recently, FAO reports described tilapia as the "fish of miracles" one that can solve the protein problems of developing countries while satisfying the increasing demand for fish in the developed world (Ntengwe and Edema 2008). Tilapia is one of the most important species in world of aquaculture **(**Fitzsimmons 2000**)**, and one of the most popular fish in Egypt. The greatest increase in tilapia production in Egypt in the last two years was reported to be 557,049 mt for 2010 and estimates approaching 620,000

mt for 2012 (Fitzsimmons 2013). Intensive fish farming causes large amounts of organic waste in the form of unconsumed feed, fecal and excretory matter to accumulate in the bottom sediment. This organic waste matter generates considerable changes in the benthic macrofauna and chemical structure of the sediment (Ackefors and Enell 1990).

The successful productivity of fish in earthern ponds depends on the physical–chemical and biological characteristics of soil and water used for fish cropping and the nutritional supplementation of the cultured species (Ntengwe and Edema 2008). Although, previous researchers reported that soil plays an important role in determining the fertility of fish ponds, but its condition is an important environmental factor influencing water quality and controlling various process (Avnimelech and Ritvo 2003; Ntengwe and Edema 2008).

Khushk et al. (2005) conducted a survey on 80 fish farmers and found that fish production varies according to soil, feeds, and fish diseases. However, Bagghi et al. (1990) studied the effect of pond soil on fish production and indicated a wide variation in fish productivity with respect to their soil types. Avnimelech et al. (2004) reported that pond bottom conditions changed with time, and affected, to a large extent the accumulation of organic matter residues leading to high oxygen consumption and the development of reducing conditions. Landau and Scarpa (2001) reported that a considerable section of commercial aquaculture takes place in earthen ponds. Although, soil affects the chemistry of the water, and the ability of the pond to hold water, it is considered an important aspect for most culturists. The chemistry of soils to some extend is considered complex. Not only does soil affect the pH of the water and the nutrients available to plants and phytoplankton, but it may also affect the chemistry of water because of their cation exchange capacity. Soils that are high in its organic content usually have a very high exchange capacity, and those with expanding clay minerals are intermediate, while those soils dominated nonexpanding minerals have a very small cation exchange capacity.

Thus, the objectives of the present study is to determine and observe the correlation between soil type and quality on Nile tilapia, *Oreochromis niloticus*, yield and net income with and without adding fertilization (organic and inorganic) along with applying two culture systems (monoculture and polyculture).

MATERIALS AND METHODS

Experimental facilities

The study has been applied for 8 months from the 15th of April of 2004 until the 10th of December 2004 at three private and commercial fish farms different in their soil type and quality in Egypt. Two of which were at Behaira governorate, and the third private fish farm at the city of Borg El-Arab, Alexandria governorate. Thus, twelve treatments were formed for the three locations, each location has four treatments (monoculture and polyculture system; fertilized and unfertilized). Each treatment has its own replicate forming a total of eight ponds in each location.

Ponds

Earthen ponds with surface area of one feddan each, and average depth of one meter were used in the present study. Initial preparation along with water exchange rate of 5%, 10%, 15%, and 20% of the total water volume for the first two months, then the second two months, followed by the third two months, and then for the rest of the experimental period, respectively.

Experimental fish and diet

Hormone treated sex-reversed all male Nile tilapia fingerlings were obtained from a private farm in Edko, Behera governorate. The stocking density of the experimental ponds was 22,000 fish/feddan for monoculture system, and 20,000 Nile tilapia along with 2000 grey mullet,

Mugil cephalus, fish/feddan for polyculture system. Nile tilapia initial average body weight (BW) of 5.31±0.03 g for monoculture system, and 9.66±0.06 g for grey mullet in polyculture system at the three studied locations Edko (E), Kafr-Eldawar (K) and Borg El-Arab (B). A commercial pelleted feed from a private fish feeds factory (25% crude protein) was introduced to satiation three times daily, six days a week.

Economical evaluation

Budget analyses were performed for all input regimes. The comparative economic evaluation throughout the experiment was conducted by determining the following parameters: fixed costs (pond rent and labor), variable costs (seeds, feed, fertilizers, and operation materials), total return, total income, operating ratio, return on sales, return on costs, and return on equity and payback period. The material costs and fish sales were based on local market prices in Egypt in 2010.

Statistical analysis

Statistical analyses were conducted using methods from SYSTAT: the system for statistics as described by Wilkinson (1990). The analysis of variance (ANOVA) and least significant differences test were conducted according to Snedecor and Cochran (1981).

RESULTS AND DISCUSSION

Data on variable costs (seeds, feeds, fertilization and harvesting), fixed costs, total income and net income for the three commercial fish farms representing different fish culture methods and different management practices (fertilized and unfertilized) are presented in Tables 1, 2, 3 and 4, and Figure 1.

In the studied locations (E), (K) and (B), feed cost showed the highest value comprising about 50% of the total production cost. Correspondingly, the fingerlings cost showed also a high percentage (20%) of the total production cost. In fertilized systems, total production cost was 25,840 L.E. in monoculture system, and 28,628 L.E. in polyculture system with income of 41,697 L.E. and 60,968 L.E. and with a net profit of 15,857 L.E. and 32,340 L.E/pond/cycle for both fertilized practices, respectively. *O. niloticus* yield income considerably comprised the highest percentage of the total income (63.4%), followed by the yield income of *Mugil cephalus* (36.6%). However, in unfertilized treatments in the monoculture and polyculture systems the feed cost showed high value than in fertilized treatments of the three locations. Their total production cost was 27,555 L.E. in monoculture and 29,945 L.E. in polyculture system with income of 40,800 L.E. and 55,402 L.E., and with net profit of 13,245 L.E. and 25,457 L.E/pond/cycle, respectively.

According to the economic efficiency for the fish farm resources which is presented in Table (1), the results of the operating ratio were 61.97%, 46.95%, 67.54% and 45.05%, for fertilized monoculture and polyculture systems, and unfertilized monoculture and polyculture systems, respectively. The return on sale for fertilized monoculture and polyculture, and unfertilized monoculture and polyculture systems were 38.03%, 53.05%, 32.46% and 45.95%, respectively. Meanwhile, the return on costs which is as an indicator for the economic surplus of the fish farm showed that fertilized monoculture, polyculture, and unfertilized monoculture and polyculture system had a return on costs of 161.37%, 212.97%, 148.07% and 185.01%, respectively. Moreover, the payback period in both fertilized and unfertilized practices showed that the fish farm can convert investment cost within the first year of operation, which was about 7 and 6 months in fertilized ponds with mono and polyculture system and about 8 and 6 months in unfertilized ponds with mono and polyculture system, respectively.

Table 1: ***Economical evaluation of Nile tilapia and gray mullet yield per feddan in fertilized and unfertilized ponds in Edkou with mono and polyculture system.***

Items	Unit	Price (L.E)	Fertilized				Unfertilized			
			Monoculture		Polyculture		Monoculture		Polyculture	
			Quantity	Cost(LE)	Quantity	Cost(LE)	Quantity	Cost(LE)	Quantity	Cost(LE)
Variable costs										
Seed stock										
Tilapia	Thousand	200	22.00	4400	20.00	4000	22.00	4400	20.00	4000
Mullet	Thousand	1200	_	_	2.00	2400	_	_	2.00	2400
Feed	Tons	1950	7.25	14 137	7.50	14 625	8.40	16 380	8.60	16 770
Fuels and oil	Liter	0.60	1500	900	1500	900	1500	900	1500	900
Fertilization										
Compost	M3	50	15	750	15	750	_	_	_	_
Superphosphate	Kg	10.46	135.50	62.33	135.50	62.33	_	_	_	_
Urea	Kg	1.20	13.50	16.00	13.50	16.00	_	-	_	_
Lime	Kg	0.75	100	75.00	100	75.00	100	75.00	100	75.00
Land rent	Feddan	2000	1	2000	1	2000	1	2000	1	2000
Preparations	Feddan	300	1	300	1	300	1	300	1	300
Wags	LE/month	350	8*2/8	700	8*2/8	700	8*2/8	700	8*2/8	700
Harvesting	LE/pond	500	1	500	1	500	1	500	1	500
Fixed costs										
Depreciation	Feddan		1	2300	1	2300	1	2300	1	2300
Total costs				25 840		28 628		27 555		29 945
Income										
Tilapia	Kg	8.50	4 905	41 697	4 545	38 632	4 800	40 800	4 549	38 666
Mullet	Kg	16.00	_	_	1 396	22 336	_	_	1 046	16 736
Total income			4 905	41 697	5 941	60 968	4 800	40 800	5 595	55 402
Net income				15 857		32 340		13 245		25 457
Economic evaluation										
Operating ratio (%)				61.97		46.95		67.54		54.05
Return on sales %				38.03		53.05		32.46		45.95
Return on costs %				161.37		212.97		148.07		185.01
Payback period(M)				7.40		6.00		8.40		6.50

1. Operating ratio = total cost / total income, 2. Return on sales = net income /total income,
3. Return on costs = total income /total costs, 4. Payback period (year) =investment cost /total income,

In K fish farm, the economic evaluation showed (Table 2) also high values for fertilized practice than unfertilized practice, and also for polyculture system than monoculture system for each practice. The operating ratio for fertilization monoculture and polyculture, and unfertilized monoculture and polyculture systems were 73.20%, 50.01%, 91.42% and 65.92%, respectively. The return on costs for fertilized mono and polyculture, and unfertilized monoculture and polyculture systems were 136.59%, 199.48%, 109.38% and 151.72%, respectively. The payback period was about 10 months and 6 months in fertilized monoculture

Table 2: Economical evaluation of Nile tilapia and gray mullet yield per feddan in fertilized and unfertilized ponds in Kafr El-Dawar with mono and polyculture system.

Items	Unit	Price (L.E)	Fertilized				Unfertilized			
			Monoculture		Polyculture		Monoculture		Polyculture	
			Quantity	Cost(LE)	Quantity	Cost(LE)	Quantity	Cost(LE)	Quantity	Cost(LE)
Variable costs										
Seed stock										
Tilapia	Thousand	200	22.00	4400	20.00	4000	22.00	4400	20.00	4000
Mullet	Thousand	1200	_	_	2.00	2400	_	_	2.00	2400
Feed	Tons	1950	8.249	16 086	8.345	16 273	7.136	13 915	7.435	14 498
Fuels and oil	Liter	0.60	1500	900	1500	900	1500	900	1500	900
Fertilization										
Compost	M3	50	15	750	15	750	_	_	_	_
Superphosphate	Kg	0.46	135.50	62.33	135.50	62.33	_	_	_	_
Urea	Kg	1.20	13.50	16.00	13.50	16.00	_	-	_	_
Lime	Kg	0.75	100	75.00	100	75.00	100	75.00	100	75.00
Land rent	Feddan	2000	1	2000	1	2000	1	2000	1	2000
Preparations	Feddan	300	1	300	1	300	1	300	1	300
Wags	LE/month	350	8*2/8	700	8*2/8	700	8*2/8	700	8*2/8	700
Harvesting	LE/pond	500	1	500	1	500	1	500	1	500
Fixed costs										
Depreciation	Feddan		1	2500	1	2500	1	2500	1	2500
Total costs				28 289		29 876		26 118		28 101
Income										
Tilapia	Kg	8.50	4 546	38 641	4 346	36 941	3 361	28 568	3 604	30 634
Mullet	Kg	16.00	_	_	1 416	22 656	_	_	750	12 000
Total income			4 546	38 641	5762	59 597	3 361	28 568	435a 4	42 634
Net income				10 352		29 721		2 450		14 533
Economic evaluation										
Operating ratio (%)				73.20		50.01		91.42		65.91
Return on sales %				26.80		46.95		8.58		34.09
Return on costs %)				136.59		199.48		109.38		151.72
Payback period (Y)				10.00		6.00		12.00		8.00

1. ***Operating ratio = total cost / total income,***
2. ***Return on costs = total income /total costs,***
3. ***Return on sales = net income /total income***
4. ***payback period (year) =investment cost /total income,***

Table 3: Economical evaluation of Nile tilapia and gray mullet yield per feddan in fertilized and unfertilized ponds in Borg El-Arab with mono and polyculture system.

Items	Unit	Price (L.E)	Fertilized				Unfertilized			
			Monoculture		Polyculture		Monoculture		Polyculture	
			Quantity	Cost(LE)	Quantity	Cost(LE)	Quantity	Cost(LE)	Quantity	Cost(LE)
Variable costs										
Seed stock										
Tilapia	Thousand	200	22.00	4400	20.00	4000	22.00	4400	20.00	4000
Mullet	Thousand	1200	_	_	2.00	2400	_	_	2.00	2400
Feed	Tons	1950	5.59	10 900	6.00	11 700	4.493	8 761	4.50	8 775
Fuels and oil	L	0.60	1500	900	1500	900	1500	900	1500	900
Fertilization										
Compost	M3	50	15	750	15	750	_	_	_	_
Superphosphate	Kg	0.46	135.50	62.33	135.50	62.33	_	_	_	_
Urea	Kg	1.20	13.50	16.00	13.50	16.00	_	-	_	_
Lime	Kg	0.75	500	375	500	375	500	375	500	375
Land rent	Feddan	2000	1	500	1	500	1	500	1	500
Preparations	Feddan	300	1	500	1	500	1	500	1	500
Wags	LE/month	350	8*2/8	700	8*2/8	700	8*2/8	700	8*2/8	700
Harvesting	LE/pond	500	1	500	1	500	1	500	1	500
Fixed costs										
Depreciation	Feddan		1	2000	1	2000	1	2000	1	2000
Total costs				21 603		22 403		18 636		20 650
Income										
Tilapia	Kg	8.50	3 604	30 643	3 041	25 845	2 311	19 644	1 805	15 343
Mullet	Kg	16.00			1 422	12 087			592	9472
Total income				30 643		37 932		19644		24 815
Net income				9 040		15 529		1 008		4 165
Economic evaluation										
Operating ratio (%)				70.50		59.06		94.87		83.21
Return on sales %				29.50		39.04		5.31		16.79
Return on costs %				141.89		169.32		105.46		120.17
Payback period(M)				8.00		7.00		11.00		9.00

1. Operating ratio = total cost / total income, ***2. Return on sales = net income /total income***
3. Return on costs = total income /total costs, ***4. payback period (year) =investment cost /total income,***

Table 4: Economical evaluation of Nile tilapia and gray mullet yield per feddan in fertilized and unfertilized ponds in three different locations with mono and polyculture system.

Items	Edko				Kafr El-Dawar				Borg El Aarab			
	Fertilized		Unfertilized		Fertilized		Unfertilized		Fertilized		Unfertilized	
	Mono	Poly	Mono	Poly	Mono	Poly	Mono	Poly	Mono	Poly	Mono	Poly
Total costs	25 840	28 628	27 555	29 945	28 289	29 876	26 118	28 101	21 603	22 403	18 636	20 650
Total return	41 697^{b}	60 968^{a}	40 800^{b}	55 402^{a}	38 641^{b}	59 597^{a}	28568^{cd}	42 634^{b}	30 643^{c}	37 932^{b}	19644 ^{e}	24 815^{d}
Net income	15 857^{b}	32 430^{a}	13 245^{b}	25 457^{a}	10 352^{c}	29 721^{a}	2 450^{e}	14 533^{b}	9 040^{c}	15 529^{b}	1 008^{e}	4 165^{d}
Operating ratio (%)	61.97^{c}	46.95^{d}	67.54b^{c}	54.05^{cd}	73.20^{b}	50.01^{d}	91.42^{a}	65.91^{c}	70.50^{b}	59.06^{cd}	94.87^{a}	83.21^{ab}
Return on sales (%)	38.03^{c}	53.05^{a}	32.46^{c}	45.95^{b}	26.80^{d}	46.95^{b}	8.58^{d}	34.09^{c}	29.50^{d}	39.04^{c}	5.31^{d}	16.79^{d}
Return on costs (%)	161.37	212.97	148.07	185.01	136.59	199.48	109.38	151.72	141.89	169.32	105.46	120.17
Payback period (month)	7.40	6.00	8.40	6.50	10.00	6.00	12.00	8.00	8.00	7.00	11.00	9.00

1 Operating ratio = total cost / total income, 2:Return on sales = net income /total income,
3. Return on costs = total income /total costs, 4: payback period (year) =investment cost /total income,

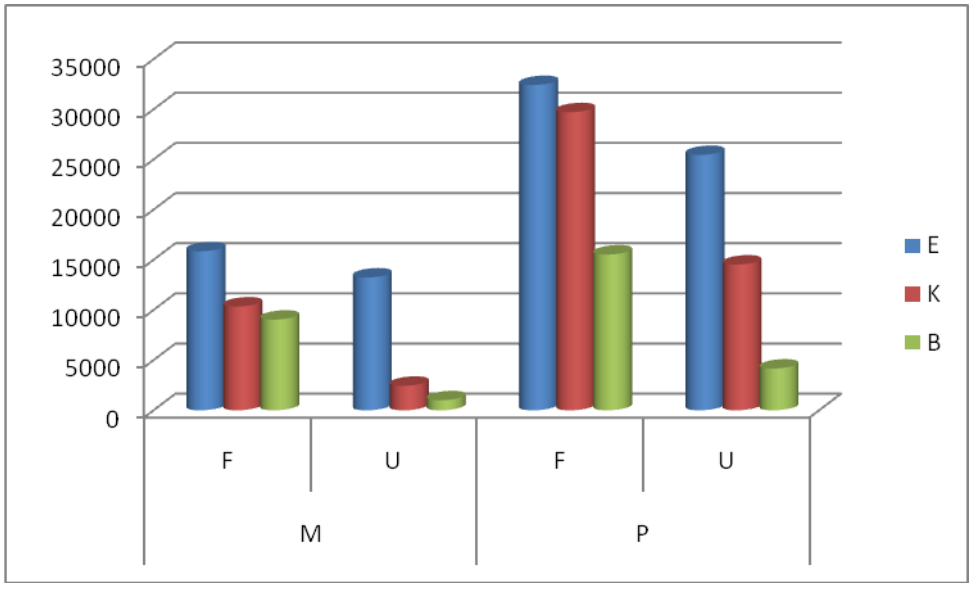

Figure 1: Net income (L.E./feddan) from different treatments of fertilized and unfertilized monoculture and polyculture systems in three different locations (Edko, Kafr Eldawar, and Borg El Arab).

and polyculture system, and about 12 months and 8 months in unfertilized mono and polyculture system, respectively. Also, it was noticed that the fertilized method practiced commercially in K fish farm was better than the unfertilized method, this reflects the effect of fertilization on fish farm. However, the fertilized method in K corresponds with the fertilized practice in E fish farm.

Therefore, the economic evaluation indicated that treatments including gray mullet (polyculture system) were significantly higher than those without it for net income, return on sale (%) return on costs (%) and payback period (month). Katz *et al.,* (2002) reported that gray mullet commercially had a significant value on production systems in many countries.

In the same manner, the economic evaluation for B fish farm showed (Table 3) lower indicators of the fertilized practice than that of unfertilized practice, for the operating ratio and return on cost. Thus, the operating ratio of fertilized monoculture and polyculture, and unfertilized monoculture and polyculture systems were 70.50% and 59.06%, 94.87% and 83.21%, respectively. Consequently, return on costs for fertilized mono and polyculture, and unfertilized monoculture and polyculture system were 141.85% and169.32%, 105.40% and 120.17% in about 11 and 9 months, respectively.

However, it was noticed that the fertilized fish culture method practiced commercially in B fish farm was better than unfertilized method, thus reflecting the effect of fertilization on fish yield. Correspondingly, it was also noticed that fertilized methods at B matches the unfertilized method in K which reveals the effect of fertilization on triggering soil quality.

The highest values of total return, operating ratio, return on sales, return on costs and payback period (Table 4) and (Figure 1) obtained from fertilized ponds in E with polyculture system were 60,968 L.E., 46.95%, 53.05%, 212.97% and 7.4 months, respectively. However, the lowest values of total return, operating ratio, return on sales, return on costs and payback period were obtained for unfertilized ponds in B with monoculture system were 19,644 L.E., 94.87%, 5.31%, 105.46% and 11 months, respectively. The results of the economic evaluation indicated that fertilized ponds were more profitable than unfertilized ponds irrespective of location and culture system. Also, polyculture was more profitable than monoculture irrespective to fertilization and location. Finally, E was more profitable than K and B irrespective to fertilization and culture system.

Similarly, net income, return on sale (%) return on costs (%) and payback period (month) were significantly higher in fertilized treatments than those in unfertilized treatments of the present study. These results agree with El-Tawil (2006) were he found that recruitment percentage was significantly higher in fertilized treatments than those in control treatments. The highest percentage of the first and second fish grades were recorded in the compost fertilizer plus feed treatments. While the lowest percentage was found in the fourth treatment (feed only). Fertilization and polyculture system increased net income return on sale (%) return on costs (%) and payback period (month) in Borg El-Arab to be higher than both of Edko and Kafr Eldawar.

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تأثير التسميد ونوعية التربة ونظم الاستزراع على الجدوى الاقتصادية لثلاث مزارع مختلفة للأسماك في مصر

محمد سلامة ، غادة سلام ، وليد فايد ، سامي الزعيم ، علاء الدحار

قسم الإنتاج الحيواني والسمكي ، كلية الزراعة – سابا باشا – جامعة الإسكندرية

أجريت هذه الدراسه بهدف تقييم إنتاجيه الفدان فى بعض مزارع القطاع الخاص والتى تختلف فى نوعية التربه الخاصه بكل منها و أثر التسميد ونوع الإستزراع على الكفاءه الإقتصاديه لإنتاجية الفدان من أسماك البلطى النيلى فى جمهورية مصر العربيه من حيث العائد الكلى وصافى الربح وفترة إسترداد رأس المال. تمت الدراسه فى ثلاث مزارع خاصه بمناطق إدكو ،كفر الدوار وبرج العرب والتى تميزت كل منها بطبيعة تربه تختلف عن الأخرى فكانت على التوالى طينيه وطينيه رمليه ورمليه وتمت دراسة أحواض بمساحه فدان مسمد بسماد عضوى للمعملات المسمده بمعدل ٥٠٠كجم/فدان/ أسبوع إضافه إلى ١٤ كجم/فدان/ أسبوع من السماد الكيماوى بنسبة ١:٤ نيتروجين: فوسفوروأخرى غير مسمده. وأختبر أيضا نظامى الإستزراع الموحد بإستخدام أسماك البلطى بمتوسط وزن إبتدائى ٥,٣١ جم وبكثافة ٢٢ ألف إصبعيه للفدان ومتعدد بكثافة ٢٠ إصبعيه من البلطى إضافة إلى البورى بمتوسط وزن إبتدائى ٩,٨٨ جم بكثافه ٢٠٠٠ إصبعيه للفدان. وتم تغذية الأسماك على عليقه تجايه مصنعه تحتوى على ٢٥% بروتين لمدة ٢٤٠ يوم. وقد أظهرت النتائج أنه تم تحقيق أعلى عائد كلى وصافى ربح وعائد على المبيع فى إدكو تلتة كفر الدوار فى الأحواض المسمده مع نظام الاستزراع المتعدد بينما سجلت برج العرب أقل نسبه مع الاحواض الغير مسمدة ونظام الإستزراع الموحد. بينما زادت قيم معدل التشغيل والعائد على التكلفه وفترة إسترداد رأس المال فى برج العرب تلتها كفر الدوار مع الأحواض الغير مسمده والنظام أحادى الإستزراع.

- ارتفعت نسبة الربح فى برج العرب فى الاحواض المسمدة ووصل الربح الى أعلى قيمة لة مع نظام الاستزراع المتعدد وأظهرت النتائج أيضا أعلى صافى ربح فى التربه الطينيه تلتها الطينيه الرمليه ثم أخيرا التربه الرمليه. وكانت أعلى نسبة تشغيل فى التربه الطينيه الرمليه تلتها الرمليه ثم الطينيه، وكان أعلى عائد على المبيع(%) فى التربه الطينيه ثم الرمليه وأخيرا الطينيه كما كانت أقصر فترة إسترداد لرأس المال فى التربه الطينيه تلتها الطينيه الرمليه وأخيرا الرمليه. كما أوضحت النتائج زيادة صافى الربح فى جمع أنواع التربه مع وجود التسميد ونظام الإستزراع المتعدد كما زادت نسبة التشغيل فى الأحواض المسمده عن الغير مسمده ومع النظام الموحد عن المتعدد. أيضا زاد بمعنويه العائد على المبيع وقلت فترة إسترداد رأس المال فى وجود التسميد ونظام الإستزراع المتعدد. لذا أوصت الدراسه بإستخدام التسميد العضوى بالإضافه إلى الكيماوى فى جميع أنواع التربه خاصة الرمليه وكذلك إتبدال نظام الإستزراع المتعدد بدلا من النظام الموحد فى جميع أواع التربه كما أشارت الدراسه إلى إمكانية رفع العائد الإقتصادى للأراضى الفقيره فى المحتوى الغذائى للأسماك (الرمليه) بإستخدام التسميد ونظام الإستزراع المناسب لذا فلا توجد هناك أراضى غير مجديه للإستزراع السمكى.