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Greenhouse- grown Cucumber as an Alternative to Field Production and its Economic Feasibility in Aswan Governorate, Egypt

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Abstract

A greenhouse experiment was carried out in 2014/2015 in the Research Station at Faculty of Agriculture and Natural Resources, Aswan University to investigate pilot/experimental greenhouse model facilities to improve efficiency of integration along the value chain of cucumber crop and provide a guide for greenhouse cucumber growers in Upper Egypt. The area of the greenhouse was 4200 m^2 representing the most common economic module in terms of unit size for the greenhouse vegetable industry. The cucumber cultivar 'Barracuda F1' was cultivated in the greenhouse and 'Elmayadeen' in the open field. The results revealed that the total harvest yield of the cucumber cultivar 'Barracuda F1' under greenhouse was 5 times the open-field yield of the cultivar 'Elmayadeen' in the area; as well as, the water used for irrigation was 70 % less than in open-field. The mean variable costs, average fixed costs and total costs for the greenhouse production system were higher than the open field production system. The total gross revenue and margin were 114000 L.E and 84383 L.E for the greenhouse cucumber, while the gross revenue and margin for the open-field cucumber were 19400 L.E and 15047 L.E. The mean net profit was 61830 L.E for greenhouse and 13666 L.E for open-field cucumber. The results revealed that the net profit for greenhouse cucumber growers was thirteen times higher that of their open-field counterparts. The average yield off for the greenhouse cucumber was higher by 24.74 ton (45.6-20.86=24.74) ton, while in open field the average yield off was higher by 6.84 ton (9.7-2.86=6.84). The financial indicators indicated higher convenience for greenhouse cucumber production system, highlighting a NPV equal to 223353 L.E, an IRR to 48.11%, which can be compared to the interest rate which was about 11% to prove the profitability of greenhouse cucumber project. The cucumber greenhouse system has been shown to have a higher profitability than the open-field system as shown by the private and social profits and is more efficient which compensates its extra costs.

Keywords: cucumber, Greenhouse, *financial analysis, production system.*

Introduction

In recent years, greenhouse cultivation has strongly been developed and considered as a factor in employment through producing off-season agricultural products, optimizing water and soil resources and utilizing small parts and facilities in villages and the margin of populated cities that lack water and sufficient time. (Hossien Younesi *et al*., 2013).

All agricultural production systems have costs, which affect financial returns and the owner's decision to proceed or forego investments. Monitoring production costs and market prices are critical for greenhouse vegetables. In this regard, greenhouse vegetable growers should take into consideration the intricacies of the market in terms of prices at different times of the year as well as the best time to enter the market as these can impact directly on returns to labor, investment and overall profitability (Govind Seepersad *et al.,* 2013).

Cucumber (*cucumis sativus* L.) is one of the most important fresh consumed vegetables worldwide. In Egypt cucumber is used to produce under open field conditions and recently is considered as one of the main greenhouse cultivated vegetables. The total greenhouse area for cucumber production increased from 5395 thousand square meters in 2004 up to 11.915 million square meters in 2014, and the production increased from 60 thousand ton in 2004 up to 161 thousand ton in 2014. The total cultivated area of open field cucumber in 2013/2014 was 52.67 thousand feddan and produced about 496.81 thousand ton of fresh fruits. The domestic consumption of fresh cucumbers in 2000 was 428 thousand ton and rose to 540 thousand ton in 2014, giving an increase of 26.20% (Ministry of Agriculture, 2015). The gap between domestic consumption and total production increase in public demand for fresh cucumbers has allowed farmers to produce more to fill that demand, and this can be narrowed by using Greenhouse Technology in cultivation. the greenhouse production of cucumber.

As compared to open field the greenhouse cucumber has the advantageous of premium price due to the high yield, seasonal availability and its fruit quality including fruit uniformity, color and firmness. The reasons of low price of open field cucumber in particular summer season are the less fruit uniformity (shape and color) due to weather and agricultural practices effects (Fouad *et al.,* 2007). Also, Farmers who produce high quality greenhouse cucumbers acquire a high annual average price per kilogram of product. Thus, a valued number of cucumbers grew farmers in Egypt changes to greenhouse production of cucumber (Fouad *et al*, 2007).

The mean objective of this study is to investigate a pilot/experimental greenhouse model facilities to improve efficiency of integration along the value chain of cucumber crop, and provide a guide for greenhouse cucumber growers in Egypt particularly Aswan.

Materials and Methods

A greenhouse experiment was carried out in 2014/2015 in the Research Station at Faculty of Agriculture and Natural Resources, Aswan University. The total area of the

greenhouse (experimental site) was about 4200 m^2 (100 m long, 42 m wide and 3.25 high). The soil of the greenhouse was clay loam with a pH 8, field capacity 42%, available phosphorus 0.01% and total nitrogen 0.08%. The greenhouse was covered by 6 mm thickness and 77-88 light transparency polyethylene sheets during winter. The Upper Egypt summer (including Aswan) is characterized by high temperature, light intensity and photoperiod. Therefore, the polyethylene sheets were covered by black insect proof nets on 15th February 2015 until the end of growing season. The soil of the greenhouse was plowed three orthogonal times, then the recommended amount of organic manure (20 ton/fedd after the second plow) for cucumber production was added (Fouad *et al,* 2007). The distance between each two adjacent was 1m , while the distance between two plants in the same row was 0.45 m. The crop was grown using surface drip irrigation systems. For installing the drip irrigation systems, the experimental site was precisely leveled then the dripper lines were installed on soil surface. The distance between the dripper lines (rows spacing) was 1 m and the distance between drippers (distance between each two plants in the same line) was 0.45 m. The downstream end of each dripper line was connected to a manifold for convenient flushing. Inlet pressure on each tape was about 1.5 bars. The system uses 125 micron disk filter.

The cucumber cultivar 'Barracuda F1' (Agrotech for Modern Agriculture, 43 Mohamed Mazhar St., Zamalek, Cairo, Egypt) is commonly used for commercial production by Upper Egypt farmers in particular Aswan. It has less vigorous plant growth and multi fruits per node. Plant production was realized parallel to growers' applications. Seeds were planted individually in seedling trays on 15th Oct. 2014 in the greenhouse. After the formation of the third true leaves (15th Nov. 2014) the cucumber seedlings were transplanted in the greenhouse. The recommended agriculture practices (fertilization, fertigation, weed control, insect and diseases control…etc) for cucumber production under greenhouses and surface drip irrigation were applied (Papadopoulos, 1994; Fouad *et al.,* 2007).

The greenhouse was equipped by fans, timber, pillars, UV, polyethylene cover sheets wires, drip irrigation system, fertilization system, and temperature and humidity measurement devices.

Yield data and observations of cucumber cultivated in the greenhouse were recorded during the production period. Thus, income and expense data were collected on time. The data of cucumber produced under open-field conditions were collected from the published records of the (Ministry of Agriculture, 2015). The missing data were re-estimated using farmer consultation procedure. The costs in the greenhouse systems were also benchmarked to typical field-grown production systems.

Empirical economic model: gross margin and net profit analyses were used to determine and compare the profitability levels for both greenhouse and open-field cucumber production systems.

The gross margins: calculated by subtracting total variable costs from gross revenue as: GMi = TRi – TVCi (1) Where; GM = Gross margin, TR = Total (Gross) Revenue, TVC = Total variable costs

Net return: calculated by subtracting total production costs from gross (total) revenue as: $\pi i = TRi - TCi$ (2) Where: π = Net Return, TR = Total revenue, TC = Total cost.

Gross (total) return: calculated by multiplying stated cucumber price by quantity of cucumber yield as reported by the respondents. The only direct and measurable revenue was obtained from the production of cucumber, the study used current season's (2014/2015) prices and labour costs. (John M. Wachira. *et al.,* 2014)

For calculating the break-even point and the profitability of the crop; the following formula was used:

Break-even point (BEP) = Total cost of production ÷ Price per unit of yield.

The assessment of the optimal return from greenhouse cucumber is based on the most commonly used Discounted Cash Flow (DFC) performance criteria NPV, IRR, B/C ratios and payback period, and Sensitivity Analysis for greenhouse system were conducted in the study, we need to consider, at least, other possible market

scenarios which might determine variations in prices, and variations in profitability and payments (Brealey and Myers, 2011).

Table 1. Summary of definitions of The most commonly used discounted cash flow (DFC)

Net present value (NPV)	$\sum_{t=1}^{p} CF_t / (1+i)^t$, where t is time, CF_t is the annual net cash flow, i is the discount rate p is the planning horizon
Internal rate of return (IRR)	The value of r such that $\sum_{t=1}^{p} CF_t / (1+r)^t = 0$
Benefit to cost ratio (B/C)	Present value of project benefits / present value of project costs
Payback period	Number of periods until NPV becomes (and remains) positive

Variable costs: comprised of inputs and labor costs at production, harvesting and marketing stages. Such inputs included seeds/seedlings, fertilizers, chemicals and water. Labor costs consisted of greenhouse construction, nursery work, land preparation, planting, agricultural practices including watering, fertilization, weed, diseases and pest control, training, pruning, de-suckering, harvesting, sorting, packing, transportation and marketing.

The main fixed costs in the present were: interest on total initial investment costs, interest on total variable costs, depreciation and administrative costs, and land rent. Interest is defined as a sum paid or calculated for the use of capital. The sum is usually expressed in terms of a rate or percentage of the capital involved, called the interest rate (Chaudhary, 2006). In this study, interest on total initial investment costs and total variable costs was calculated by charging a simple interest

rate of 12% (annual saving deposits interest rates on LE commercial banks in 2015) on one-half of total initial investment costs. The reason to divide the annual interest by two is because the growers prefer to grow two crops yearly in unheated-greenhouses in Egypt. Administrative costs can be estimated to be 2–7% of total gross production value or 3–7% of total costs (Engindeniz *et al*., 2009). The administrative costs in the presented study were estimated to be 3% of total variable costs. Also, land rent was divided by two because most farmers grow two crops per year in the region**.** Depreciation for initial investment was estimated using the straight-line method (Penson *et al.,* 2002; Lazol, 2007). Assets were divided by their useful life expectancies to determine annual costs for depreciation. Greenhouse was exempted from property tax and was not insured.

Water is available to the greenhouse. Thus, it might not require additional investment for the drilling of water well (Engindeniz and Gül, 2009). A water pump was used for irrigation. Gross margin per meter squared and net profit per square meter were then calculated by dividing gross margin and net profit by the area in meters squared. A greenhouse structure of 4200 m^2 was selected as representing the most common economic module in terms of unit size most often used to expand an existing operation or used by potential entrants as a planning unit for entry into the greenhouse vegetable industry.

Results and Discussion

Technical Analysis

Farmers can get 10 times more yield with greenhouse production system than with the open-field system of production (Seminis-Kenya, 2007). Greenhouses system is one of the protected cultivation types used to produce vegetables and flowers. Certain plastic covers protect plants from adverse weather condition and increase their resistance to pest attack (Benoit and Ceustermans, 1992). In the recent years, growing vegetables is expanding under protected cultivation in Egypt. The common types of protected cultivation in Egypt are the plastic low tunnels and the single span plastic house (El-Aidy *et al.*, 2007).

The cucumber cultivar 'Barracuda F1' was used because of its high productivity and availability to be grown under greenhouse conditions. The gathered information revealed that the total harvest yield of the cucumber cultivar 'Barracuda F1' under greenhouse was 5 times the open-field yield of the cultivar 'Elmayadeen' in the area; as well as, the water used for irrigation was 70 % less than in open-field. A comparison between the greenhouse and open field production of cucumber under Aswan governorate conditions is presented in Table (2).

The results indicated that the total yield of cucumber under open-field conditions was 10 tons / feddan. However, in the greenhouse the same cultivated area of cucumber produced about 3.5 times more than that was produced in the open field (48 tons/feddan).

Table 2. Summary of Cultivation of green houses cucumber vs open field

No.	Details	Greenhouse*	Open-Field**
1	Variety	BarracudaF1	Elmayadeen
2	Seeds cost	10000	1000 L.E
3	Seeds quantity	8000 seedlings /fed	0.5 Kgs/fed.
4	Planting date	15 Nov 2014	15 Sept 2014
5	Planting Space	50cm* 100cm	50cm*150cm
6	Planted Area	4200 m^2	4200m^2
7	First Flowered	15 Dec 2014	15 Octo 2014
8	First Fruit Picked	22 Dec 2014	22 Octo 2014
9	Fruit length	Min 15 cm – Max 20cm	Min 12 cm – Max 14 cm
10	Single fruit weight	Min 150 gm – Max 180 gm	Min 200 gm – Max 250 gm
11	Fruit diameter	Min 7 cm Max 9 cm	Min 10cm – Max 12cm
12	Fruit color	Dark green	Green – light green
13	Proportion of undeveloped Fruit (%)	2%	15%
14	Plant height	240 cm	120cm
15	Total Yield(Expected*)	48 ton*	10 ton
16	Last Picking (Expected*)	01 April 2015*	01 Jan2015
17	Growing Period	Up to 105 Days	Less than 100 Days
18	Optimum Growth Temperature	28C^o	30 C^o

Source: *The results of current study. **The results derived from Economic Affairs Sector, Ministry of agricultural and land reclamations 2015.

Based on the study findings one square meter of cultivated cucumber under greenhouse conditions can produce approximately 11.4 kgs. However, one square meter of cultivated cucumber under open-field conditions can produce approximately 2.3 kgs. These findings attributed to the cucumber cultivar, irrigation and fertilization systems, weeds, pest and diseases management and harvest practices applied in the greenhouse as compared to the open field.

Irrigation Schedule:

The cucumber plants in the greenhouse were supplied with water using drip irrigation system. This system allowed watering the plants with the required amount of water and nutrients at right place (near to the root zone) and time. Watering was according to the schedule related to the plant growth stages (Table3).

Table 3. Irrigating Schedule

Plant growth stage	No of weeks	Greenhouse			
		Time (Min)	No. of Irrig.	Water (m^3)	Cost (L.E)
• Initial (establishment)	3	180	21	105.84	210
• Growth (vegetative growth)	3	399	21	223.43	400
• Flowering	1	210	7	117.6	70
• Flowering + fruit setting + harvesting	16	6618	49	3091.2	860
Total		**7407**			**1540**

***Source*:** the results of current study.

Fertilization Schedule:

It was noted that the fertilizers used were 52 % less than in open-fields, which reveal an improvement in the efficiency of fertilizer use (Table 4).

Table 4. Fertilization Schedule:

Details	Greenhouse	
	Actual	Cost/L.E
Ammonium Nitrate (Kg)	50	150
Potassium Oxide(K_2O)(Kg)	50	300
Phosphoric Acid(Liter)	25	350
Magnesium Sulfate(Kg)	16	160
Zinc Sulfate(Kg)	02	40
Fe EDDHA (Iron Chelate) (Kg)	01	250
Borax(Kg)	01	60
Copper Sulfate(Kg)	01	60
Total		1370

Source: The results of current study.

Economic Analysis

Economic analysis is a process whereby the strengths and weaknesses of the greenhouse are analyzed. It is important in order to understand the exact conditions of applying the greenhouse pilot in Aswan. Economic ratings are another important aspect of economic analysis, as it provides an accurate picture of how cultivation under greenhouses is faring compared to the open-field cultivation. In our case, the actual greenhouse area for cucumber was 4200 square meter. Itemized expenses associated with the production of cucumbers are given in Tables 5, 6, 7 and 8. Costs of construction of the greenhouse are presented in Table 5. Initial investment costs were determined as L.E 126000 for 4200 square meter greenhouse, or 30 L.E. greenhouse building (Sit preparation and ground gravel, Wood & kits, assembly and installation costs cover 34.13% of total initial investment costs. While the greenhouse Equipments (Fans, Fertilization system, harvesting equipments, Drip Irrigation System &Water, and polyethyl-

ene sheets and black insect proof nets) cover 65.87% of total initial investment costs. Annual initial investment costs were calculated as L.E 18600, and since most farmers grow two crops per annum in the region, the cost was divided by two. Thus, annual initial investment costs were estimated as L.E 9300 for cucumber production. Total and annual investment costs may change according to greenhouse type and size, climate control equipments and soilless culture technique used. Multiple greenhouses would increase the total expenditure but most likely they would reduce the cost per square meter because economic gains would be realized, the large production would reduce the cost of production per unit.

Table 5. Initial investment costs for greenhouse construction (4200 m^2)

INVESTMENT DETAIL:	Initial Cost L.E	% of Cost	Useful Life	Annual Cost LE
Greenhouse Building:				
Sit preparation and ground	10000	7.94	(*)	1000
Wood & kits	18000	14.29	10	1800
Assembly and installation	15000	11.90	(*)	1500
Subtotal 1	**43000**	34.13		**4300**
Equipments:		0.00		
(Fans, Fertilization system, harvesting equipments, …etc)	33000	26.19	10	3300
Drip Irrigation System &Water	35000	27.78	10	3500
polyethylene sheets and black insect proof nets	15000	11.90	2	7500
Subtotal 2	**83000**	65.87		**14300**
TOTAL	**126000**	100.00		**18600**

(*)Calculated over 10 years (Hickman & Klonsky, 1993; Estes & Peet, 1999).

Source: (1) Authors, based on data provided by the company of consulted, 2014 price.

(2) Authors, based on consultations with experts

Production cost of the crop under greenhouse is higher than the open field. Variable costs associated with the production of cucumbers and the profitability analysis are presented in Table 6. The results revealed that the mean variable costs as L.E were 4353 for open-field production system and 29617 for the greenhouse systems. The fixed costs as an average were 1381 L.E for open-field and 22553 L.E and greenhouse systems, while the mean total costs were 5734 L.E and 52170 L.E for open-field and greenhouse systems, respectively. Variable and fixed costs of greenhouse production were higher than open-field production. These results imply that the production of greenhouse cucumber was more costly and required more work capitals as compared to the production of cucumber under open-field conditions.

Table 6. Economic comparison between greenhouse and open-field production of cucumber: cultivated area 4200 m^2

Detailes[1]		Greenhouse*		Open field **	
		Total/L.E	L.E/m^2	Total/L.E	L.E/m^2
Variable costs (A)	Seeds	10000	2.38	1000	0.24
	Compost	500	0.12	280	0.07
	Fertilizers	1370	0.33	507	0.12
	Diseases and pests control	3511	0.84	200	0.05
	Repairs	455	0.11	0	0.00
	Machinery	1540	0.37	726	0.17
	Small Tools, Supplies	445	0.11	100	0.02
	Labor	10565	2.52	1260	0.30
	Others (Fuel, Transportation)	1231	0.29	280	0.07
	Total (A)	**29617**	7.05	**4353**	1.04
Fixed COSTS	Interest on total initial investment costs[2]	7560	1.80	-	
	Annual initial investment costs[2]	9300	2.21	-	
	Interest on total variable costs	3554	0.85	-	
	Land Rent[2]	1250	0.30	1250	0.30
	Administrative costs[3]	889	0.21	131	0.03
	Total (B)	**22553**	5.37	**1381**	0.33
Total costs (A+B)		**52170**	12.42	**5734**	1.37

Note: (1) Interest on total initial investment costs and total variable costs was calculated by charging a simple interest rate of 12%.

(2) = one-half of total initial investment costs. The reason to divide the annual interest by two is because the growers prefer to grow two crops yearly

(3) administrative costs were estimated to be 3% of total variable costs

Source: *The results of current study. **The results derived from Economic Affairs Sector, Ministry of agricultural and land reclamations 2015(Wages and production inputs).

Market Analysis:

The yield of the greenhouse cucumber marketed at local and wholesale markets after packing in plastic bags. The basic determinants of the profitable greenhouse production are the economical rather than the ecological factors. Domestic market dynamics take first place among these factors. The existence of a large domestic market is the most important factor in terms of supporting development of greenhouse production. Particularly large population, with relatively high growth, in addition to increases per capita income creates demand for greenhouse products. Fresh cucumber is a mainstay for direct vegetable marketing. Consumer familiarity with the crop, a greater emphasis on the health benefits of eating fresh produce; and sales to high value markets help keep the cucumber sales strong and growing. Based on results of our experimental pilot and our forecasting; the greenhouses produce will keep good market opportunities for the small farmers growing cucumber and considering it as an important source of cash. With good management, each plant in the greenhouse may produce as much as 6 Kgs of fruit over a four-month period. Table 7 shows a comparison between the production of greenhouse and open-field cultivation in terms of marketing aspects.

Table 7. Marketing Schedule

Details	*Greenhouse	**Open-Field
Potential Market	Pickles – Hyper Markets	Pickles - Local Market- Export
Uses	Fresh	Pickles - Fresh
Packaging Material	Boxes- loose	Boxes - Sacks
Average Selling Price	L.E 2.5	L.E 2
Availability per Season	3.5 months	2 months
Productivity	48 Tons	10 Tons
Market Competitors	Limited	Unlimited
Low price recorded in the season	L.E 2	L.E 1
Loss in yield as a result of the harvest	5 %	3%

Source: *The results of current study. **The results derived from Economic Affairs Sector, Ministry of agricultural and land reclamations 2015.

Gross Return and Net Return

The total gross revenue obtained from the greenhouse cucumber was 114000 L.E, while the gross revenue was19400 L.E for the open-field cucumber. The gross margin was 84383 L.E and 15047 L.E for the greenhouse and open-field cucumber production systems, respectively (Table 8). The results indicated that although both production systems had varying levels of variable costs, returns were high enough to offset those costs associated with production. The mean net profit was L.E 61830 and L.E 13666 for greenhouse and open-field cucumber, respectively. These results reveal that, the net profit for greenhouse cucumber growers was thirteen times higher that of their open-field counterparts.

Table 8. The economic comparison of greenhouse and open-field cucumber production systems.

Item	Greenhouse*	Proportional of revenue %	Open field**	Proportional of revenue %
Costs				
Variable costs (A)	29617	16.24	4353	22.44
Fixed cost(B)	22553	12.36	1381	7.12
Total costs (A+B)	**52170**	**28.60**	**5734**	**29.56**
Gross return				
Total yield (ton)	45.6		9.7	
loss in yield (ton)	2.4		0.3	
Average price of LE/ ton	2500		2000	
Gross total return	**114000**	**100.00**	**19400**	**100.00**
Gross margin	**84383**	**74.02**	**15047**	**77.56**
Net return	**61830**	**54.23**	**13666**	**70.44**
Net return (LE m2)	**14.72**		**3.25**	
Break-even yield point (BEP) ton	**20.86**		**2.86**	

Source: *The results of current study. **The results derived from Economic Affairs Sector, Ministry of agricultural and land reclamations 2015.

The production of cucumber in the greenhouses is hard and risky business. Additionally, the lack of marketing experiences and levels of required skills grow up the break-even point under intensively greenhouse condition were reported as main problems of the greenhouse production of cucumber (Jose 2005). Accordingly, the break-even point for cucumber cultivation under greenhouses and open-field, were about 20.86 and 2.86 ton, respectively. This means that the average yield of greenhouse cucumber in the study area is higher by 24.74 ton (45.6-20.86=24.74) ton .while in open field the average yield of is higher by 6.84 ton (9.7-2.86=6.84).

Therefore, this outcome point outs that the yield for cucumber crop in both greenhouse and open field covered its actual costs of production. On top, the results show that both systems were able to recover all the total production costs in terms of variable as well as fixed costs. The cucumber greenhouse system has been shown to have a higher profitability than the open-field system as shown by the private and social profits and is more efficient which compensates its extra costs. Chain analysis study is suggested as it could open up more avenues for improving the performance of this important sub-sector.

Financial analysis

In order to better understand the sustainability of greenhouse cucumber production system, it is necessary to assess not only the profitability of the greenhouse but also the financial sustainability of the business cycle and applying appropriate indexes (Bonazzi *et al*., 2014). Financial analysis has been carried out determining the Net Present Value (NPV), the Internal Rate of Return (IRR), the Discounted Cost-Benefit Rate (DCBR) and the Discounted Pay-Back Time (DPBT).

Table 9. Financial and Sensitivity analysis results of investment in a greenhouse cucumber production system (4200 m^2)

Indicators	Our case	Sensitivity analysis.	
		Production Cost + 5%	Return − 5%
Net presents value (NPV)	223353	208614	191147
Internal rate of return (lRR)	48.11	43.26	38.52
Discounted Cost-Benefit Rate (DCBR)	1.50	1.42	1.40
Discounted Pay-Back Time (DPBT).	2.47	2.54	2.86

With regards to financial indicators, the results show higher convenience for greenhouse cucumber production system, highlighting a NPV equal to 223353 L.E, an IRR to 48.11%, which can be compared to the interest rate which was about 11% to prove the profitability of greenhouse cucumber project (Table 9). In other words, this project can gain 35% more than the opportunity cost (the interest rate on the long term loan). The DCB Rate to 1.5 and a DPBT to 2.47 years. Conversely, as the financial parameters vary with changes in market conditions, we carried out a sensitivity analysis, by increasing the production cost and decreasing revenue by 5 % (Table 9). This variation has been chosen taking into account the volatility of prices and productive factors that could happen in the market as function of the current economic conditions, In first case(increasing the production cost 5%) we have obtained NPV values 191147 L.E, IRR to 38.52%, the DCBR to 1.40 and a DPBT to 2.86 years. Considering a reduction of the return from the greenhouse cucumber, the NPV values 208614 L.E, IRR to 43.26%, and the DCBR to 1.42 and a DPBT to 2.54 years.

The financial analysis shows high positive net present value of the net profit over the ten years project life, with revenues significantly exceeding the capital and operating costs, and a high IRR. Values of the previous indicators evidently present high profitability perspective. Though, the project is small sensitive to change in costs and revenues. (Sericulture) project has relatively a small period of payback.

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الجدوى الاقتصادية لإنتاج الخيار فى الصوب الزراعية كبديل للإنتاج الحقلى فى محافظة أسوان (مصر)

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الملخص:

أجريت هذه الدراسة فى المزرعة البحثية بكلية الزراعة والموارد الطبيعية جامعة أسوان خلال الموسم ٢٠١٤-٢٠١٥، وحيث إن إنتاج الخيار تحت الصوب من المشروعات ذات التكلفة الاستثمارية العالية التي تحتاج الى دراسات جدوى اقتصادية قبل القيام بها ،هذا بالإضافة إلى قلة الأبحاث التي أجريت فى هذا المجال فان تلك الدراسة تهدف إلى : إلقاء الضوء على الجوانب الفنية الخاصة بزراعة الخيار فى الصوب الخشبية على مساحة فدان، كنموذج يتم تقديمه للزراع فى إقليم جنوب الصعيد، وخاصة أراضى الاستصلاح، وتقدير مؤشرات الجدوى المالية لهذه المشروعات من ناحية أخرى،هذا بالإضافة إلى تحليل حساسية تلك المشروعات وتحديد قدرتها على الاستمرار فى ظل ظروف عدم التأكد أو اللايقين. وقد تم استخدام الصنف باراكودا (F1) لزراعة الصوب مقارنة بالصنف الميادين المنتشر استخدامه فى الحقل المفتوح.

وأظهرت الدراسة النتائج التالية:

– يعطى الإنتاج فى الصوب الزراعية ٥ أمثال الإنتاج فى الحقل المفتوح، بالإضافة الى الوفر فى استخدام مياه الرى الذى بلغ حوالى ٧٠%.

– بالرغم من ارتفاع تكاليف الإنتاج عند الزراعة فى الصوب إلا أن هذا النظام اظهر تفوقا فى صافى العائد عن الزراعة فى الحقل المفتوح بما يعادل ٢٢% (١٣٦٦٦ جنيه فى الحقل المفتوح مقابل ٦١٨٣٠ جنيه فى الصوب).

– يغطى الإنتاج من المحصول فى الصوب نقطة الإنتاج الحدى الذى تتعادل عندها التكاليف والإيرادات مع وجود فائض انتاجى مقداره ٢٤,٧٤ طن.

– وقد اتضح من استعراض نتائج التقييم المالي وفقا للافتراضات التي تمت على أساسها الدراسة إن صافى القيمة الحالية للمشروع موجبة عند أسعار الخصم المستخدمة في التحليل، وان معدل العائد الداخلى بلغ حوالى ٤٨,١١% الأمر الذى يدل علي الجدوى المالية من أقامة المشروع. كما تبين أنة وفقاً لاختبار تحليل الحساسية للمشروع انخفاض حساسية المشروع للعوامل او الظروف التي يمكن أن تؤدى إلى انخفاض الإيرادات وارتفاع التكاليف.