Analytical Study of the Economic Efficiency of the Production of Ornamental Plants in the Syrian Coast (Yucca Model)

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***Abstract**: Due to the economic importance of ornamental plants (Yucca) as one of the most important or complementary crops, especially in the coastal strip, as one of the promising areas for the spread of this agriculture, the focus of this research was on the economic advantages and the material returns resulting from the cultivation of yucca in the Syrian coast, through the study of production costs and economic efficiency indicators, based on data collected from the research community of 80 farmers, based on the determination of the cost of materials and wages prevailing market prices in 2018.*

As a result of the study, the average annual net profit for the researcher of the plastic house planted of Yucca (2423046 SP / year), while the profitability factor compared to the capital invested was (63.9 %), compared to production costs which attained (94.2%).

The capital recovery period attained 1.5 years, and the index of economic efficiency was 1.94, which is bigger than the correct one (1), indicating the feasibility of production of yucca plants in the coastal area.

Keywords: *ornamental plants- Yucca -Material Costs-Manpower Cost Economical Feasibility-Profitability Coefficient-Time of Capital Recovery.*

I. INTRODUCTION

The cultivation of ornamental plants developed with the development of protected agriculture. The credit to the spread of this agriculture is to the Greeks, as they were the first who apply experiments in greenhouses to produce ornamental plants, and this was in the gardens of Adonis [1].

Yucca is one of the most common ornamental plants. Its name is derived from the Indian designation of tapioca or cassava, where Indians used to cook yucca. Southeastern United States and Mexico are home to it [2].

The genus Yucca belongs to the Agavaceae [3]. This genus includes about 40 species. It is an evergreen shrub, its stem is woody. The plant height is up to 5 meters. Leaves are green in color, up to 60 cm long and 5 cm wide [4].

Yucca is economically important because of its tolerance to varying degrees of shade and high drought tolerance. This makes it one of the most important plants with multiple coordination uses, especially in the internal arrangements and in public and private gardens, due to the simplicity of its shape and the height of its long leaves as individual models or plant groups within markets, homes and offices, as well as the possibility of using its leaves in the manufacture of ropes, as sometimes used in the manufacture of paper. The economic importance of Yucca is increasing as it is possible to extract some steroidal saponins from the leaves, which has proven effective in the treatment of bone infections and rheumatoid arthritis [5].

It should be noted that this agriculture is relatively new in our country, where it was mainly concentrated in the rural Damascus, Aleppo, Lattakia and Tartous. It is now an important branch that many farmers and amateurs work in most of the countries.

According to the Ministry of Agriculture, the total number of greenhouses planted with ornamental plants in 2017 reached to (963) in the Syrian Arab Republic with an area of (38.5 hectares).

Globally, this cultivation flourished remarkably in the last decade of the last century and the beginning of the current century, where the global trade related to ornamental plants grew by 25% as an annual rate [6]. Global production of ornamental plants and cut flowers amounted to around (35,500 million Euros) in 2016 [7].

It should be noted that the climatic conditions in the coastal area are suitable for these cultivations, in addition to the Syrian coast is gaining an important position as a seaport, and includes many railways and highways, in addition to the presence of an international airport and therefore has a good infrastructure to help it discharge and export production.

The Syrian coast is a very suitable area for the cultivation of Yucca, due to the availability of natural and climatic conditions suitable for this cultivation, although it did not receive sufficient attention by farmers, due to the difficulty in obtaining the assets and raw plant material (seedlings, native mothers). In addition to the lack of farms experience in export procedures, where there is no government support for this agriculture, neither in terms of securing production requirements or in terms of providing external export markets. As well as the monopoly of a few trade names for sales and purchases, which play the role of intermediary in the marketing process and a high commission of up to more than twenty percent of the value of the material produced, causing injustice to the effort of the farmer and tired.

Therefore, this study had to be prepared as a pilot study for the concerned parties, enabling farmers to diversify the sources of income in the coastal area, thus improving their standard of living.

Based on the above, the research aims to achieve the following:

- Calculation of the production costs of Yucca in the Syrian coast.
- Calculation of some indicators of economic evaluation.

II. MATERIALS AND METHODS

A). Study Population:

The number of nurseries concerned with the production of Yucca in the Syrian coast, which registered in the directorates of agriculture and agrarian reform in Latakia and Tartous in 2018 attained about (35-45) nurseries, respectively, bringing the number of nurseries in the Syrian coast about 80 nurseries [8]. Consequently, all members of the studied community were approached. Data were collected from farmers.

B). Research Methodology:

This research was based on the descriptive analytical method by distributing the pre-prepared forms to all community members. The resulting data were then entered through the computer using Excel after the definition of all the search variables, to perform all the calculations of production costs and the studied economic indicators. the main indicators on which this study was based are explained the following:

- Manpower Cost economical feasibility for agricultural operation = number of times of the operation × number of workers required to perform it × number of days required to carry out the operation × the daily wage of the worker.
- Material costs of the requirements of agricultural operations = quantity (or number or volume) of the material used in the unit area × number of times added × price per material (g, kg, liters, etc.).
- Total production costs per plastic house = initial costs (material + manpower) + Benefit capital invested + ground revenue per plastic house.
- Benefit of invested capital = [initial costs (materials + manpower) + ground revenue] x $\frac{9}{100}$.
- Total product value = production quantity x average of farm price.
- Capital invested = total investment costs + operating costs.
- Annual production costs = annual depreciation + operating costs.
- Total output costs = variable costs + fixed costs.
- Average annual net profit = Average annual revenue - Annual production costs.
- Annual Profit to Annual Revenue = Average Net Annual Profit ÷ Average Annual Revenue x 100.
- Net farm income = total output value - total costs (without capital benefit).
- Net farm income per unit of production = net farm income ÷ production quantity.
- Variable asset rotation = Average annual revenue (total output value) ÷ Total variable costs.
- Time of rotation of variable assets= 365 ÷ Variable rotation rate.
- Farm production efficiency = average annual revenue (total output value) ÷ (variable cost value + annual depreciation value).

Variable costs represent operating costs without adding benefit to invested capital.

- Total Economic Efficiency = total output value ÷ Annual Production Costs.
- Profitability factor based on capital invested = (total annual profit realized ÷ capital invested) x 100.
- Profitability factor in relation to production costs = total annual profit realized ÷ (material expenses + workers' wages) x 100.
- The capital recovery period = capital invested / average annual net profit.
- Revenue factor based on capital invested: $R = \frac{N.P}{C.L} \times 100$, where:

R: Revenue factor based on the capital invested. N.P: net total output = (profit + mass of wages and salaries). C.L: the capital invested.

- Revenue factor based on production costs: $Em.l = 100 \times \frac{N.P}{TC}$. Em.l: Revenue factor based on the production costs. N.P: net total output = (profit + mass of wages and salaries) TC: annual production costs.

III. RESULTS AND DISCUSION

A). Calculating the cost of producing Yucca plant in the Syrian coast:

The study included the economic analysis of a single plastic house planted with Yucca plants within a year, considering that the area of the regular plasti house is 400 m^2, and can accommodate about (4000) 20 cm basins (basin of sale), relying on determining the cost of materials and wages at market prices prevailing in 2018.

a) Production costs:

Investment costs (fixed):

The investment costs of one plastic house planted with yucca for 2018 attained about (1509023 SP), with annual investment costs reached to (295795 SP / year). Table (1) shows the total and annual investment costs of a plastic house planted by Yucca

Table (1): Total and annual investment costs of a plastic house planted by yucca.

Fixed origin	Total Cost / SP (Purchase cost)	Economic Age/ year	Annual cost (sp./ year)	Relative importance %
Metal structure	400000	20	20000	6.8
Plastic cover (nylon)	142500	2	71250	24
Metal wire (tape)	27500	5	5500	2
Electric sprayer	65000	10	6500	2.2
200 liter plastic bowl	5000	10	500	0.1
Plastic basin (14, 16) cm*	480000	5	96000	32.5
2inch water pump	75000	10	7500	2.5
1inch connecting tube	3500	5	700	0.2
1inch traction tube	15000	5	3000	1
Pusat Paint	25000	2	12500	4.2
marine sand	60000	4	15000	5
revenue Land	20000	-	20000	6.8
1. total	1318500	-	258450	-
2. Petty expenses %5	65925	-	12922	4.4
3. total (1+2)	1384425		271372	-
4.Capital invested benefit (9%)	124598	-	24423	8.3
Total investment costs **(4+3)**	1509023	-	295795	100

Source: Table based on field survey data, 2018.

***:** Plastic basins measuring (14, 16) cm (potted): results of the field survey showed that each house needs 8000 plastic basin for rooting the seedlings, including 4000 (14 cm basins), where the seedlings are placed for 3 months, and 4000 (16 cm basins) for another three monthes. The average price of the basin (14 cm) is 50 SP, while of the basin (16 cm) is 70 SP, and an economic age of 5 years for both measurements.

Table (1) shows that the cost of plastic basins take the first, at about (32.5%) of the total annual costs, followed by the cost of plastic cover, attained (24%), followed by the cost of the metal structure and ground revenue, which amounted to about (6.8%), then the cost of the capital invested, reached to (8.3%), the cost of marine sand (5%), followed by petty expenditures (4.4%), then the cost of painting Tarsh, which amounts to about (4.2%).

Operating costs (variable costs)

First: Commodity Requirements:

1- **Seedlings:** results showed that the yucca seedlings are planted with a density of (4000 seedlings per plastic house), at a rate of one seedlings per basin (14 cm) for the rooting process, remained for three months to removed to basins (16 cm) for an additional three months. The average price of seedlings is (150 SP.). The annual cost of seedlings = 4000 × 150 = 600000 SP / year.

2 - **plastic basins (20 cm):** Results indicated that the one plastic house needs 4000 basins (20 cm). Where Yucca seedlings are transferred from basins (16 cm) to 20 cm ones. It remain for a six months to be after the sale. The average price of the basin (20 cm) is 125 Sp. The annual cost of basins (20 cm) = 4000 x 125 = 500000 SP. / year.

3 - The agriculture medium (Turf): Results of the field survey showed that the needs of one house per year of an estimated 400 bags of Turf, distributed as follows:

- 200 bags of Turf to fill the basins (14 cm).
- 100 bags of Turf during the transfer of seedlings from basins (14 cm) to basins (16 cm).

- 100 bags of Turf during the transfer of seedlings from basins (16 cm) to basins (20 cm).
The average price per bag is 500 SP, so the annual cost of the Turf = 400 × 500 = 200000 SP / year.

4. **Sterilization materials:** Results indicated that the sterilization process takes place in three stages:
The first stage: after planting the seedlings of Yucca plant in basins (14 cm) and add Turf to it.
The second stage: during the transfer of seedlings from basins (14 cm) to basins (16 cm).
The third stage: through the transfer of seedlings from basins measuring 16 cm to basins measuring 20 cm, where the basins of the Turf are sterilized by the addition of the Akobsin, and the needs of each house during each stage 1 kg, at a price of 4400 SP.
Thus, the annual cost of sterilization materials = 3 × 4400 = 13200 SP / year.

5- **Mineral fertilization:** Results showed that the periodic fertilization of one plastic house is through the addition of two types of fertilizers: **solute fertilizers** (ground) which added to the root through the electric sprayer after mixing with water in a plastic drum, and for one hour in each time. And **Foliar fertilizers** which applied to the green growth for half an hour at each time of fertilization (table 2).

Table (2): The cost of fertilizing annually and during each season for each type of ground fertilizer and the needs of the house of it.

the season	Type of the added fertilizer	Needs per house each time fertilizing / kg	The value of fertilizer SP / kg	Fertilization times	The annual fertilization cost is SP. / year*
autumn	Balanced at a rate of 20 days each time	2 kg	800	4	6400
	Foliar Fertilizer at a rate every week once	0.25 kg	1000	12	3000
	High phosphorus at a rate of one time	1.5 kg	1000	1	1500
winter	-	-	-	-	-
spring	Balanced at a rate one time every 15 days	2 kg	800	6	9600
	Foliar Fertilizer at a rate once every week	0.25kg	1000	12	3000
	High phosphorus rate twice	1.5kg	1000	2	3000
	high potassium rate once time	1.5	1000	1	1500
summer	Balanced at a rate one time every 15 days	2kg	800	6	9600
	Foliar Fertilizer at a rate once every week	0.25kg	1000	12	3000
	high potassium rate twice	1.5	1000	2	3000
total	-	-	-	-	43600

Source: Table based on field survey data, 2018. *: Annual fertilization cost = needs of each house each fertilization × value of fertilizer × number of times fertilization.

6. **Control:** Results of the field survey showed that Yucca plants need two types of control:
- Insect control against spiders: These process is carried out by the pesticide Pimactin. Each house needs about (150 cm^3) which its price is 1200 SP. It also needs a general insecticide using the pesticide Linitrac. Each house needs a quarter liters (its price is 1000 SP.). The former pesticides are sprayed at a rate of once every 20 days, which attained (18 times) a year for one hour in each control process. The annual cost of insect control = (1200 + 1000) × 18 = 39600 SP. / year.

- **Fungicides:** The process is carried out by pesticide Topsen. Each house needs to half a kg (2500 SP.), and spray the fungicide once every 30 days, an average of 12 times a year for one hour in each control. The annual cost of fungal control = 2500 × 12 = 30000 SP / year.
- Thus, the annual cost of control = 39600 + 30000 = 69600 SP / year.

7. **Irrigation and electricity:** Results showed that the irrigation process is carried out directly on Yucca plants for one hour at a time.

Table (3): Irrigation timetable, number of irrigations and hours required to implement them during each season

season	Number of irrigation during the period	hours
autumn: twice a week	24	24
winter: once a week	12	12
spring: twice a week	24	24
summer: three times a week	36	36
total	96	96

Source: Table based on field survey data, 2018

The

Directorate of Water Resources charges an annual tax for irrigation of dunum of 2500 SP. Thus, the share of the plastic house, an area of 400 m^2, of the irrigation tax is 1000 SP. per year.

Electricity: Results of the study indicated that the average monthly electricity bill amounted to about 3000 SP., and therefore the annual cost of electricity = 12 × 3000 = 36000 SP. / year.

The annual cost of irrigation and electricity = 36000 + 1000 = 37000 SP / year.

Second: Service equipments:

1. **Manpower**: The study sample showed that the average of daily wage of the worker is 2000 SP., knowing that the full working day is 8 hours (Table 4).

Table (4): The cost of Manpower per year for each type of operation

<table>
<tr><th colspan="2">Type of operation</th><th>Time required to complete each time / day, hour</th><th>Number of times per year / time</th><th>number of workers required to complete each time / worker</th><th>Average wage per day, working hours / sp.</th><th>The annual cost of Manpower SP / year*</th></tr>
<tr><td colspan="2">Installation of plastic house</td><td>2 days</td><td>1</td><td>6</td><td>2000</td><td>24000</td></tr>
<tr><td colspan="2">Plastic house shading</td><td>2 hours</td><td>1</td><td>1</td><td>250</td><td>500</td></tr>
<tr><td colspan="2">Sea Sand Brushes</td><td>4 hours</td><td>1</td><td>2</td><td>250</td><td>2000</td></tr>
<tr><td colspan="2">Installation of irrigation network</td><td>1hour</td><td>1</td><td>1</td><td>250</td><td>250</td></tr>
<tr><td colspan="2">Processing basins and planting seedlings</td><td>5 days</td><td>3</td><td>4</td><td>2000</td><td>120000</td></tr>
<tr><td colspan="2">sterilization</td><td>1day</td><td>3</td><td>4</td><td>2000</td><td>24000</td></tr>
<tr><td colspan="2">irrigation</td><td>1 hour</td><td>96</td><td>1</td><td>250</td><td>24000</td></tr>
<tr><td rowspan="2">the control</td><td>insecticides</td><td>1 hour</td><td>18</td><td>2</td><td>250</td><td>9000</td></tr>
<tr><td>fungicides</td><td>1 hour</td><td>12</td><td>2</td><td>250</td><td>6000</td></tr>
<tr><td rowspan="2">mineral fertilization</td><td>soil</td><td>1 hour</td><td>22</td><td>2</td><td>250</td><td>11000</td></tr>
<tr><td>foliar</td><td>0.5 hour</td><td>36</td><td>2</td><td>250</td><td>9000</td></tr>
<tr><td colspan="2">weeding</td><td>3hours</td><td>24</td><td>2</td><td>250</td><td>36000</td></tr>
<tr><td colspan="2">Packaging</td><td>4hours</td><td>1</td><td>4</td><td>250</td><td>4000</td></tr>
<tr><td colspan="2">total</td><td>-</td><td>-</td><td>-</td><td>-</td><td>269750</td></tr>
</table>

Source: Table based on field survey data, 2018. *: Annual cost of manpower = number of times a year performed × the time required to complete each time × number of workers needed to perform each time × average wage per day, hour of work.

2.Marketing costs:

- Nylon bags for basins packaging (the pots): Results showed that the plastic house planted with Yucca plants needs 4000 nylon bags per year, and the price of the bag is about 15 SP. The annual cost of nylon bags = 15 × 4000 = 60000 SP / year.

- Transportation Fees: Results showed that each basin (pot) (20 cm) fare transported 50 SP. The annual cost of transporting packages = 4000 × 50 = 200000 SP / year.

Thus, the total annual marketing costs = the cost of nylon bags + the cost of transport charges = 60000 + 200000 = 260000 SP / year. Table (5) shows the total variable costs annually.

Table (5): Total variable operating costs per year for the yucca-grown greenhouse.

Statement	annual cost sp./ year	Relative importance %
seedlings	600000	26.3
Plastic basins (20 cm)	500000	22
agriculture medium (turf)	200000	8.8
Sterilization materials	13200	0.6
Fertilizers	43600	1.9
control	69600	3
Irrigation water and electricity	37000	1.6
Total production input costs	1463400	-
manpower costs (workers' wages)	269750	11.8
Marketing costs	260000	11.4
Total service supplies	529750	-
1. Total costs of production inputs and service supplies	1993150	-
2 Petty cash (5%)	99657	4.4
3.total costs (1+2)	2092807	-
4 Capital Interest (9%)	188352	8.2
Total Operating Costs (3 + 4)	2281159	100

Source: Table based on field survey data, 2018.

Table (5) indicated that the average annual total operating costs in the study population was about (2281159 sp / year). Seedling costs of 26.3% accounted for the largest proportion of annual operating costs. This is followed by the costs of a 20 cm plastic plantation, which is about 22%, followed by the cost of manpower (labor wages) of 11.8%, then marketing costs of 11.4%, then the cost of agriculture (8.8%). Afterthat the value of invested capital (8.2%) and petty cash (4.4%).

a.**Revenues:**

Results of the field survey indicated that the average production of plastic house planted with yucca plants was about (4000 basins), as it is grown in one plastic house 4000 planting of yucca distributed over 4000 basins (20 cm). Results also showed that the average sale price of basins with these specifications is (1250 sp.).

Thus, the average annual revenue (total output value) = 4000 × 1250 = 5 million SP / house / year, which reflects the efficiency of the use of the farm labor component.

c. Indicators of economic evaluation:

Table (6): The studied Economic indicators for the production of Yucca in the Syrian coast.

Statement	the value
Average annual revenue (value of total output)	5000000 sp/house/ year
Capital invested	3790182sp
annual productivity costs	2576954 sp/house/ year
Average annual net profit	2423046 sp/house/ year
Annual Profit to Annual Revenue Ratio	48.4 %
Period of recovery of invested capital	1.5 year
Cost of producing one basin	644sp.
Farm productivity efficiency	2
total economic efficiency	1.94
Variable asset turnover	2.3 sp.
time of variable asset turnover	158 day
Profitability coefficient relative to invested capital	63.9 %
Profitability coefficient relative to production costs	94.2 %
Revenue coefficient based on invested capital	71 %
Revenue coefficient based on production costs	104.4 %

Source: Study population, and data from tables (1,5) for 2018.

Table (6) shows the most important indicators of economic evaluation of the production of Yucca plants in the Syrian coast.

The above table shows the great economic importance of this type of agricultural projects, since in general all indicators were good to excellent compared to other agricultural projects. Where the average annual revenue (gross product) of the plastic house planted Yucca on the Syrian coast attained about 5 million sp. / house / year.

It reflects the efficiency of using the farm labor component, and the average annual net profit was about 2423046 sp./ house / year. This is the amount that the farmer receives after covering all productive costs, including regulation, and interest on capital.

The annual profit-to-revenue ratio reached about (48.4%), which is a good ratio in the field of agricultural investment, as every 100 Syrian pounds of revenue is about 48 SP net profit.

The recovery period for invested capital was 1.5 years, equivalent to about 18 months, which is a good indicator compared to other investment sectors.

The total economic efficiency index of Yucca production in the Syrian coast is 1.94, which exceeds the correct one (1), which indicates the feasibility of the project, and indicates the efficiency of farmers in the use of fixed and variable capital. This means that every 100 Syrian pounds invested in productive factors return to the farms with a total output of 194 sp., with an annual profit of (94 sp.), which is the technical and economic efficiency index of Yucca. The turnover of variable assets was (2.3 sp.), which is an indication of the efficiency of investing available resources and increasing productivity.

The profitability coefficient in relation to production costs was about 94.2%. This indicator is very good in the field of agricultural investment as the profitability rate equals about 94 SP per 100 Syrian pounds invested annually.

As shown in Table (6) good rentals achieved from the production of Yucca in the Syrian coast, where the revenue factor coefficient in relation to investments, and production costs about (71% and 104.4%), respectively. Then every hundred sp. invested in the production of Yucca plants in the Syrian coast give the farmer a net output of 71 sp / year. and every hundred sp. spent annually in the production of Yucca plants return to the farmer with a total net output of 104 sp / year.

Conclusion

In the final this study guide us to a number of points:

- The cultivation of ornamental plants (Yucca) is one of the most important or complementary plantations in the Syrian coast and high economic revenue, as the result of the study shows that the net annual profit realized from the plastic house planted yucca amounted to 2423046 SP / house / year.

-It was found through study of economic efficiency indicators for the cultivation of Yucca plant in Lattakia:

- ∗ The profitability coefficient of Yucca plant compared to capital costs was 63.9% and production costs was 94.2%. This index considers excellent.
- ∗ The capital recovery period for Yucca cultivation was 1.5 years and this index is excellent compared to other investment sectors.

1- Adopting and introducing this agriculture as a complementary to the traditional agriculture in the Syrian coast, due to the economic savings it achieves for the agricultural investor.

1- 3- Insurance the importation of the necessary requirements for the production of ornamental plants (agriculture, seedlings, origins, etc.) without complicated procedures.

2- 5- Issuing the necessary laws and legislations to facilitate the export of ornamental plants, with the need to focus on the provision of external export markets to discharge and facilitate the marketing of the products of this agriculture internally and externally.

3- Providing state support for this product, in terms of securing loans, issuing laws that facilitate investment procedures, technical supervision, securing production requirements, or guaranteeing the marketing of production.

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