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An Economic Study on the Impact of Using Technology on Strawberry Production in Qalyubia Governorate

Asmaa Mohamed El-Tokhy Bahloul

Agricultural Economics Dept., Faculty of Agriculture, Benha University, Egypt

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ABSTRACT

The strawberry is considered one of the most promising horticultural crops in foreign markets, as Egypt's total exports of strawberry reached about 39 thousand tons, at a value of 73 million$, which is approximately 9% of production in 2015, which amounts to about 428 thousand tons of a total area of 22 thousand fedden for the same year. Egypt ranked sixth with an average production about 327.1 thousand tons and with a relative importance about 4% of the strawberry production at the globally during the period (2013/2015) and it was found that there is a comparative advantage for Qalubia Governorate in the cultivation and production of strawberry. The research problem was as follows: Despite the increase in the contribution of the crop to agricultural exports, but there is a variation of fedden productivity in Qalyubia governorate for the frego strawberry compared to the fresh strawberry, therefore it must be applied with the application of technology beginning with the cultivation of fresh seedlings is highly productive, and the use of modern irrigation methods (drip irrigation) to rationalize the use of water, and work to raise the efficiency of using available resources to achieve the highest possible return. The most important of result that, the net revenue per feddan of fresh strawberry reached 68.20 thousand pound compared about 24.02 thousand pound for frego strawberry, an increase about 44.18 thousand pound per feddan, compared to frego strawberry. While the ratio of the total return to the total costs of fresh strawberry was about 2.08 compared to 1.61 for frego strawberry, which indicates the superiority of the untradition**al** style over the traditional pattern by 0.47, and the profits of the pound invested per fedden of fresh strawberry. About 1.08 pounds compared about 0.61 piasters for the traditional pattern, an increase of about 0.47 piasters, compared to the traditional style, while the total margin per fedden of frego strawberry reached 71.60 thousand pound per fedden compared to 29.52 thousand pound for frego strawberry (traditional), with an increase estimated about 42.08 thousand pound per fedden, compared to the traditional pattern. The monthly yield of fedden from fresh strawberry reached about 7.58 thousand pound compared to 2.67 thousand pound for the traditional style, an increase about 4.91 thousand pound per fedden per month, compared to the traditional pattern. The product incentive per fedden of fresh strawberry reached 51.94% compared to about 37.92% for the traditional pattern, an increase about 14.02% between the two patterns, which confirms the previous indications that the cultivation of the untraditional pattern (fresh strawberry) for production and economic efficiency exceeds the cultivation of the traditional pattern (frego strawberry)

Keywords: Fresh Frego Strawberry, and productivity, Economic study, Seedlings, Profitability, the net revenue

Introduction

The strawberry is considered one of the most promising horticultural crops in foreign markets, where total Egyptian exports of fresh and frego strawberry reached about 39 thousand tons, at a value of 73 million $, approximately 9% of production in 2015, which amounts about 428 thousand tons of a total area of 22 thousand fedden at 2015، It engaged in the production and manufacture of many food products, in addition to the possibility of cultivating it in reclaimed, sandy and yellow lands, which reduces competition with the main crops in the old lands. The strawberry crop is one of the crops that requires high agricultural labor.

Its cultivation has spread in many governorates in Egypt i.e., (Ismailia, Sharkia, Nubaria and Beheira) after it was confined to Qalyubia Governorate, which indicates a comparative advantage for the governorate, where it is grown with frozen seedlings (Frego) as a traditional pattern in agriculture, which gives a crop at the beginning of March, but that is not commensurate with the export window

Corresponding Author: Asmaa Mohamed El-Tokhy Bahloul, Agricultural Economics Dept., Faculty of Agriculture, Benha University, Egypt. E-mail: asmaa.bahlol@fagr.bu.edu.eg

for Egypt, which production is from November to October to obtain the highest prices and avoid competition with other countries because delay production until March is near the end of the export season and low prices, and therefore we must cultivate with fresh seedlings as an unconventional pattern in agriculture, to benefit from the early crop as external demand increases, which increases in foreign currencies, which reduces the load on the balance of payments, it is a must to apply and practice of technology in crop cultivation.That is, agricultural technology is new methods or inputs, whether mechanical, biological, or chemical, that achieve the best use of land and human resources in the agricultural field from the preparation of land for agriculture until the highest productivity and the highest return from the productive units are obtained.

Research problem:

In spite of the importance of the strawberry in Egypt generally and the Qalyubia governorate specially, it also increases the contribution of the Egyptian agricultural exports, the cultivated area of crop fluctuates between the decline and rise of both the Republic and the governorate.
This is in addition to the decrease in the productivity on the one hand, and the difference in the productivity of Qalyubia Governorate for frego strawberry crop (the traditional pattern) compared to fresh strawberry (the unconventional pattern) on the other hand. therefore, the application must be applied with technology starting from the cultivation of fresh seedlings with high productivity, using modern irrigation methods (drip irrigation) to rationalize water using, and raise the efficiency of using available resources to achieve the highest return of production.

Research Goals-:

The research aims to study the economics of strawberry crop production, technology application and the efficient use of resources to achieve the maximum yield of the crop through the following sub-goals.

1- Study the evolution of the area, production and productivity of the crop at the world, Republic and Qalyubia Governorate.
2- Statistical estimation of the production functions of the strawberry crop (fresh – frego).
3- Knowing the structure of cost items for the strawberry crop (fresh - frego).
4- Knowing the indicators of productive and economic efficiency of the strawberry (fresh - frego).
5- Knowing the productive problems of the strawberry crop in Qalyubia Governorate.

Research method and data sources- :

A descriptive and quantitative analysis method was used to describe some economic variables. General time trend equations and a gradient regression method were estimated in its linear and logarithmic forms to find out the most important factors affecting crop production in addition to some simple methods such as percentages to reach the research goal.
The research relied on the published and unpublished secondary data from the Ministry of Agriculture and Land Reclamation, the Economic Affairs Sector and the Central Agency for Public Mobilization and Statistics and the data of the Agricultural Directorate in the Qaliubiya Governorate. The primary data was obtained by a random sample of strawberry farmers in Qaliubiya governorate using a questionnaire in a personal interview with farmers during the Agricultural season 2016/2017.

Selecting the research sample:

The Qalubia Governorate was chosen as the oldest of the governorates and one of the most important in strawberry cultivation for the purpose of production for local markets and export. Multi-Stage Stratified Random sample was chosen from the research society from farmers in Qalubia Governorate, as the relative importance of cultivated area and production as shown in Table (1**)** in the appendix, the cultivated area with the crop reached about 2.67 thousand fedden during the 2016/2017 season The crop production reached about 42.181 thousand tons of fresh strawberry and about 27.1 thousand tons of frego strawberry the 2016/2017 season.

A random sample was selected from 120 farmers from strawberry crop in the governorate of Qaliubiya, so the two highest centers at the governorate were chosen according to the relative importance of the cultivated area and production from the total area and production of the governorate, There were Shebin Al-Qanater and Toukh, where the total cultivated area at the Shebin

Al-Qanater Center reached about 1266 fedden, representing about 55.9% of the total cultivated area in the governorate, and the number of holders in the center reached about 1331 holders, representing about 51.09% of the total number of holders of the governorate, which is about 2605 holders.The total cultivated area in the Toukh Center was about 860 fedden, representing about 37.9% of the total cultivated area in the governorate, and the number of holders reached 971 holders, representing about 37.3% of the total number of holders in the governorate. Two villages, Arab Al-Ghadeer and Al-Deir, were chosen from Toukh Center as a sample of farmers

Frego strawberry and the villages of Al-Dair and Mit Kinana as a sample for farmers of fresh strawberry, and the villages of Al-Qolzom and Kafr Al-Sohbi from Shebin Al-Qanater Center as a sample of fresh and frigo strawberry farmers by 60 forms in each center, and 15 forms for each of the villages in the study sample.

Results and Discussion

First: the development of the cultivated area, productivity and production of strawberry worldwide during the period (2001-2015).

The evolution of the cultivated area of the strawberry:

Table (1) data indicates that the cultivated area of the strawberry globally during the study period (2001/2015) fluctuates with increasing and decreasing around the general average of 807.7 thousand feddans during the study period, with a minimum of 728.2 thousand feddans in 2002, with a decrease of 9.8% from the general average, and with a maximum of 930.4 thousand feddans in 2015, an increase of 15.2% from the general average of the cultivated area of strawberry during the study period.

By estimating the general time trend, it is clear from Table (2) of the development of the cultivated area of strawberry during the period(2001/2015), which is shown by equation (1) in the table, that the cultivated area of strawberry is increasing by about 9.54 thousand fedden annually, and at an annual rate of increase about 1.18%, and its significance was statistically proven at the level of significance of 0.01, as the results indicate that 61% of the change in area is due to the time factor.

Table 1: Development of cultivated area, total production and productivity of strawberry crop worldwide during the period (2001-2015)

Statement	The strawberry		
Years	Cultivated area * (Thousand fedden)	Production (Million tons)	Productivity (Ton / fedden)
2001	771.49	4.47	5.8
2002	728.22	4.62	6.3
2003	762.14	5.04	6.6
2004	783.80	5.49	7.03
2005	810.38	5.73	7.1
2006	807.23	5.81	7.2
2007	812.66	5.84	7.2
2008	774.51	5.99	7.8
2009	781.32	6.59	8.5
2010	755.94	6.57	8.6
2011	805.03	6.73	8.3
2012	821.93	7.38	9
2013	879.90	7.88	8.9
2014	890.15	8.14	9.2
2015	930.3	8.74	9.4
Average	807.22	6.34	7.8

*The area mentioned in the data of the Food and Agriculture Organization has been transferred on the basis **that 1** hectare = 2.38 fedden.

Source: - the Food and Agriculture Organization (FAO) website :www.fao.org

The evolution of total production of strawberry:

Table (1) indicates that the total production of strawberry globally during the study period (2001/2015) fluctuated by decreasing and increasing around the general average of 6.3 million tons during the study period, with a minimum of 4.5 million tons in 2001, with a decrease of 28.6% of the general average, with a maximum of 8.7 million tons in 2015, an increase of 38.1% of the general average of total strawberry production during the study period.

By estimating the general time trend, it is clear from Table (2) of the evolution of production from strawberry during the period 2001/2015, which is clarified by the equation (2) in the table, that the production of strawberry increased by 0.28 million tons annually, and at an annual rate of increase about 4.4%, and its significance has been statistically proven at the level of significance at 0.01, as the results indicate that 96% of the change in production is due to the time factor.

Productivity development of strawberry:

Table (1) data indicates that the productivity of strawberry crop globally during the study period (2015/2001) fluctuated with decreasing and increasing around the general average about 7.8 tons / fedden during the study period, with a minimum of about 5.8 tons / acre in 2001, with a decrease about 25.6% from the general average, with a maximum about 9.4 tons / fedden in 2015, and an increase of about 20.5% of the general average productivity of strawberry during the study period.
In estimating the general time trend, it is clear from Table (2) of the development of productivity from the strawberry crop during the period 2001/2015, which is clarified by the equation (3) in the table, that the productivity of the strawberry increases about 0.25 tons / fedden annually, and at an annual rate of increase about 3.2%, and its significance was statistically proven at the level of significance 0.01, as the results indicate that 96% of the change in productivity is due to the time factor.

Table 2: General time trend equations for strawberry crop area production, production and productivity worldwide during the period (2015-2001**)**

Area: (Thousand fedden) Productivity: (Ton / fedden) Production:(Million tons)

Series	Statement	The equation	R^2	F	growth rate	significance
(1)	**Area**	$\hat{Y}$= 731.3 + 9.5 X (37.8)** (4.5)**	0.61	20.15	1.18	**
(2)	**Production**	$\hat{Y}$=4.1 + 0.28 X (29.3)** (18.1)**	0.96	327	4.4	**
(3)	**Productivity**	$\hat{Y}$= 5.8 + 0.25 X (46.6)** (18.12)**	0.96	328.2	3.2	**

Source: compiled and computed from Table (1) in study.
whereas:
Yi ^ = cultivated area, total production and yield of strawberry crops in the world.
Xi = time factor arrangement **R2** = determination factor **(** **)** = computed T value
** = at level of significance at 0.01 * = level of significance at 0.05

Second: Egypt's position among the most important strawberry crop producing countries in the world during the period (2015-2013):

Table (3) shows that China comes at the top of strawberry producing countries with an average production about 3.2 million tons, which represents about 38.8% of the average strawberry production worldwide, which is about 8.2 million tons, while America comes second with an average production of About 1.4 million tons, and with relative importance, amounted about 16.8% of global production during the same period. Mexico, Turkey, and Spain ranked third, fourth and fifth, respectively, with an average of about 410.4,374.8 and 333.9 thousand tons, respectively, during the same period, and with relative importance amounted about 5,4.6 and 4.1%, respectively. While Egypt ranked sixth with an average production about 327.1 thousand tons and with a relative importance about 4% of the average strawberry production globally level during the same period, then the rest of the world comes with a relative importance about 17.6% of the average production globally during the period (2013-2015).

Table 3: The most important strawberry crop producing countries in the world as an average during the period 2013-2015

Production: Thousands tons

Countries	2013	2014	2015	The average	%	The Arrangement
China	2997.5	3113	3479.0	3196.5	38.8	1
USA	1382.1	1371.5	1390.4	1381.3	16.8	2
Mexico	379.5	459	392.6	410.4	5.0	3
Turkey	372.5	376.1	375.8	374.8	4.6	4
Spain	312.5	291.9	397.4	333.9	4.1	5
Egypt	**262.4**	**283.5**	**435.3**	**327.1**	**4.0**	**6**
Korea	216.8	209.9	194.5	207.1	2.5	7
Russia	188	189	182.0	186.3	2.3	8
Poland	192.6	202.5	204.9	200.0	2.4	9
Japan	165.6	164	158.7	162.8	2.0	10
The rest of the world	1379.4	1466	1507.3	1450.9	17.6	
The world's total production	7848.9	8126.4	8717.9	8231.1	100	

Source: - Compiled and calculated from the Food and Agriculture Organization (FAO) website www.fao.org

Third: The cultivated area, production and productivity of the strawberry crop at the level of the governorates of the Republic as an average for the period (2013-2015)

Table (4) shows that the average cultivated area in Qalyubia Governorate amounted to 3415.5 fedden, representing about 15.3% of the average cultivated area in the Republic during the period (2013-2015) of 22344.7 fedden, and the Qalubia Governorate occupies the third position at the level of the Arab Republic of Egypt After Nubaria area and Ismailia, and it occupies the second position at the level of the Lower Egypt governorates after Ismailia Governorate, as an average for the period (2013-2015).

Table 4: The cultivated area, productivity and production of the strawberry at the governorates percentage as an average for the period (2013-2015).

Governorates	Area (fedden)	%	Productivity (ton/fed.)	%	Production (ton)	%
Behera	2256.5	10.1	27.4	62.7	42234.7	6.2
Gharbia	123.6	0.6	25.1	57.5	2558.7	0.4
Sharkia	3204.8	14.3	32.2	73.7	68619.0	10.1
Ismailia	5166.2	23.1	43.2	98.9	160502.7	23.7
Qalyoubia	**3415.5**	**15.3**	**48.4**	**110.9**	**120750.3**	**17.8**
lower Egypt	14131.3	63.2	39.6	90.7	248530.7	36.7
Giza	21.3	0.1	18.7	42.8	1170.7	0.2
Middle Egypt	23.2	0.1	18.9	43.3	1215.7	0.2
Inside the valley	14146.5	63.3	39.4	90.2	399157.3	58.9
Noubaria	8216.4	36.8	52.1	119.4	278750.3	41.1
Outside the valley	8219.0	36.8	52.1	119.3	278783.3	41.1
Total	**22344.7**	**100.0**	**43.7**	**100.0**	**677940.7**	**100.0**

Source: compiled and computed from Table (2) in the appendix

As for the fedden productivity, Qalyubia Governorate ranked second after Nubaria area, at about 48.4 ton / fed. With relative importance about 110.9% of the total average productivity of the Republic during the same period, and it ranked first in productivity at the level of Lower Egypt governorates, and by studying production for the Qaliubiya Governorate as an average for the period (2013-2015) Qaliubiya occupied the third position at the level of the Republic, reaching about 120.8 thousand tons, It represents about 17.8% of the total production in Egypt, which is about 677.9 thousand tons, and the Qalyubia Governorate is considered one of the most important governorates in the production of strawberry due to the nature of the soil, the geographical location, and the available markets in the governorate.

Fourth: The development of cultivated area, productivity and production of strawberry at the level of the Arab Republic of Egypt and Qalyubia Governorate during the period (2001-2015):

1- At the level of the Arab Republic of Egypt:

The evolution of the cultivated area of the strawberry crop:

Table (5) indicates that the cultivated area of the strawberry crop locally during the study period (2001/2015) fluctuates with increasing and decreasing around the general average about 11.7 thousand feddan during the study period, with a minimum of about 6 thousand feddan in 2001, 2002, with a decrease about 48.7% from the general average, and with a maximum about 22,000 feddans in 2015, an increase about 88.03% from the general average of the cultivated area of strawberry during the study period.

By estimating the general time trend, it is clear from Table (6) of the development of the cultivated area of the strawberry during the period 2001/2015), which is shown by equation (1) in the table, that the cultivated area of the strawberry is increasing by about 0.83 thousand fedden annually, and at an annual rate of increase It reached about 7.07%, and its significance was statistically proven at the level of significance of 0.01, as the results indicate that 82% of the change in area is due to the time factor.

The evolution of total production of strawberry:

Table (5) indicates that the total production of strawberry locally during the study period (2001/2015) fluctuated by decreasing and increasing around the general average about 189.5 thousand tons during the study period, with a minimum about 59 thousand tons in 2002, with a decrease of About 68.9% of the general average, with a maximum of about 428,000 tons in 2015, an increase about 125.9% from the general average of total strawberry production during the study period.

By estimating the general time trend, it is clear from Table (6) of the development of production from the strawberry crop during the period 2001/2015, which is clarified by equation (2) in the table, that the production of the strawberry increased about 20.9 thousand tons annually, and at an annual rate of increase about 11.04%, and its significance was statistically proven at the level of significance 0.01, as the results indicate that 89% of the change in production is due to the time factor.

Table 5: Evolution of cultivated area, total production and productivity of strawberry crop at the level of the Arab Republic of Egypt and Qalyubia Governorate during the period (2001-2015)

Statement	Egypt			Qaliubiya Governorate		
Years	Cultivated area (Thousand /fedden)	Productivity (Tons /fedden)	Production (thousand /tons)	Cultivated area (Thousand /fedden)	Productivity (Tons /fedden)	Production (thousand /tons)
2001	6	10.8	67	2.5	13.0	33.0
2002	6	10.7	59	2.2	11.5	25.9
2003	7	10.9	77	2.1	13.6	28.7
2004	9	11.4	99	2.3	16.3	37.5
2005	12	13.2	156	3.0	16.0	48.0
2006	10	13	126	2.9	14.9	43.6
2007	10	14.7	150	2.8	17.7	49.8
2008	12	16.6	196	3.0	20.4	61.4
2009	13	18.4	234	2.7	22.7	60.5
2010	12	19.1	238	1.8	24.1	42.7
2011	13	18.0	237	2.2	17.9	40.2
2012	14	17.5	241	2.4	18.3	44.7
2013	14	18.7	259	2.4	20.2	49.1
2014	15	18.6	276	2.4	21.7	53.1
2015	22	19.1	428	2.8	19.6	55.8
Average	**11.7**	**15.4**	**189.5**	2.5	**17.8**	**44.9**

Source: Collected and calculated from the data of the Ministry of Agriculture and Land Reclamation, Economic Affairs Sector, Central Administration of Agricultural Economics, Agricultural Economy Bulletins, sparse numbers.

Table 6: General time trend equations for strawberry crop cultivated area production, production and productivity worldwide during the period (2001-2015)

Region	Series	Statement	The equation	R^2	F	Growth rate	Significance
Egypt	(1)	Area (thousand fedden)	$Y_i^{\wedge} = 5.07 + 0.83\ X_i$ (5.3) ** (7.8)**	0.82	60.8	7.07	**
	(2)	Production (thousand tons)	$Y_i^{\wedge} = 22.16 + 20.9\ X_i$ (1.1) (10.1)**	0.89	102.7	11.04	**
	(3)	Productivity (tons / fedden)	$Yi^{\wedge} = 9.7 + 0.71\ X_i$ (14.8) ** (2.05)**	0.88	97.7	4.6	**
Qalyubia Governorate	(4)	Area (thousand fedden)	None of the statistical images were significant	-	-	-	-
	(5)	Production (thousand tons)	$Y_i^{\wedge} = 32.38+1.6\ X_i$ (3.1)** (7.1)**	0.43	9.77	3.5	**
	(6)	Productivity (tons / fedden)	$Y_i^{\wedge} = 12.8+0.63\ X_i$ (4.4)** (9.7)**	0.59	19.07	3.6	**

Source: compiled and computed from Table (5) in study.
Whereas:
Yi ^ = cultivated area, total production, and productivity of strawberry crops in the Arab Republic of Egypt and Qalyubia Governorate.
Xi = chronological order of time factor **R2** = determination factor **( )** = computed T value
**= level of significance at 0.01 * = level of significance at 0.05

Productivity development of strawberry:

Table (5) data indicates that the productivity of the strawberry crop locally during the study period (2001/2015) fluctuated with decreasing and increasing around the general average about 15.4 tons / fedden during the study period, with a minimum about 10.7 tons / fedden in 2002, with a decrease about 30.5 % from the general average, with a maximum about 19.1 tons / fedden in 2010, 2015, and an increase about 24.03% from the general average of productivity of strawberry during the study period.

By estimating the general time trend, it is clear from Table (6) of the development of productivity from the strawberry during the period 2001/2015, which is clarified by equation (3) in the table, that the productivity of the strawberry increases by about 0.71 tons / fedden annually, and at an annual rate of increase about 4.6%, and its significance was statistically proven at the level of significance 0.01, as the results indicate that 88% of the change in productivity is due to the time factor.

2- At the level of Qalyubia Governorate:

The evolution of the cultivated area of the strawberry:

Table (5) data indicates that the cultivated area of the strawberry crop in the governorate during the study period (2001/2015) fluctuates with increasing and decreasing around the general average of about 2.5 thousand feddan during the study period, with a minimum about 1.8 thousand feddan in 2010, with a decrease about 28% of the general average, and with a maximum about 3 thousand acres in 2008, an increase about 20% from the general average of the cultivated area of strawberry during the study period.

By estimating the general time trend, it is clear from Table (6) of the evolution of the area of the strawberry crop during the period (2001/2015), which is shown by equation (4) in the table, that the area of the strawberry did not prove the significance of the statistical forms, meaning that the data revolves around its arithmetic mean during the study period (relative stability) statistically.

The evolution of total production of strawberry:

Table (5) data indicates that the total production of strawberry crops in the governorate during the study period (2001/2015) fluctuated by decreasing and increasing around the general average about 44.9 thousand tons during the study period, with a minimum about 25.9 thousand tons in 2002, with a decrease about 85.3% of the general average, with a maximum limit about 61.4 thousand tons in

2008, with an increase about 36.8% from the general average of total strawberry crop production during the study period.

By estimating the general time trend, it is clear from Table (6) of the evolution of production from the strawberry during the period 2001/2015, which is clarified by equation (5) in the table, that the production of the strawberry increased about 1.6 thousand tons annually, and at an annual rate of increase about 3.5%, and its significance was statistically proven at the level of significance 0.01, as the results indicate that 43% of the change in production is due to the time factor.

Productivity development of strawberry:

Table (5) data indicates that the productivity of the strawberry crop in the governorate during the study period (2001/2015) fluctuated with decreasing and increasing around the general average of about 17.8 tons / fedden during the study period, with a minimum of about 11.5 tons / fedden in 2002, with a decrease about 35.4% over the, with a maximum about 24.1 tons / fedden in 2010, and an increase about 35.4% from the general average of productivity of strawberry during the study period.

By estimating the general time trend, it is clear from Table (6) of the evolution of productivity of the strawberry during the period 2001/2015), which is clarified by equation (6) in the table, that the productivity of the strawberry crop increases about 0.63 tons / fedden annually, and at an annual rate of increase about 3.6%, and its significance was statistically proven at the level of significance 0.01, as the results indicate that 59% of the change in productivity is due to the time factor.

Fifth: Statistical estimation of the production functions in Qalyubia Governorate:

In this part, the production functions are estimated at the level of each possession category separately in the study sample in the governorate, that is, the farm capacity is fixed, and accordingly, it can be considered that the estimation of the functions is in the short term and the production functions were used in the double logarithmic form (Cup Douglas) and the use of the multi-stage regression method.

1- Statistical estimation of the fresh strawberry crop production functions :

Estimate the production function for the first possession category (less than an fedden):

The results of Table (7) show the estimation of the production functions of the for the first holding category, where the results showed that there is a significant effect for each of the phosphate fertilizers (effective units), potassium fertilizers (effective units), labor (man / day), and automated work (Hour) on the productivity. Where the estimated function shows that there is a positive significant effect on productivity.

As the productivity elasticity of those elements reached about 0.069, 0.091, 0.359, 0.217, respectively, which means that any change in the quantity of these elements by 10%, the productivity changes in the same direction about 0.69%, 0.91%, 3.59%, 2.17% In sequence, and it found that human labor was the greatest influence on productivity, followed by that automated work, then potassium fertilizer, then phosphate fertilizer.

It was also found that the total elasticity of the total production amounted about 0.734, which reflects the relationship of the diminishing return of the capacity, meaning that production takes place in the second stage, which is the economic stage, and that by increasing the productivity factors combined by 1%, it leads to an increase in the productivity of the fresh strawberry yield by 0.734%.

The results of the determination coefficient, which amounted to about 0.92, indicate that the above-mentioned independent variables explain about 92% of the changes in the acre productivity of the fresh strawberry yield. and the confirming the calculated value of (F) the significance of the model as whole.

The economic efficiency of using the production elements can be measured as they are achieved when the marginal product value of the productive element is equal to the value of this element, that is, the economic efficiency of the resource is achieved when the price of the element is equal to the value of the element. Table (8) shows the economic efficiency of the production elements of the fresh strawberry for the first holding category, From that, the marginal product value for each of the production elements is the amount of phosphate fertilizer, potassium fertilizer, labor and

automated work was greater than the cost of each, which indicates a low level of efficiency, but there is an opportunity to increase the efficiency of these elements by adding other quantities of them.

Table 7: Results of the statistical estimation of the production functions of (Cup Douglas) for fresh strawberry yield for each holding category in Qaliubiya Governorate.

S	Possession category	Function	R^2	F	Total production elasticity
1	The first	$\hat{Y}$ = Log 0.069 + 0.068 Log X_4 + 0.0.091Log X_5 (3.24)** (2.90)** (3.10) * * + 0.359 Log X_8 + 0.217 Log X_9 (3.34)** (4.31) **	0.92	234.5**	0.734
2	The second	$\hat{Y}$ = Log 0. 183 + 0.396 Log X_1 + 0.119 Log X_2 (2.50)* (2.10)* (2.59) ** + 0.049 Log X_3 + 0.137 Log X_6 +0.247 Log X_8 (3.18) ** (2.65)** (3.69)**	0.95	179.54**	0.941
3	Total sample	$\hat{Y}$ = Log 0.244 + 0.041 Log X_1 + 0.033 Log X_2 (4.78)** (3.56)** (2.19) * + 0.096 Log X_3 + 0.094Log X_5+ 0.058 Log X_6 + (6.70) ** (4.97) ** (2.10)* 0.285 Log X_8 + 0.107 Log X_9 (7.90) ** (6.5) **	0.90	188.98**	0.714

whereas-:
Y = Fedden productivity of strawberry per ton.
X1 = Seedling quantity per fedden.
X2 = The amount of fertilizer (chick season) in cubic meters.
X 3= The amount of nitrogen fertilizer with effective unit.
X4 = The amount of phosphate fertilizer with effective unit.
X5 = The amount of potassium fertilizer with effective unit.
X 6 = the amount of foliar fertilizer in kilogram.
X 7 = The amount of pesticides in kilograms.
X8 = The number of labor per (man/ day).
X 9 = The number of hours of automatic work per hour.
** significant at level of significance 0.01, * significant at level of significance 0.05.
R2 = determination factor **F** = calculated in model.
Source: Collected and calculated from the questionnaire form for the agricultural season 2016/2017.

Estimate the production function for the second possession category (greater than fedden):

The results of equation (2) in Table (7) show the significance of the effect of the quantity of seedlings, chick fertilizer (cubic meter), nitrogen fertilizer (effective unit), foliar fertilizer (kg), and labor (man / day) on fedden productivity. Where the estimated function shows that there is a positive significance effect, as the productive elasticity of these elements reached about 0.396,0.119, 0.049, 0.137, 0.247, respectively, meaning that any change in the quantity of those elements by 10%, then the productivity changes in the same direction by a rate about 3.96%, 1.19%, 0.49%, 1.37%, 2.47%, respectively. From the above, the quantity of seedlings was the greatest influence on productivity, followed by labor, then foliar fertilizers, then chick compost, then nitrogen fertilizer.

Moreover, the total elasticity of the total production amounted about 0.941 positive, which reflects the relationship of the diminishing return of the capacity, meaning that production takes place in the second stage, which is the economic stage, and that by increasing the productivity factors combined by 1%, it leads to an increase in the productivity of the fresh strawberry yield by 0.941%.

The results of the coefficient of determination, which amounted to about 0.95, indicate that the above-mentioned independent variables explain about 95% of the changes in the fedden productivity of the fresh strawberry yield, and the confirming the calculated value of "F", the significance of the model as a whole.

By estimate of the economic efficiency index, it is evident from Table (8) the economic efficiency of the production elements of the strawberry for the second possession category, and from it found that the value of the marginal product is greater than the value of the element for each of the

Table 8: The economic efficiency of the production elements in the production function, fresh strawberry for the first and second holding category, and the total sample for the 2017/2016 season.

The standard	The first possessory category					Second possessory category					Total study sample					
	Phosphate Fertilizer (Effective Unit)	potassium Fertilizer (Effective Unit)	(man/ Labor (day	work Automat (hour)	seedlings	Chicken compost	Nitrogen Fertilizer (Effective unit)	Foliar fertilizers	Labor (man /dav)	seedlings	Chicken compost	Nitrogen Fertilizer (Effective Unit)	potassium Fertilizer (Effective Unit)	Foliar fertilizers	Labor (man /dav)	work Automat (Hour)
Productive flexibility	0.068	0.09	0.359	0.217	0.396	0.119	0.049	0.137	0.247	0.285	0.033	0.096	0.094	0.058	0.285	0.107
Marginal productivity	0.0024	0.0046	0.0262	0.0055	0.0002	0.0745	0.0017	0.0050	0.0175	0.0001	0.0241	0.0034	0.0048	0.0043	0.0240	0.0035
Marginal throughput value	14.29	27.48	156.87	32.69	1.16	446.45	10.29	30.22	104.79	0.75	144.44	20.17	28.70	25.80	143.66	20.92
unit price	8.47	6.3	52.38	9.98	0.17	155.82	7.84	10.65	50.97	0.15	150.89	7.47	5.7	11.82	46.58	8.54
Economic efficiency	**1.69**	**4.36**	**2.99**	**3.28**	**6.80**	**2.87**	**1.31**	**2.84**	**2.06**	**4.99**	**0.96**	**2.70**	**5.04**	**2.18**	**3.08**	**2.45**

Source: Collected and calculated from the questionnaire form for the agricultural season 2016/2017in study.
(1) Marginal productivity = elasticity throughput x (fedden productivity ÷ average element quantity).
(2) Marginal productivity value = marginal productivity x average price per ton. (3) Economic efficiency = marginal productivity value unit price of an item ÷ Unit price for item.

production elements, the quantity of seedlings, chick compost, the amount of nitrogen fertilizer, foliar fertilizer and labor, which indicates a low level efficiency of these elements, and can increase using efficiency by adding other quantities of them.

Estimating the production function for the total study sample:

The results of equation (3) in Table (7) show the significance of the effect of the quantity of seedlings, chick fertilizer (cubic meter), nitrogen fertilizer (effective unit), potassium fertilizer (effective unit), and foliar fertilizer (kg), labor (man / day)), and automated work (hour) on the size of fedden productivity. Where it was found from the estimated function that there is a positive significance effect, as the productive elasticity of these elements reached about 0.041, 0.033, 0.096, 0.094, 0.058, 0.285, 0.107, respectively, and this means that any change in the quantity of these elements by 10%, then the fedden productivity changes in the same direction with a percentage about 0.41%, 0.33%, 0.96%, 0.94%, 0.58%, 2.85% and 1.07%, respectively. From the above, the labor was the greatest impact on productivity, followed by that automated work, then nitrogen fertilizer, then potassium fertilizer, then foliar fertilizer, then the amount of seedlings, then chick compost.
However, the total elasticity of the total production amounted about 0.714 positive, which reflects the relationship of diminishing returns for the capacity, that is, production takes place in the second stage, which is the economic stage, and that by increasing the productivity factors combined by 1%, it leads to an increase in the productivity of the fresh strawberry yield by 0.714%.

The results of the determination coefficient, which amounted to about 0.90, indicate that the above-mentioned independent variables explain about 90% of the changes in the acre productivity of the fresh strawberry yield. and the confirming the calculated value of "F", the significance of the model as a whole. By estimate of the economic efficiency index for the use of production elements in this category of possession, it is clear from Table (8) that the value of the marginal product for each amount of seedlings, chick compost, the amount of nitrogen fertilizer, potassium fertilizer, foliar fertilizer, labor and automated work is greater than the unit cost per item, This indicates a decrease in the level of efficiency, but there is an opportunity to increase the efficiency of these elements by increasing the amount used

Statistical estimation of the production functions of the frego strawberry:
Estimate the production function for the first possession category (less than an fedden):

The results of equation (1) in Table (9) show the estimation of the production functions (Cup Douglas) for the frego strawberry for the first possession category as the double logarithmic function showed that there is a significant effect for both the quantity of seedlings and phosphate fertilizer (effective unit), and labor (man / day)), and automated work (hour) on the productivity.

Where the estimated function shows that there is a positive significant effect on acre productivity, as the productive elasticity of these elements reached about 0.199, 0.210, 0.098, 0.292, respectively. This means that any change in the amount of those elements by 10%, the fedden productivity changes in the same direction by about 1.99%, 2.10%, 0.98%, 2.92%, respectively, and from the above the labor was the greatest impact on productivity, followed by in this phosphate fertilizer, then seedlings, then automated work.

Moreover, the total elasticity of the total production amounted about 0.789, which reflects the relationship of the diminishing return of the capacity, meaning that production takes place in the second stage, which is the economic stage, and that by increasing the productive factors combined by 1%, it leads to an increase in the productivity of the frego strawberry about 0.789%.The results of the determination coefficient, which amounted to about 0.95, indicate that the aforementioned variables explain about 95% of the changes in the acre productivity of the frego strawberry. The economic efficiency of using the production elements can be measured as they are achieved when the marginal product value of the productive element is equal to the value of this element, that is, the economic efficiency of the resource is achieved when the price of the element is equal to the value of the element.

Table (10) shows the economic efficiency of the production elements of the frego strawberry crop for the first holding category, and from it that turns out that the marginal product value for each of the production elements is the amount of seedlings, phosphate fertilizer, labor and automated work

was greater than the cost of each, which indicates a low level of efficiency but there are an opportunity to increase the efficiency of these elements by adding other quantities of them.

Table 9: Results of the statistical evaluation of the production functions of (Cup Douglas) for the frego strawberry for each holding category in Qaliubiya Governorate.

S	Possession category	Function	R^2	F	Total production elastically
1	The first	$\hat{Y}$ = Log 0.107+ 0.199 Log X_1 + 0.210 Log X_4+ (2.07)* (2.89)** (3.63) ** 0.292 Log X_8 +0.098 Log X_9 (2.78)** (2.26) *	0.95	96.98	0.789
2	The second	$\hat{Y}$ = Log 0. 187 + 0.060 Log X_1 + 0.136 Log X_3 + (9.43)** (3.47) ** (2.50) * 0.238 Log X_4 + 0.291 Log X_8 (4.13) ** (3.20)**	0.96	135.96	0.725
3	Total sample	$\hat{Y}$ = Log 0.111 + 0.254 Log X_1 + 0.174 Log X_3 + (2.75)** (4.61)** (2.93) * * 0.163 Log X_4+ 0.089 Log X_6+ 0.225 Log X_8 + (3.53) ** (2.50) * (2.93)** 0.097 Log X_9 (2.63) *	0.89	67.49	0.933

whereas :
Y = Fedden productivity of strawberry per ton.
X1 = Seedling quantity per fedden.
X2 = The amount of fertilizer (chick season) in cubic meters.
X 3= The amount of nitrogen fertilizer with effective unit.
X4 = The amount of phosphate fertilizer with effective unit.
X5 = The amount of potassium fertilizer with effective unit.
X 6 = the amount of foliar fertilizer in kilogram.
X 7 = The amount of pesticides in kilograms.
X8 = The number of labor per (man/ day).
X 9 = The number of hours of automatic work per hour.
** significant at level of significance 0.01, * significant at level of significance 0.05.
R2 = determination factor **F** = calculated in model.
Source: Collected and calculated from the questionnaire form for the agricultural season 2016/2017.

Estimate the production function for the second possession category (greater than fedden):

The results of equation (2) in Table (9) show the significance of the effect of the quantity of seedlings, nitrogen fertilizer (effective unit), phosphate fertilizer (effective unit), and labor (man / day) on the productivity. By estimates that there is a positive significant effect, as the productive elasticity of these elements reached about 0.060, 0.136, 0.238, 0.291, respectively. This means that any change in the amount of these elements by 10%, the yield per acre changes in the same direction by a rate of about 0.60%, 1.36%, 2.38%, and 2.91%, respectively. From the above, it can be said that the amount of labor was the greatest impact on productivity, It is followed by phosphate fertilizer, nitrogen fertilizer, and the amount of seedlings.

However, the total elasticity of the production amounted about 0.725 positive, which reflects the relationship of the diminishing return of the capacity, that is, production takes place in the second stage, which is the economic stage, and that by increasing the productive factors combined by 1%, it leads to an increase in the productivity of the frego strawberry about 0.725%.The results of the coefficient of determination, which amounted to about 0.96, indicate that the above-mentioned independent variables explain about 96% of the changes in the fedden productivity of the frego strawberry, while the rest of the changes are due to other uncharted factors, and the foregoing confirms that the calculated value of "F" the significance of the model as a whole.

By estimate of the economic efficiency index, it is evident from Table (10) the economic efficiency of the production elements of the frego strawberry for the second holding category, and from that is found that the value of the marginal product is greater than the value of the element for

Table 10: The economic efficiency of the production elements in the production function, frego strawberry for the first and second holding category, and the total sample for the 2017/2016 season.

	The first possessory category				**Second possessory category**				**Total study sample**				
The standard	**Seedling**	**Phosphate Fertilizer (Effective Unit)**	**Labor man/ (Day)**	**Automat work (Hour)**	**Seedling**	**Nitrogen Fertilizer (Effective Unit)**	**Phosphate Fertilizer (Effective Unit)**	**Labor (man/day)**	**Seedling**	**Nitrogen Fertilizer (Effective Unit)**	**Phosphate Fertilizer (Effective Unit)**	**Foliar fertilizer**	**Labor (man/day)**	**Automat work (Hour)**
Productive flexibility	0.199	0.2	0.292	0.098	0.06	0.136	0.238	0.291	0.254	0.174	0.163	0.098	0.225	0.097
Marginal productivity	0.0001	0.0065	0.014 1	0.0027	0.0002	0.0030	0.0066	0.0159	0.0001	0.0033	0.0045	0.0027	0.0131	0.0028
Marginal throughput value	0.28	29.46	63.67	12.42	0.76	13.78	30.05	72.15	0.28	15.12	20.58	12.42	59.26	12.53
unit price	0.12	5.78	46.23	9.98	0.13	7.84	5.65	45.13	0.11	7.97	5.45	9.70	43.74	7.16
Economic efficiency	**2.33**	**5.10**	**1.38**	**1.24**	**5.85**	**1.76**	**5.32**	**1.60**	**2.51**	**1.90**	**3.78**	**1.28**	**1.355**	**1.75**

Source: Collected and calculated from the questionnaire form for the agricultural season 2016/2017in study.
(1) Marginal productivity = elasticity throughput x (fedden productivity ÷ average element quantity).
(2) Marginal productivity value = marginal productivity x average price per ton. (3) Economic efficiency = marginal productivity value unit price of an item ÷ Unit price for item.

each of the production elements, the amount of seedlings, nitrogen fertilizer, the amount of phosphate fertilizer, and labor, which indicates a low level efficiency of these elements, so their use efficiency can be increased by adding other quantities of them.

Estimating the production function for the total study sample:

The results of equation (3) in Table (9) show the significance of the effect of the quantity of seedlings, nitrogen fertilizer (effective unit), phosphate fertilizer (effective unit), foliar fertilizer (kg), labor (man/day), and automated work (hour) on the productivity. Where it was found from the estimated function that there is a positive significant effect, as the productive elasticity of these elements reached about 0.254, 0.174, 0.163, 0.089, 0.225, 0.097, respectively. This means that any change in the quantity of these elements by 10%, the yield changes in the same direction by about 2.54%, 1.74%, 1.63%, 0.9%, 2.25%, 0.97%, respectively, and from the above we can say that the seedlings were greater Effect on productivity, followed by labor, nitrogen fertilizer, phosphate fertilizer, automated work and foliar fertilizer.

And the total elasticity of the total production amounted about 0.933 positive, which reflects the relationship of the diminishing return of the capacity, that is, production takes place in the second stage, which is the economic stage and by increasing the productivity factors combined by 1% it leads to an increase in the productivity of the frego strawberry by about 0.933%.The results of the determination coefficient, which amounted about 0.89, indicate that the above-mentioned independent variables explain about 89% of the changes in the acre productivity of the frego strawberry, while the rest of the changes are due to other uncharted factors, and the foregoing confirms the calculated value of "F", the significance of the model as a whole.

By estimate of the economic efficiency index, it is shown from Table No. (10) the economic efficiency of the production elements of frego strawberry for the total study sample, and from that it is found that the value of the marginal product is greater than the value of the element for each of the production elements, the amount of seedlings, the amount of nitrogen fertilizer, phosphate fertilizer, foliar fertilizer, labor, and automated work, which indicates a decrease in the level of efficiency of these elements, and that the efficiency of their use can be increased by adding other quantities

Sixth: The structure of items of the production costs per feddan of fresh and frego strawberry, and their relative importance with the study sample for the agricultural season (2017-2016).

Table (11) shows the most important items of the structure of the production costs (fixed and variable) for the fresh strawberry (untraditional system) and the frego strawberry (traditional system) and the relative importance of each, where the fixed costs included both the fedden rent in the agricultural season (the period that the crop stayed in land from planting to harvest) and depreciation premium to the drip irrigation network for the period the that crop stays in the land,

Whereas, the variable cost items from the costs of each of the production requirements (seedlings, organic fertilizer, chemical fertilizer, pesticides, sterilization with methyl bromide gas and mulch plastic) and the costs of performing productive agricultural operations that include the payments of both labor and automated work. It was found that the total cost per fedden of fresh strawberry (untraditional system) amounted to about 68.11 thousand pounds distributed on variable costs by about 59.71 thousand pounds, representing about 87.67% of the total costs per fedden, while fixed costs amounted to about 8.40 thousand pounds, representing about 12.33% of the total costs and for changing production costs. The costs of production requirements amounted to about 38.55 thousand pounds, representing about 64.56% of the total variable costs, and about 56.60% of the total costs, as sterilization and seedling costs reached the first and second ranks respectively of the total costs.

The costs of performing production operations were estimated at about 21.16 thousand pounds, representing about 35.44% of the total variable costs, and about 31.1% of the total costs. The previous presentation shows the relative importance of the variable cost items as the costs of production requirements come in the first followed by the costs of performing production operations where the cost of labor is the largest cost item, followed by the cost of sterilization and seedlings.

Table 11: Items of production costs per feddan of strawberry, fresh and frigo, and their relative importance in the study sample in Qaliubiya Governorate, 2016/2017 season

Cost items		Fresh strawberry (untraditional style)			Frego strawberries (traditional style)		
		The Value	Of % variable costs	% Of total costs ة	The Value	Of % variable costs	% Of total costs ة
Variable costs	Seedlings	9000	15.07	13.21	3050	9.02	7.76
	Municipal manure fertilizer	2769.9	4.64	4.07	1769.9	5.23	4.50
	Chemical fertilizer	4556.34	7.63	6.69	4533.58	13.40	11.53
	Pesticides	3978.6	6.66	5.84	2142.35	6.33	5.45
	Sterilization	15480	25.92	22.73			
	Plastic mulch	2764	4.63	4.06			
	Total costs of production inputs	38548.84	64.56	56.60	11495.83	33.98	29.23
	Labor	19696.95	32.99	28.92	16795.38	49.65	42.71
	Automated work	1466.3	2.46	2.15	5537	16.37	14.08
	Total costs of performing production operations	21163.25	35.44	31.07	22332.38	66.02	56.78
	Total variable costs	59712.09	100.00	87.67	33828.21	100.00	86.02
Fixed costs	Rent an fedden	6475		9.51	5500		13.98
	Depreciation premium for the drip irrigation network	1926		2.83			
	Total fixed costs	8401		12.33	5500		13.98
	Totall costs	68113.09		100.00	39328.21		100.00

(1) Variable costs = costs of production inputs + costs of performing productive operations.
(2) Fixed costs = rent per fedden + depreciation premium for the drip irrigation network for the duration of the crop remaining on the land.
(3) Total costs = variable costs + fixed costs.
Source: Calculated and collected from field study sample data for the 2016/2017 agricultural season.

While it was found in Table (12) that the total costs per fedden of the frego strawberry crop (the traditional pattern) amounted to about 39.33 thousand pound distributed on variable costs by about 33.83 thousand pound, representing about 86.02% of the total costs per fedden, while fixed costs were estimated at about 5.5 thousand pound, which represents about 13.98% of the total costs, and with regard to items of variable production costs, the costs of production requirements were estimated at 11.5 thousand pound, representing 33.98% of the total variable costs, and about 23.23% of the total costs. The costs of performing production operations were estimated about 22.3 thousand pound, representing about 66.02% of the total variable costs, and about 56.78% of the total costs. From the above, it is clear that the share of variable costs to total costs is higher than the contribution of fixed costs to total costs, which It means that the variable costs make up the largest part of the strawberry production costs.

Seventh: Indicators of productive and economic efficiency of the strawberry crop in the study sample:

The results of Table (12) indicate that the average yield of fresh strawberry crop (untraditional style) during the agricultural season (2016-2017) was about 21.9 tons, while the average productivity of frego strawberry (traditional style) was about 14 tons, an increase of about 7.9 tons per fedden compared to that of fresh strawberry. The average price per ton of fresh strawberry was about 4.53 thousand pounds, and the average total revenue per fedden of frego strawberry was approximately 131.31 thousand pound compared to about 63.35 thousand pound of fresh strawberry, an increase It is estimated at 67.96 thousand pound per fedden, compared to that of frego strawberry.

While the net revenue per feddan of fresh strawberry reached 68.20 thousand pound compared about 24.02 thousand pound for frego strawberry, an increase about 44.18 thousand pound per feddan, compared to frego strawberry. While the ratio of the total return to the total costs of fresh

strawberry was about 2.08 compared to 1.61 for frego strawberry, which indicates the superiority of the untradition**al** style over the traditional pattern by 0.47, and the profits of the pound invested per fedden of fresh strawberry.

Table 12: Indicators of productive and economic efficiency per fedden of strawberry crops for the study sample**.**

Statement	Fresh strawberry (untraditional style)	Frego strawberry (traditional style)	The impact of technology
Average production (ton)	21.9	14	7.9
Average price per ton (pound)	5995.85	4524.76	1471.09
Total revenue (pound) (1)	131309.115	63346.64	67962.48
Variable costs	59712.09	33828.21	25883.88
Total costs	63113.09	39328.21	23784.88
Net yield per fedden (pound) (2)	68196.03	24018.43	44177.60
Net revenue per fedden (pound) (3)	3113.97	1715.60	1398.37
Ratio of total return to total costs (4)	2.08	1.61	4.6
Profitability of the Pound Investor (5)	1.08	0.61	0.47
Total Margin (6)	71597.03	29518.43	42078.60
Monthly return (pound) (7)	7577.34	2668.71	4908.62
Profitability of the producing unit (8)	51.94	37.92	14.02

(1) Total revenue = average amount of main output x average price per ton.
(2) Net fedden yield = revenue - costs.
(3) net yield per ton = net fedden yield ÷ fedden productivity.
(4) The ratio of the total return to the total costs = the total revenue the total costs.
(5) Profit of the invested pound = net return ÷ total costs.
(6) Total Margin = Total Revenue - Variable Costs.
(7) Monthly Return = Net Return ÷ Duration of the crop (9 months).
(8) Product incentive = (net per ton ÷ price of ton) x 100.
Source: Calculated and collected from field study sample data for the 2016/2017 agricultural season in study.

About 1.08 pounds compared about 0.61 piasters for the traditional pattern, an increase of about 0.47 piasters, compared to the traditional style, while the total margin per fedden of frego strawberry reached 71.60 thousand pound per fedden compared to 29.52 thousand pound for frego strawberry (traditional), with an increase estimated about 42.08 thousand pound per fedden, compared to the traditional pattern. The monthly yield of fedden from fresh strawberry reached about 7.58 thousand pound compared to 2.67 thousand pound for the traditional style, an increase about 4.91 thousand pound per fedden per month, compared to the traditional pattern. The product incentive per fedden of fresh strawberry reached 51.94% compared to about 37.92% for the traditional pattern, an increase about 14.02% between the two patterns, which confirms the previous indications that the cultivation of the untraditional pattern (fresh strawberry) for production and economic efficiency exceeds the cultivation of the traditional pattern (frego strawberry).

Eighth: The most important production problems for fresh and frego strawberry in the study sample, 2016/2017 season at Qaliubiya Governorate:

The results showed in Table (13) the existence of many problems related to strawberry production that led to the variation and decline in the productivity of the crop, the lack of cultivation of the untraditional pattern, and the high costs of production:

First, the productive problems of fresh strawberry, where the seedlings prices rise, the sterilization gas price increases, the lack of agricultural extension is 100% of the sample, followed by the increase in fertilizer prices by 96.7% of the sample, then the lack of employment, high payments and the spread of diseases by 95% of the sample, then the price of pesticides increased by 91.7% of the sample, and finally the lack of seedlings by 66.7% of the sample. Secondly, the productive problems of frego strawberry, where the forefront of agricultural extension is 100% of the sample, followed by a lack of employment and a high payments of 96.7%.Then, the prices of pesticides increased by 95% of the sample, then the prices of fertilizers increased and the spread of diseases and pests by 83% of the sample, then the prices of seedlings increased by 56.7% of the sample, and finally the lack of seedlings by 43.3% of the sample

Table 13: The most important production problems for fresh and frego strawberry crop in the study sample, 2016/2017 season at Qaliubiya Governorate.

Series	Items	Repetitions of fresh strawberry	%	Repetition of frego strawberry	%
1	**The lack of seedlings**	40	66.7	26	43.3
2	**Increase in seedlings prices**	60	100	34	56.7
3	**Unavailability of labor and high wages**	56	95	58	96.7
4	**High prices for fertilizers**	58	96.7	50	83
5	**High prices of pesticides**	57	95	57	95
6	**High sterilization gas price**	60	100	-	-
7	**The spread of diseases and pests**	56	94	50	83
8	**The lack of agricultural extension**	60	100	60	100

Source: Calculated and collected from field study sample data for the 2016/2017 agricultural season.

Conclusions and Recommendations

Conclusively, from the obtained results, it can be concluded the following points:

1. Encouraging farmers to produce strawberry by applying agricultural practices and modern technology in crop production for export and profit.
2. Establishing tissue culture centers to ensure the presence of fresh seedlings and planting early to ensure competition in foreign markets.
3. Cultivating high quality varieties to increase the competitiveness of the crop in the most important export markets.
4. Providing good alternatives to soil sterilization for the danger of methyl bromide gas and its international forbidden.
5. Providing production requirements for fertilizers and pesticides and encouraging farmers to load some secondary agricultural crops (such as garlic) on the main crop to increase farmers 'income and profits .
6. Encouraging farmers to grow crops in reclaimed lands, due to the existence of modern irrigation methods and rationalization of water consumption when cultivating.
7. Activating the role of agricultural extension to provide farmers with the production and technical information necessary to raise the productivity of the crop .

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The appendices

Table 1: Area and average acre production and total area production of strawberry, fresh and frigo at the level of Qalubia Governorate centers:

Center	Fresh strawberry					Frego Strawberry					Total Area	The relative importance of space	Number of holders	The relative importance of the number of holders
	Area	Average production per of fedden		Total area production		Area	Average production per fedden		Total area production					
	Feddeen	Kg	Ton	Kg	Ton	Fedden	Kg	Ton	Kg	Ton	Fedden	%		%
Shabin Alqanatir	1137	531	21		24481	129	584	9	350	1236	1266	55.87	1331	51.09
Tukh	723	238	21		15355	137	856	9	300	1350	860	37.95	971	37.27
Benha	63	955	17		1131						63	2.78	60	2.30
Alkhanika						11	482	10	310	115	11	0.49	64	2.46
Alqanatir Alkhayria	20	790	17	800	355						20	0.88	65	2.50
Qilyub	46	694	18	950	859						46	2.03	114	4.38
Total	1989				42181	277				2701	2266		2605	

Source: Qaliubiya Agriculture Directorate, Horticulture Department, unpublished data, separate numbers.

Table 2: The area, production and productivity of strawberry crops at the governorates level in the Republic during the period (2013-2015).

Governorates	2013			2014			2015		
	Area (fedden)	Yield (ton/fed.)	Production (ton)	Area (fedden)	Yield (ton/fed.)	Production (ton)	Area (fedden)	Yield (ton/fed.)	production (ton)
Behera	1358	11.5	15617	1473	12	17676	2316	11.582	26825
Gharbia	122	11.9	1447	93	10.097	939	56	9.25	518
Sharkia	1730	12.8	22212	2474	14.686	36333	2154	14.031	30222
Ismailia	3522	19.2	67469	3684	17.342	63888	4389	19.922	87437
Qalyoubia	2436	20.2	49082	2447	21.693	53083	2845	19.598	55756
lower Egypt	9346	16.987	9346	10171	16.903	171919	11830	17.058	201797
Giza	133	8	1064	10	8	80	10	8	80
Middle Egypt	138	7.9	1089	12	8.333	100	10	8	80
Inside the valley	9484	16.8	159846	10183	16.893	172019	11840	17.058	201877
Noubaria	4367	22.7	99207	4685	22.249	104235	10526	21.464	225925
Outside the valley	4374	22.7	99231	4686	22.245	104239	10531	21.455	225940
Total	13858	18.7	259077	14869	18.579	276258	22371	19.124	427817

Source: Ministry of Agriculture and Land Reclamation, Economic Affairs Sector, Agricultural Economics Bulletin, various issues