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World Rural Observations

MARSLAND PRESS
Multidisciplinary Academic Journal Publisher

Maximizing the Egyptian Exports from Strawberry Crop

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Abstract: The research aims to maximize the Egyptian exports of the strawberry crop to maximize the net return from exporting this crop. The study depended on the simple linear regression and the use of the linear programming method. The most important results**:** The crop Strawberry exports from Egypt in 2020 amounted to about 17.6 thousand tons, distributed to Belgium, Germany, the United Kingdom, Saudi Arabia, Russia, the United Arab Emirates, Syria, the Netherlands and other countries, with quantities amounting to about 4350, 2253, 2040, 1954, 1495, 1332, 786, 713, 2659 tons, with a value of about 78.5 million pounds. By conducting linear programming after determining the highest price countries, and the target function of this model was estimated at 166.6 million dollars, an increase over the actual value of the function by 88.1 million dollars, with an estimated increase of 112.2%. The locator of the geographically closest markets that imports this crop from Egypt has been established. the target function of this model was estimated at 82.8 million dollars, an increase over the value of the function of the actual model by about 4.3 million dollars, an increase rate of about 5.4%, which shows a net achievement The value of this model is the net value of the actual model. The Search recommended to Increasing exports by opening new export markets, especially in Arab and African countries.

[Ghada Shalaby Ali Shalaby and Shahira Mohamed Reda Ebrahim. **Maximizing the Egyptian Exports from Strawberry Crop**. *World Rural Observ* 2022;14(2):70-85]. ISSN: 1944-6543 (Print); ISSN: 1944-6551 (Online). http://www.sciencepub.net/rural. 11. doi:10.7537/marswro140221.11.

Key Words: Maximizing, linear programming, Strawberry.

Introduction

Foreign trade plays an important role in the Egyptian national economy as it contributes to raising the rates of economic development by providing the necessary capital for investments and thus expanding the production base. Exports contribute to increasing the national income and managing the foreign currencies needed to finance imports. The continuous increase in imports leads to a continuous deficit in the Egyptian balance of payments. Therefore, the Egyptian exports in general are considered one of the main economic activities as the economic policy aims to maximize returns from them by increasing and diversifying exports in order to avoid the risks of dependence on a limited number of export crops.

The country is striving to increase the agricultural exports as one of the most important aspects of foreign trade in light of the emergence of many economic and international blocs and groupings, especially after Egypt officially signed the Euro-Mediterranean Agreement in June 2004 with giving that both of the European Union and the southern Mediterranean countries consider them to be the competing countries for exports in the European Union market Although it is also considered one of the most important import markets for Egyptian agricultural exports, especially strawberries, where the European Union market alone accounts for nearly 27.4% of the agricultural exports. So, it has become important to identify the relative change that is expected to occur in the exported quantities of strawberries such as Competing countries and the extent of shifting demand for strawberry exports on the one hand and the ability of the Egyptian market to penetrate into those markets.

Strawberries (ground berries) are non-traditional fruit crops. It can be said that they are horticultural crops with great yield and can be exported frozen, processed or fresh. Partially colored in pink, then red. The area of the colored part increases gradually. The coloration begins from the apical end of the fruit to the basal end, accompanied by an increase in the size of the fruits, an increase in the percentage of moisture and a decrease in hardness with an increase in the proportion of sugary substances that constitute 70-80% of the dissolved solid materials.

Strawberries are rich in mineral salts as they contain mineral salts such as calcium, iron and phosphorous. They also contain citric acid, apple acid, and fructose. They also contain high amounts of vitamins A, B, and C. Strawberry leaves are used as a boil for the infusion prepared from those leaves and roots of the plant. It is used as a treatment for pulmonary tuberculosis and colon infections as well

as being used as a blood purifier and as a gargle for sore throat. Boiled leaves are also useful in relieving asthma attacks. It also contains oxidants that help to prevent the infection with diseases, especially cancer. It is a fruit rich in ascorbic (60 mg per 100 g) and potassium 158 (mg per 100 g). It is also rich in niacin and contains medium amounts of iron (1 mg per 100 g).) and riboflavin. It also contains a large amount of carbohydrates (8 g per 100 g) most of the sugars in it are in the form of fructose sugar, so it is suitable to be eaten fresh for those who suffer from diabetes and is suitable for the growth and health of children and adults alike because it contains a percentage of amino acids; especially when served mixed in a glass of milk with the addition of white bee honey.

Research Problem:

The problem of the research is represented in the decline in Egyptian exports of strawberries from 75 thousand tons in 2011 which represents nearly 31.5% of the quantity produced for the strawberry crop, which amounted to 238.4 thousand tons to 17.6 thousand tons in 2020 representing nearly 3.3% of the produced quantity from strawberry crop amounting to 539.5 thousand tons in spite of the high export prices of the strawberry crop amounting to 4467 dollars/ton.

This means that Egyptian exports in general and strawberry exports in particular face many challenges due to the fluctuation in the quantity and value of those exports during recent years between increase and decrease. Hence, the study problem is represented in this clear fluctuation in the exports of the crops under study as a result of the intense competition faced by Egyptian exports. In the European Union market, it is one of the countries that enjoy a comparative advantage in exporting these crops to those markets.

Objective of the Research:

Basically, conducting a study to investigate the competitiveness of Egyptian agricultural exports of the strawberry crop to the most important foreign markets to maximize its exports through:

1- To identify the production and export potentials of the strawberry crop in Egypt.

2- Studying some indicators of the export performance of the strawberry crop.

3- Identifying the Egyptian price competitiveness of the strawberry crop.

4- Determining the most important importing countries for this crop to reach the highest possible value from exporting the crop, taking into account the determinants of the absorptive capacity of the most important importing countries for this crop so that it can expand and increase exports from it.

The Methodology and Data Sources:

The research depended on both the descriptive analysis approach represented by the mean and standard deviation and the quantitative analysis approach represented by the simple linear regression and the use of the linear programming method to maximize the net return from exporting the crop through three models: the first model (the actual distribution), the second model (the highest priced countries) and the third model (the markets closest to geography), the fourth model: (the markets importing this crop from Egypt with a decrease of 25% of the quantities exported to those countries for distribution to higher-priced countries). The study also relied on published data from the Ministry of Agriculture and Land Reclamation, the Economic Affairs Sector, and the international trade website https://www.trademap.org

Results and Discussion:

First: The relative importance of the strawberry crop area in Egypt in 2019/2020.

Table and figure (1) an indicates the relative importance of the strawberry crop area in the governorates of Egypt, where Al-Nubariya ranked first with nearly 13.5 thousand feddans representing 50%, Ismailia Governorate ranked second with 8.6 thousand feddans representing 32.2%, Kalyobiya Governorate ranked third with nearly 4.1 thousand feddans representing 15.5%, Monofiya Governorate ranked fourth with nearly 0.4 thousand feddans representing 1.5%, with a total of 26.6 thousand feddans, representing 99.4%, then the rest of the governorates (Kafr El-Sheikh, Dakahliya, Damietta, Giza, Upper Egypt, Assiut, Upper Egypt, New Valley) by nearly 0.1 thousand Feddans. It represents 0.6% of the total strawberry crop area in Egypt, which is 26.7 thousand feddans.

Second: The Evolution of the most Important Productivity and Economic Indicators for the Strawberry Crop During the period (2009-2020).

1- Evolution of the strawberry crop area during the period (2009-2020):

Table and figure (2) show that the area of the strawberry crop during the study period (2009-2020), its minimum limited nearly reached 12.5 thousand feddans in 2010 while its maximum limited nearly reached 31.6 thousand feddans in 2019 with an average of nearly 18.9 thousand feddans and a standard deviation of 1.9 thousand acres on average during the study period.

Table (3) shows the general time trend equation No (1) that the strawberry crop area is increasing annually at a statistically significant rate of

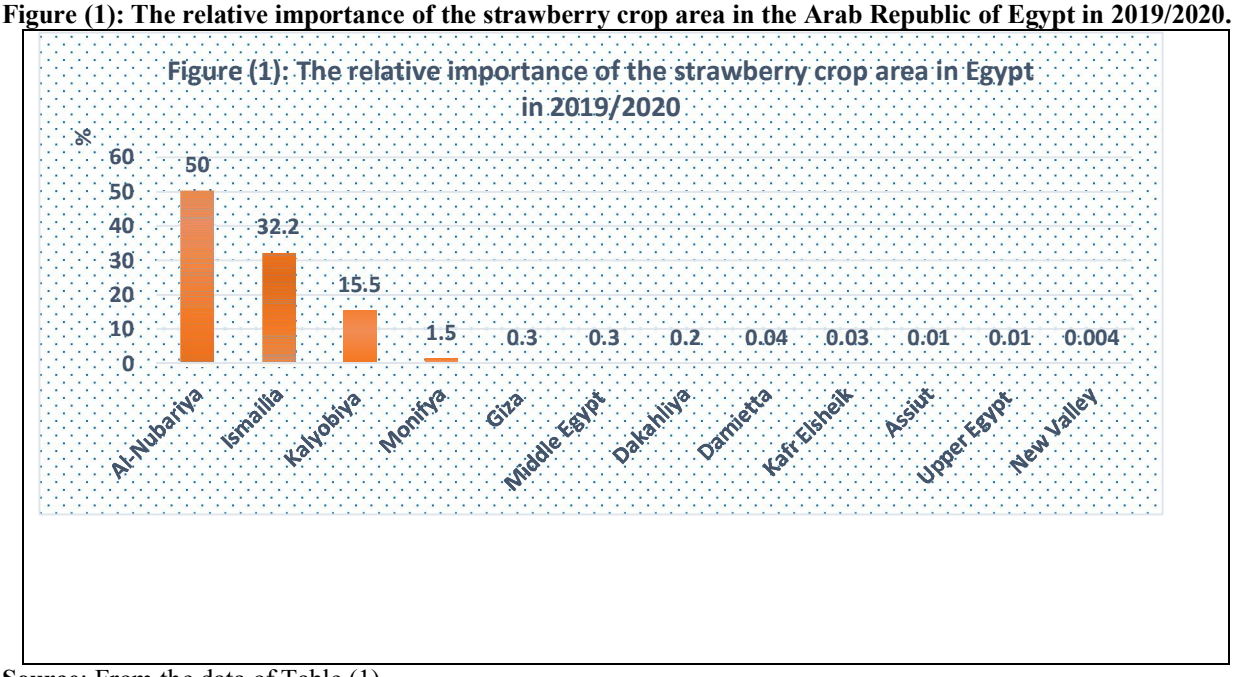
1.61 thousand feddans with an annual change rate of 8.5% of its average of 18.9 thousand feddans and the coefficient of determination is nearly 0.82 which means that 82 % of the changes in the area of strawberries are due to the time factor and 12% of these changes are due to other factors and the value of F of 46.3 indicates the significance of the model used.

Table (1): The relative importance for the area of strawberry crop in the Egyptian Governorates in 2019/2020.

Governorate	Area	%	Productivity	Production
Kafr Elsheik	8.0	0.0	10.5	84.0
Dakahliya	41.0	0.2	20.0	820.0
Damietta	10.0	0.0	11.5	115.0
Ismailia	8607.0	32.2	19.6	168760.0
Monifya	400.0	1.5	11.0	4411.0
Kalyobiya	4142.0	15.5	17.5	72328.0
Giza	86.0	0.3	8.5	729.0
Middle Egypt	86.0	0.3	8.5	729.0
Assiut	3.0	0.0	4.0	12.0
Upper Egypt	3.0	0.0	4.0	12.0
New Valley	1.0	0.0	4.0	4.0
Al-Nubariya	13458.0	50.3	13.9	186682.0
Total	**26756.0**	**100.0**	**16.2**	**433945.0**

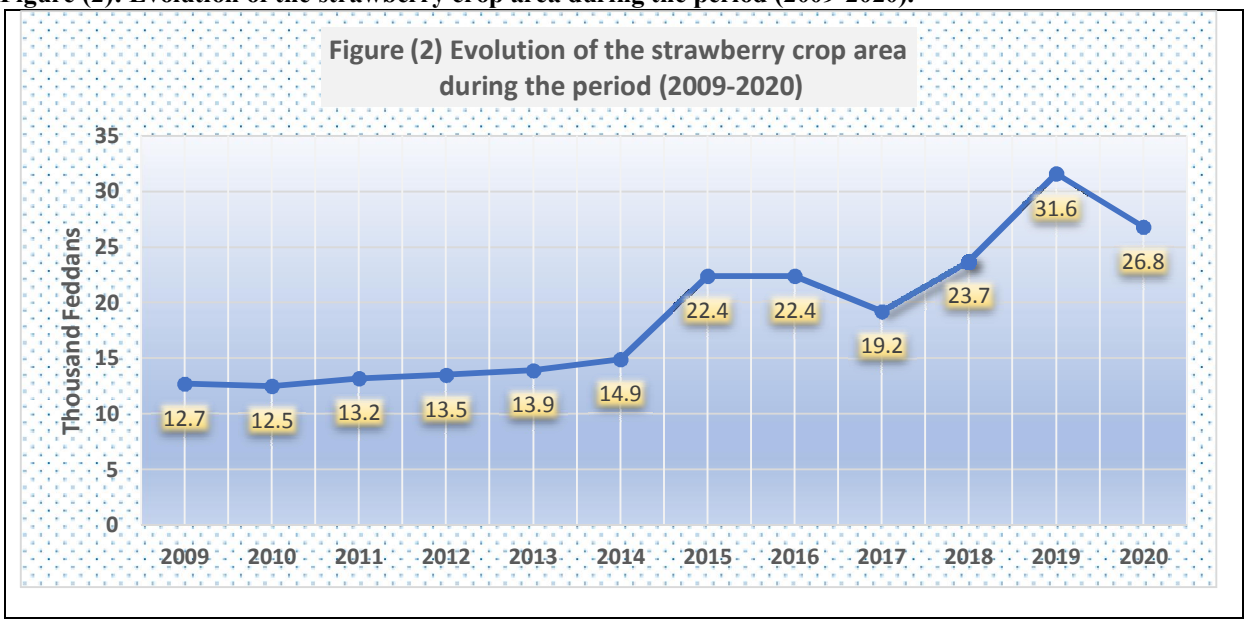
Source: Ministry of Agriculture and Land Reclamation, Economic Affairs Sector, Agricultural Statistics Bulletin, Winter Crops 2020.

Figure (1): The relative importance of the strawberry crop area in the Arab Republic of Egypt in 2019/2020.



Source: From the data of Table (1)

Figure (2): Evolution of the strawberry crop area during the period (2009-2020).



Source: From the data of Table (2)

Table (2): The evolution of the most important productive and economic variables for the strawberry crop during the period (2009-2020).

Year	Area	Productivity	Production	Qty Exports	% of Production	Exports Value	Exchange Rate	Equivalent price	Export price
	K Fed	Ton/Fed	K Ton	K Ton		M $	Eeg	M Eeg	$ / Ton
2009	12.7	18.4	234.1	67.0	28.6	86.2	5.6	480.1	1291
2010	12.5	19.1	234.1	24.5	10.5	65.5	5.7	372.0	2672
2011	13.2	18.0	238.4	75.0	31.5	58.7	6.0	350.6	783
2012	13.5	18.3	237.4	23.0	9.7	77.2	6.1	474.0	3363
2013	13.9	18.7	248.3	33.2	13.4	69.5	7.2	496.8	2092
2014	14.9	18.6	259.1	54.8	21.1	75.5	7.1	535.2	1379
2015	22.4	19.1	276.3	73.5	26.6	73.8	7.8	577.9	1004
2016	22.4	16.6	427.8	138.6	32.4	100.0	8.9	888.1	721
2017	19.2	16.6	372.8	40.6	10.9	90.0	18.4	1651.5	2216
2018	23.7	16.4	319.0	43.6	13.7	74.2	17.8	1320.1	1703
2019	31.6	17.1	389.0	84.0	21.6	88.4	16.8	1484.5	1052
2020	26.8	16.2	539.5	17.6	3.3	78.5	15.8	1240.9	4467
Min Value	**12.5**	**16.2**	**234.1**	**17.6**	**3.3**	**58.7**	**5.6**	**350.6**	**721**
Max Value	**31.6**	**19.1**	**539.5**	**138.6**	**32.4**	**100.0**	**18.4**	**1651.5**	**4467**
Average	**18.9**	**17.8**	**314.6**	**56.3**	**18.6**	**78.2**	**10.3**	**822.6**	**1895.3**
Deviation	**1.9**	**0.3**	**28.3**	**9.9**	**2.8**	**3.3**	**1.5**	**136.7**	**329.2**

Source: Ministry of Agriculture and Land Reclamation, Economic Affairs Sector, Agricultural Statistics Bulletin, during the period (2009-2020).

Table (3): Equations of the Time Trend of the Most Important Productive and Economic Indicators for the Strawberry Crop during the period (2009-2020)

No.	Indicators		Equation		Average	%rate of change	R^2	F
1	**Area**	K Fed	$\hat{Y}i = 8.4 + 1.61Xi$	**(6.8)****	18.9	8.5	0.82	46.3
2	**Productivity**	Ton/fed	$\hat{Y}i = 19.2 - 0.23Xi$	**(-3.8)****	17.8	-1.3	0.59	14.9
3	**Production**	K ton	$\hat{Y}i = 165.7 + 22.8Xi$	**(4.6)****	314.6	7.2	0.70	24.2
4	**Qty Export**	K Ton	$\hat{Y}i = 51.8 + 0.68Xi$	**(0.22)**	56.3	1.2	0.005	0.05
5	**% of Production**	%	$\hat{Y}i = 23.9 - 0.8Xi$	**(-1.01)***	18.6	-4.4	0.09	1.03
6	**Exports Value**	M $	$\hat{Y}i = 69.5 + 1.33Xi$	**(1.45)**	78.2	1.7	0.17	2.11
7	**Exchange Rate**	EG P	$\hat{Y}i = 2.01 + 1.62Xi$	**(5.6)****	10.3	12.3	0.76	31.9
8	**Equivalent Price**	M EGP	$\hat{Y}i = 89.18 + 2.8Xi$	**(5.3)****	822.6	13.7	0.73	28.25
9	**Export Price**	$ / Ton	$\hat{Y}i = 1518.6 + 57.94Xi$	**(0.58)**	195.3	3.05	0.03	0.34

whereas**:**

Y_i = Estimated value of the dependent variable

X_i = Time as an independent variable where e (1, 2, 3, 4...12).

R^2 = The coefficient of determination

The values between brackets are the calculated t values

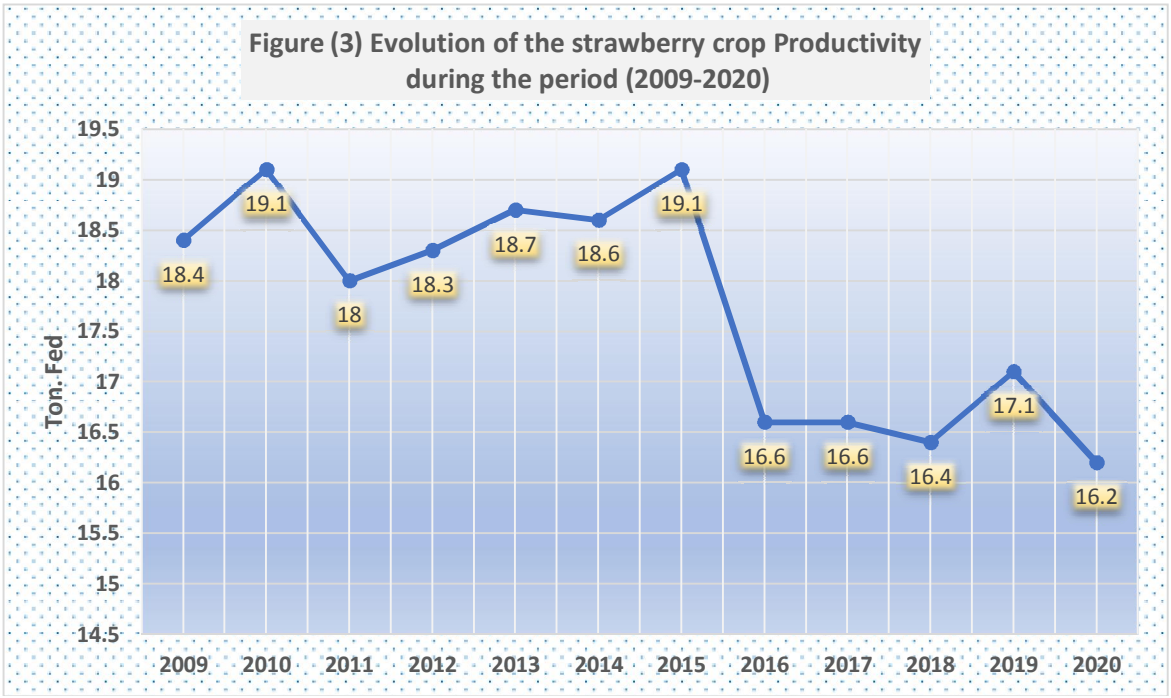
** = **Significance at 0.01%,**

* = **Significance at 0.05%**

Source: It was collected and calculated from table (2).

2- Evolution of the feddan productivity of strawberry crop during the period (2009-2020).

It is clear from Table (2) and figure (3) that the average feddan productivity of the strawberry crop during the study period (2009-2020), its minimum reached nearly 16.2 tons / feddan in 2020, while its maximum reached nearly 19.1 tons / feddan in 2015, with an average of nearly 17.8 tons / feddan with a standard deviation of 0.3 tons / feddan from the average during the study period**.**



Source: From the data of Table (2)

Figure (3): Evolution of the feddan productivity of the strawberry crop during the period (2009-2020).

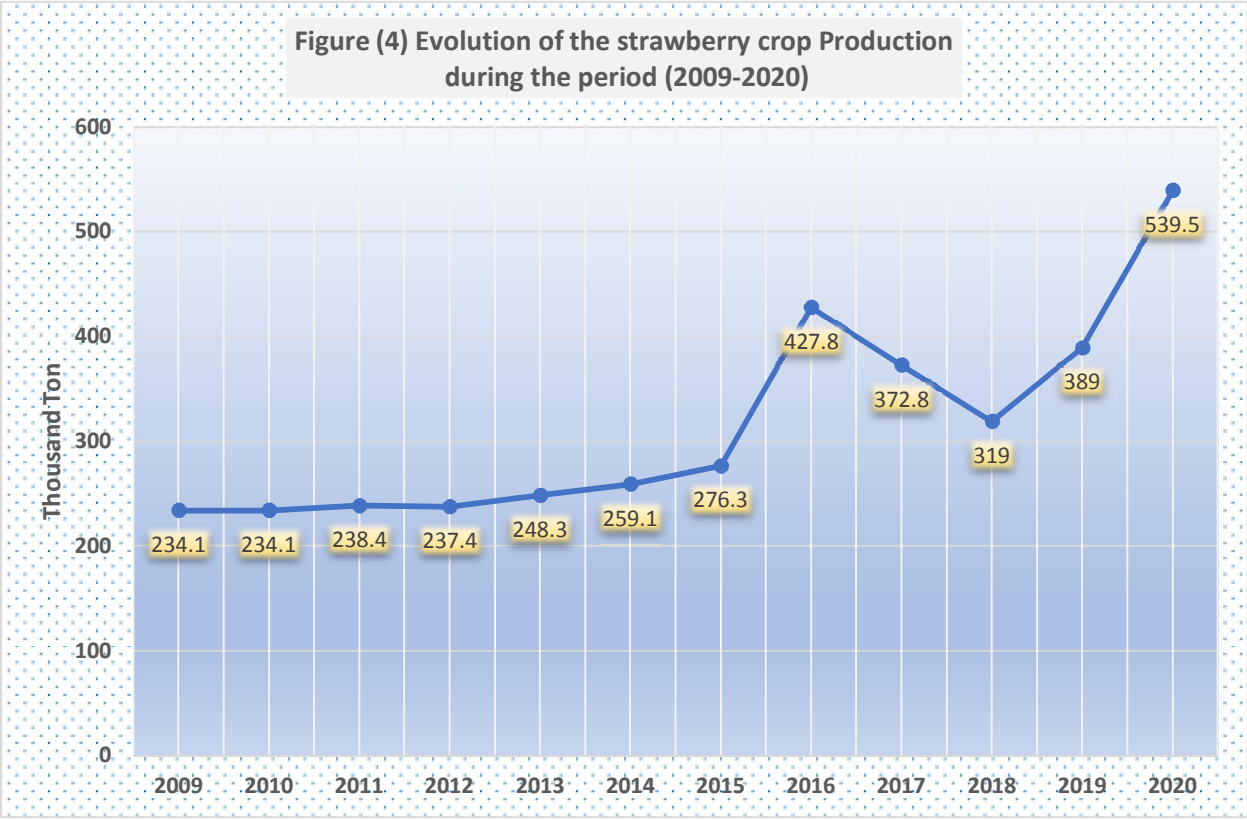
Table (3) shows the general time trend equation No. (2) that the productivity of the strawberry crop decreases annually with a statistically significant rate of 0.23 tons, with an annual change rate of -1.3% of its average of 17.8 tons, and the coefficient of determination is nearly 0.59, which means that 59% Of the changes in the area of strawberries are due to the factor of time and that 41% of these changes are due to other factors, and the value of F of 14.9 indicates the significance of the model used.

3- Evolution of total production:

Table (2) and figure (4) indicates that the total production of the strawberry crop during the study period (2009-2020), its minimum reached nearly 234.1 thousand tons in 2010, while its maximum reached nearly 539.5 thousand tons in 2020, with an average of nearly 315.6 thousand tons, and with a standard deviation of 28.3 thousand tons more than the average during the study period.

Table (3) shows the general temporal trend equation No. (3) that the total production of the strawberry crop is increasing annually with a statistically significant rate of 22.8 thousand tons and an annual change rate of 7.2% of its average of 314.6 thousand tons, Figure (2) The coefficient of determination also reached nearly 0.70, which means that 70% of the changes in the area of strawberries are due to the time factor and 30% of these changes are due to other factors, and the value of P of 24.2 indicates the significance of the model used.

Figure (4): Evolution of Total Production of Strawberry Crop during the period (2009 – 2020).



Source: From the data of Table (2)

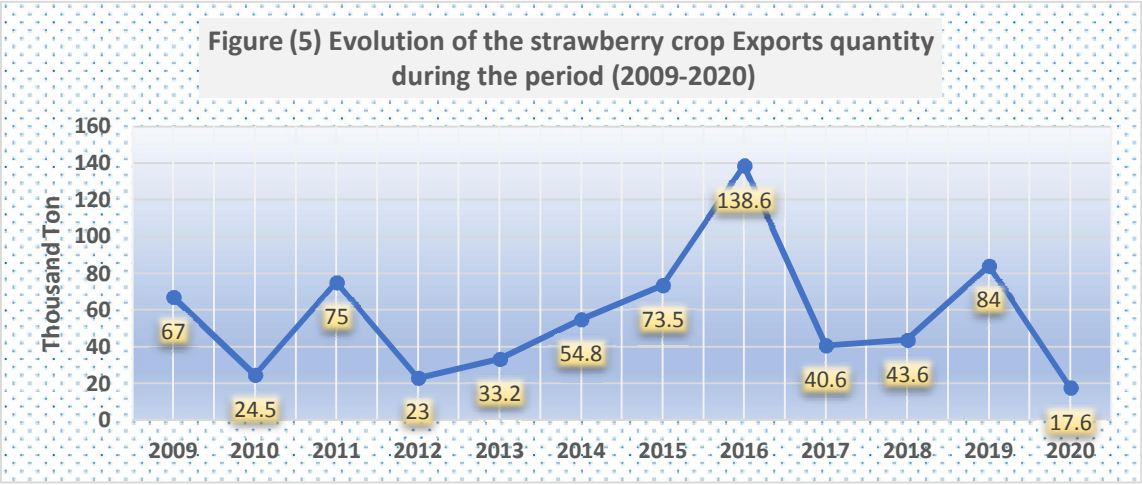
Figure (4): Evolution of Total Production of Strawberry Crop during the period (2009 – 2020) .

4- Evolution of Exports Quantity:

Table (2) and figure (5) indicates that the quantity of exports of the strawberry crop during the study period (2009-2020), its minimum reached nearly 17.6 thousand tons in 2020, while its maximum reached nearly 138.6 thousand tons in 2016, with an average of nearly 56.3 thousand tons, with a standard deviation It reached 9.9 thousand tons more than its average during the study period.

Table (3) shows the general time trend equation No. (4) that the exported quantity of the strawberry crop is increasing annually at a statistically insignificant rate of 0.68 thousand tons, and at an annual change rate of 1.2% of its average of 56.3 thousand tons.

Figure (5): Evolution of the quantity of strawberry exports during the period (2009-2020).



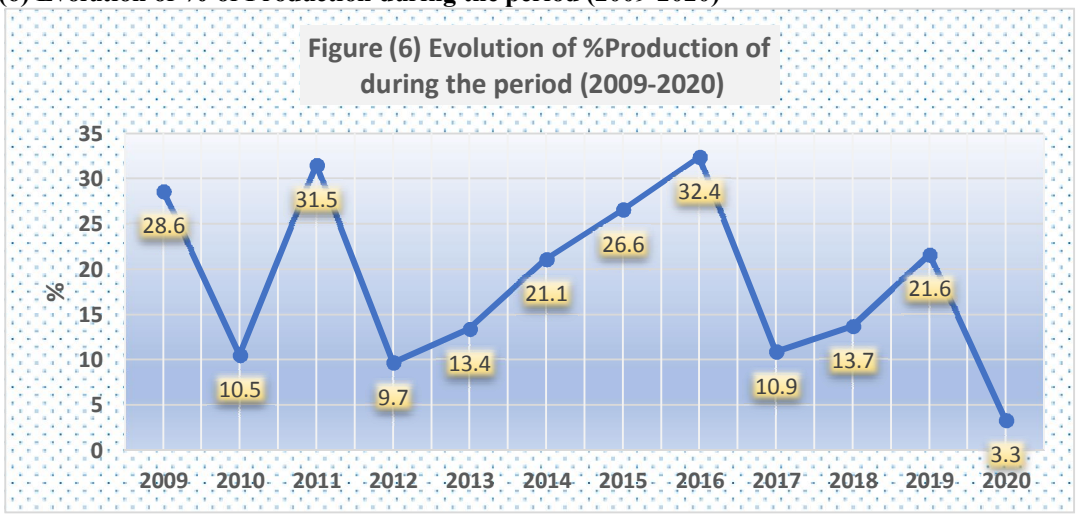
Source: From the data of Table (2)

5- **Evolution of % of Production**

Table (2) and figure (6) indicates that % of Production of the strawberry crop during the study period (2009-2020), its minimum reached nearly 3.3% in 2020, while its maximum reached nearly 32.4% in 2016, with an average of nearly 18.6%, and a standard deviation of 2.8% on average during the study period.

Table (3) shows the general time trend equation No. (5) that the exported quantity of the strawberry crop is decreasing annually at a statistically insignificant rate of -0.8 thousand tons, and at an annual change rate of -4.4 percent of its average of 18.6%, Fig. (6): of the exported quantities of production.

Figure (6) Evolution of % of Production during the period (2009-2020)



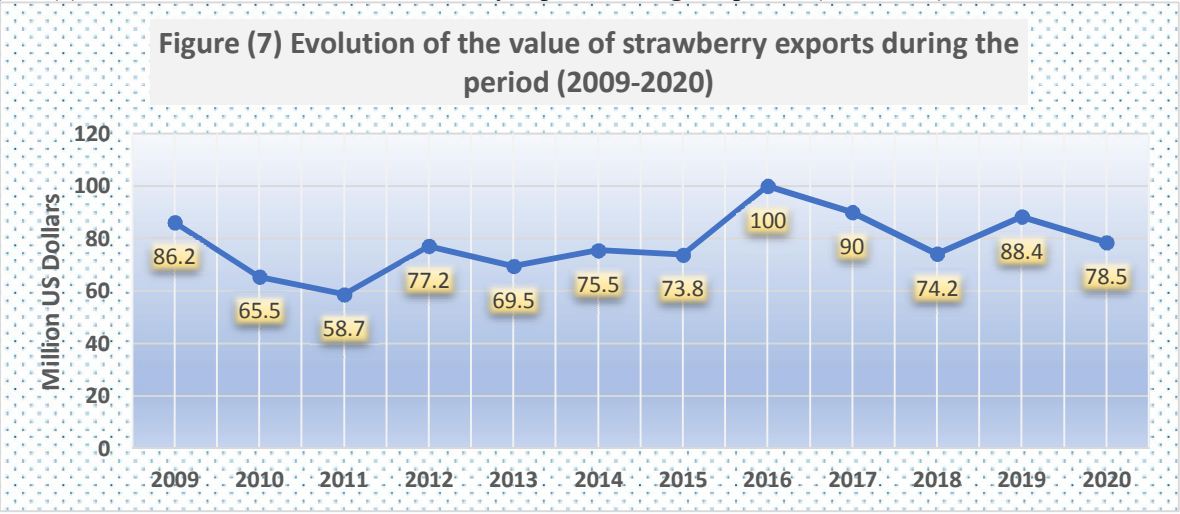
Source: From the data of Table (2)

6- Evolution of Exports Value

Table (2) and figure (7) indicates that the exports value of strawberry crop during the study period (2009-2020), its minimum amount reached nearly 58.7 million US Dollars in 2011 while its maximum reached nearly 100 million US Dollars in 2016 with an average of nearly 78.2 million US Dollars. The standard deviation was 3.3 million US Dollars which is more than its average during the study period.

Table (3) shows the general time trend equation No. (6) that the value of strawberry exports increases annually at a statistically insignificant rate of 1.33 million US Dollar at an annual change rate of 1.7% of its average of 78.3 million US dollars,

Figure (7): Evolution of the value of strawberry exports during the period (2009-2020)



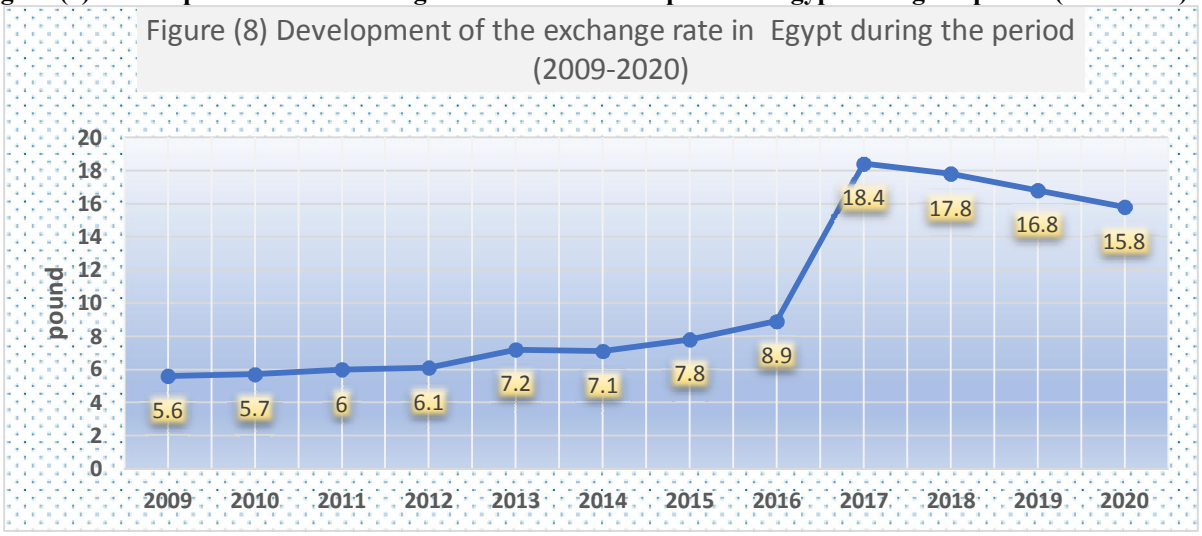
Source: From the data of Table (2)

7- Exchange Rate

Table (2) and figure (8) shows that the exchange rate in the Arab Republic of Egypt during the study period (2009-2020), its minimum reached nearly 5.6 Egyptian Pounds in 2009 while its maximum reached nearly 18.4 Egyptian Pounds in 2017 with an average of nearly 10.3 Egyptian Pounds and a standard deviation of 1.5 Egyptian Pounds on average during the study period.

Table (3) shows the general time trend equation No. (7) that the exchange rate increases annually at a statistically significant rate of 1.26 Egyptian Pounds and an annual change rate of 12.3% of its average of 10.3 Egyptian Pounds. The coefficient of determination is nearly 0.76, which means that 76% of the Changes in the quantity of strawberries exported are due to the time factor. 24% of these changes are due to other factors. The value of PH of 31.9 indicates the significance of the model used.

Figure (8): Development of the exchange rate in the Arab Republic of Egypt during the period (2009-2020)



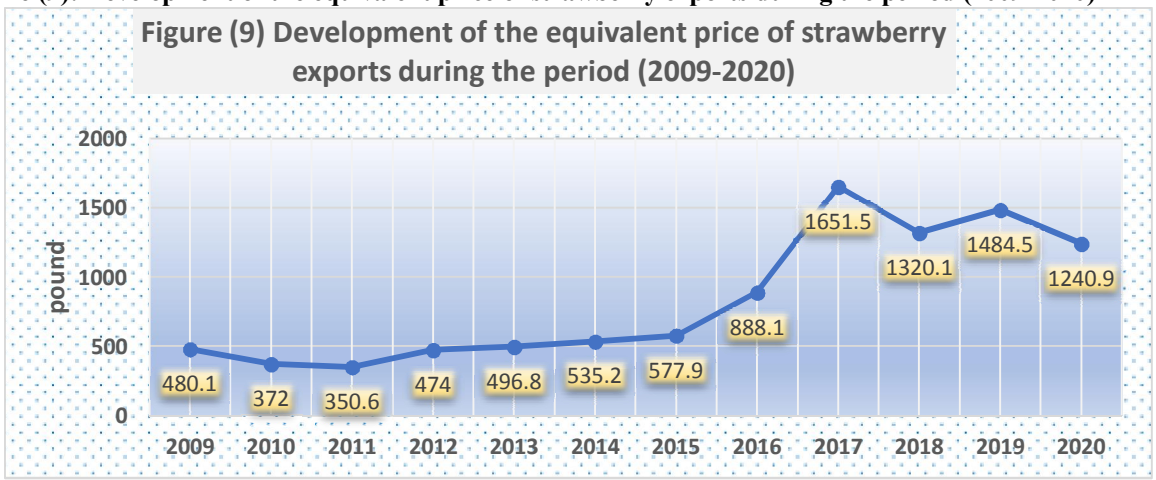
Source: From the data of Table (2)

7- The price equivalent to the value of strawberry exports in pounds:

Table (2) and figures (9) shows that the equivalent price for strawberry exports during the study period (2009-2020), its minimum reached nearly 350.6 million pounds in 2011 while its highest reached nearly 1651.5 million pounds in 2020 with an average of nearly 822.6 million pounds with a standard deviation of nearly 822.6 million pounds which means that it is 136.7 million pounds more than the average during the study period.

Table (3) shows the general time trend equation No. (8) that the equivalent price for strawberry exports is increasing annually with a statistically significant rate of 112.8 million pounds and an annual change rate of 13.7% of its average of 822.6 million pounds. The coefficient of determination is nearly 0.73. This means that 73% of the changes in the quantity of strawberries exported are due to the time factor and that 27% of these changes are due to other factors. The value of P of 28.2 indicates the significance of the model used.

Figure (9): Development of the equivalent price of strawberry exports during the period (2009-2020)



Source: From the data of Table (2)

8- Development of Export Price:

Table (2) and Figure (10) shows that the export price of a ton of strawberry crop during the study period (2009-2020), its minimum amounted to nearly 721 dollars / ton in 2016 while its maximum amounted to nearly 4467 dollars / ton in 2020 with an average of about 1895.3 dollars / ton and with a standard deviation of $329.2/ton from its average during the study period.

Table (3) shows the general time trend equation No. (9) that the price of ton exports of the strawberry crop is increasing annually at a statistically insignificant rate of 57.94 dollars / ton and an annual rate of change of 3.05% of its average of 18955.3 dollars / ton.

Figure (10): Development of the strawberry export price in dollars during the period (2009-2020)

Source: From the data of Table (2)

Third: Maximizing the Egyptian exports of the strawberry crop by using linear programming.

The linear programming method is considered one of the advanced methods in economic planning and the most used mathematical method in solving the optimization problem due to several reasons, including the ease of solving this type of models in relation to other types whose solution requires very complex mathematical methods. Resulting in linear programming models lead. In addition, it deals with all the variables that occur in the productive factors in an instantaneous manner at the same time. Thus, it is possible to reach decisions that cannot be reached by other methods under the same conditions**.**

Objective function and data used: -

The function aims to maximize the net return from the export of the crop and then determine the most important importing countries for this crop to reach the highest possible value from the export of the crop, taking into account the determinants of the absorptive capacity of the most important importing countries for this crop in addition to the economic, social and political conditions and objectives that are taken into account.

1- **In the first model**, the surplus and deficit data were relied on for the strawberry crop for the year 2020. While in the second model, exports were distributed to maximize the return on the exports of the three crops under study.

2- The import price from the quantitative data and the value of imports for the strawberry crop in each of the importing countries.

whereas:

The objective function = Max Z = $\sum_{i=1}^{n}\sum_{j=1}^{m}$ **Pj Q ij**

Pj **:Country's Import Price** j

Qij :The quantity to be exported from country i to country j

The absorptive capacity of the market is one of the most important determinants of the export of the crop, which can be reached through the average per capita consumption of the population as well as the Egyptian export prices compared to the prices of the competing countries. Therefore, two types of determinants were identified. The first determinant being the most important countries with the highest price, and then the group of countries importing from Egypt with the highest price.

Model analysis results:

1- **The first model (actual distribution):**

Table No. (4) indicates that strawberry exports from Egypt for the year 2020 amounted to 17.6 thousand tons, distributed to Belgium, Germany, the United Kingdom, Saudi Arabia, Russia, the United Arab Emirates, Syria, the Netherlands and other countries in quantities amounting to about 4350, 2253, 2040, 1954, 1495 , 1332, 786, 713, 2659 tons, with a value of about 78.5 million pounds.

2- The second model (the highest price countries):-

By conducting the linear programming process after the determinant of the highest-priced countries. The results obtained from Table (5) indicated that this model included the distribution of Egyptian exports of the strawberry crop to the highest-priced countries in order to achieve the highest net return from Egyptian exports for this crop as about 17,582 tons were distributed. Egypt's exports of this crop for the year 2020 to Japan, Indonesia, Hong Kong, China, Singapore, Thailand, Malaysia and Iceland amounted to about 3032, 197, 6598, 3620, 1984, 1518, 633 tons, respectively. The targeting function of this model was estimated at nearly 166.6 million US Dollars with an increase from the value of the actual function nearly reaching 88.1 million US dollars with an increase rate of 112.2%.

Table (4): the actual distribution of Egyptian exports of strawberry to the world countries in 2020.

Form	Quantity	price per ton	Value
Countries	**Ton**	**$**	**Million $**
Belgium	4350	4467	19.4
Germany	2253	4466	10.1
The United Kingdom	2040	4466	9.1
KSA	1954	4466	8.7
Russia	1495	4467	6.7
UAE	1332	4467	6.0
Syria	786	4465	3.5
Netherlands	713	4464	3.2
Others	2659	4465	11.9
Total Exports Quantity	**17582**		
Total Value			**78.5**

Source: https://www.trademap.org

Table (5): Suggested distribution according to the majority of Egyptian exports of strawberry to the world in 2020.

Form	Quantity	price per ton	Value
Countries	**Ton**	**$**	**Million $**
Japan	3032	11063	33.5
Indonesia	197	10080	2.0
Hong Kong – China	6598	9917	65.4
Singapore	3620	9292	33.6
Thailand	1984	8441	16.7
Malaysia	1518	6509	9.9
Iceland	633	8515	5.4
Total Exports Quantity	**17582**		
Total Value			**166.6**

Source: https://www.trademap.org

3- The Third Model: (markets closest geographically):-

The identifier of the geographically closest markets that imports this crop from Egypt has been established. The results of Table (6) indicated that the exported quantities of the same crop were redistributed so that the Egyptian export revenues of this crop could be maximized to Kuwait, Germany, Qatar, Kingdom of Saudi Arabia, Oman, the United Arab Emirates, Bahrain and Syria in quantities amounted to about 6220, 2225, 2147, 1954, 1750, 1333, 1167, 786 tons, respectively, where the targeting function of this model was estimated at 82.8 million US dollars with an increase over the value of the function of the actual model by about 4.3 million US Dollars and with an increase rate of nearly 5.4% which shows the realization of the net value of this model from the net value of the actual model.

4- The Fourth Model: (the markets that import this crop from Egypt with a decrease of 25% of the quantities exported to those countries for distribution to higher-priced countries):-

The markets importing this crop from Egypt have been determined, with a decrease of 25% of the quantities exported to those countries to be distributed to higher-priced countries. The results of Table (7) indicated that the exported quantities of the same crop were redistributed so that the Egyptian export revenues of this crop could be maximized. To all of Belgium, Hong Kong, China, Germany, the United Kingdom, Saudi Arabia, Singapore, Japan, Russia, the United Arab Emirates, Thailand, Syria, the Netherlands, Iceland and Indonesia from quantities amounting to about 3263, 2639, 1690, 1530, 1466, 1448, 1213, 1121, 999, 758, 590, 535 253, 79 tons, respectively, as the targeting function of this model was estimated at 112.4 million US Dollars with an increase in the value of the function of the actual model by nearly 33.9 million US Dollars with an increase rate of about 43.1%, which shows the achievement of the net value of this model over the net value of the actual model.

Table: (6): The proposed distribution according to the majority of the return on the Egyptian exports of the onion crop to the countries of the world in 2020, according to the identifier of the geographically closest countries imported from Egypt.

Form	Qty	price per ton	Value
Countries	**Ton**	**$**	**Million**
Kuwait	6220	4475	27.8
Germany	2225	4466	9.9
Qatar	2147	6417	13.8
KSA	1954	4467	8.7
Oman	1750	4472	7.8
UAE	1333	4465	6.0
Bahrain	1167	4464	5.2
Syria	786	4471	3.5
Total Exports Quantity	**17582**		
Total Value			**82.8**

Source: https://www.trademap.org

Table (7): the proposed distribution according to the majority of the Egyptian exports of the strawberry crop to the countries of the world in 2020, according to the specific countries importing from Egypt.

Form	Qty	price per ton	Value
Countries	**Ton**	**$**	**Million**
Belgium	3263	4467	14.6
Hong Kong China	2639	9917	26.2
Germany	1690	4466	7.5
The United Kingdom	1530	4466	6.8
KSA	1466	4466	6.5
Singapore	1448	9292	13.5
Japan	1213	11063	13.4
Russia	1121	4467	5.0
UAE	999	4467	4.5
Thailand	758	8441	6.4
Syria	590	4465	2.6
Netherlands	535	4464	2.4
Iceland	253	8515	2.2
Indonesia	79	10080	0.8
Total Exports Quantity	**17582**		
Total Value			**112.4**

Source: https://www.trademap.org

From the above it is clear that the best obtained models is the fourth model because it achieved a higher net value than the first model, while the third model was devoid of some of the main markets that import this crop from Egypt, so the study recommends its use.

Summary:

The problem of the study is represented in the decline in Egyptian exports of strawberries from 75 thousand tons in 2011, which represents about 31.5% of the quantity produced for the strawberry crop which amounted 238.4 thousand tons to 17.6 thousand tons in 2020 representing nearly 3.3% of the quantity produced from strawberry crop amounting 539.5 thousand tons despite the high export prices of the strawberry crop amounting 4467 dollars / ton,

The study aims to maximize Egyptian exports of the strawberry crop and to maximize the net return from exporting the crop and then identify the most important importing countries for this crop to reach the highest value Possible to export the crop, taking into account the limitations of the absorptive capacity of the most important importing countries for this crop in addition to the economic, social and political conditions and objectives that are taken into account.

The study relied on both the descriptive analysis represented by (the mean and standard deviation) and the quantitative analysis represented by the simple linear regression and the use of the linear programming method to maximize the net return from exporting the crop through three models: the first model (actual distribution), the second model (highest priced countries), the third model: (the markets closest to geography), the fourth model: (markets that import this crop from Egypt with a decrease of 25% of the quantities exported to those countries for distribution to higher-priced countries).

The most important results:

1. By studying the relative importance of the area of the strawberry crop in the governorates of the Republic, where Nubaria governorate ranked first with about 13.5 thousand acres representing 50%, Ismailia governorate ranked second with 8.6 thousand acres representing 32.2%, Qalyubia governorate ranked third with about 4.1 thousand acres representing 15.5%, and Menoufia governorate ranked The fourth is about 0.4 thousand feddans, representing 1.5%, with a total of 26.6 thousand feddans, representing 99.4%, then the rest of the governorates (Kafr El-Sheikh, Dakahlia, Damietta, Giza, Central Egypt, Assiut, Upper Egypt, Wadi El-Gadi) by about 0.1 thousand feddans, representing 0.6%, from The

total area of the strawberry crop in the Arab Republic of Egypt, which is 26.7 thousand acres.

2. The results indicate that the area of the strawberry crop is increasing annually at a statistically significant rate of 1.61 thousand acres, with an annual change rate of 8.5% of its average of 18.9 thousand acres, and that the productivity of the strawberry crop is decreasing annually at a statistically significant rate of 0.23 tons, with an annual change rate of -1.3%. From its average of 17.8 tons, the total production of the strawberry crop is increasing annually at a statistically significant rate of .22.8 thousand tons, and at an annual change rate of 7.2% of its average of 314.6 thousand tons. The exported quantity of the strawberry crop is increasing annually at a statistically insignificant rate amounting to 0.68 thousand tons, with an annual change rate of 1.2% from its average of 56.3 thousand tons,
3. Strawberry exports from Egypt in 2020 amounted to about 17.6 thousand tons, distributed to Belgium, Germany, the United Kingdom, Saudi Arabia, Russia, the United Arab Emirates, Syria, the Netherlands and other countries, with quantities amounting to about 4350, 2253, 2040, 1954, 1495, 1332, 786, 713, 2659 tons, with a value of about 78.5 million pounds.
4. By conducting linear programming after determining the highest price countries, the results indicated that about 17,582 tons of Egypt's exports of this crop for the year 2020 were distributed to Japan, Indonesia, Hong Kong, China, Singapore, Thailand, Malaysia and Iceland, with quantities amounting to about 3032, 197, 6598, 3620, 1984, 1518, 633 tons, respectively, and the target function of this model was estimated at 166.6 million dollars, an increase over the actual value of the function by 88.1 million dollars, with an estimated increase of 112.2%.
5. The locator of the geographically closest markets that imports this crop from Egypt has been established. The results indicated that the exported quantities of the same crop were redistributed so that the Egyptian export revenues of this crop could be maximized to Kuwait, Germany, Qatar, Saudi Arabia, Oman, United Arab Emirates, Bahrain and Syria in quantities amounting to About 6220, 2225, 2147, 1954, 1750, 1333, 1167, 786 tons, respectively, where the target function of this model was estimated at 82.8 million dollars, an increase over the value of the function of the actual model by about 4.3 million dollars, an increase rate of about 5.4%, which shows a net achievement The value of this model is the net value of the actual model.
6.

Pursuant to the aforementioned results, the study recommends what follows:

1- The use of the fourth model because it achieved a higher net value than the first model, while the third model was devoid of some of the main markets that import this crop from Egypt
2- Establishing export policies and programs to develop strawberry exports due to its high export prices compared to other crops
3- Increasing exports by opening new export markets, especially in Arab and African countries.

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6/22/2022