

Some Economic Relations of the Most Important Egyptian Medicinal and Aromatic Plants

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Abstract: The current study aims is to determine the impact of the some economic relations of the most important local variables on the production and export of certain aromatic and medicinal plants, through analysis of some important economic indicators affecting the production and export of these crops. The results showed that, the application of the general time trend of production equations during the period (1995-2009) indicate that, the area of medicinal and aromatic plants in old lands was estimated at 55.4 thousand acres representing 0.46% of crop area, with an average of 12,145 thousand feddans. Fluctuations in the cultivated area of medicinal and aromatic plants were evident during the study period. Estimation of the equation of the general trend of the area cultivated medicinal and aromatic plants at the level of the Egypt during the study period showed statistically significant annual increases with about 1.6 thousand feddans and annual growth rate of about 2.8% of the average area during (1995-2009). The equation of the overall time trend of the average production per feddan of these crops during the period (1995-2009) indicated that, there were annual statistically significant increase in anise and caraway crops being equivalent to 7.6%, 7.11% of the average production, respectively, while the annual rate of decrease in the production of cumin was about 5.7% of the average production is estimated at 2967.7 kg. The increase in the productivity was not statistically significant in the coriander, fennel and chamomile crops. The results of the net revenue showed that, all the crops have not been significantly affected, except for cumin or fennel which was significantly indicating that there is an inverse relationship between the net revenue on the previous year and the current cultivated area. The relationship of the cost per ton with the price of ton of the crops, coriander, fennel, anise, cumin, caraway and chamomile, indicated that if the cost of the ton increased one pound there will be a significant increase in the farm price estimated by 2.45, 3.225, 1.35, 1.09, 0.922, 0.601 pounds. The revenue of the invested pound in the first period compared to the second and third periods for the crops coriander and fennel only, while the values of the rest of the crops were increased in the third period compared to the other two periods. The results of coefficient of instability indicated that the clear that the amount of exports was more stable than the export price or the value of exports for coriander, cumin, anise, chamomile rather than fennel and caraway crops.

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Key Words: aromatic and medicinal plants, general trend equation, coefficient of instability

1. Introduction

The medicinal and aromatic plants represents an important position in the Egyptian economy, as it is the source of active ingredients in preparation of medicines in the form extracts or raw materials for the production of some chemical compounds which are considered the basics for synthesis of some chemical important medicinal materials. The increasing importance of these plants, due to the increase in the funds invested in the manufacture of medicine, and therefore, the consumption of these raw materials in the pharmaceutical industry is increase. The total area under cultivation of medicinal and aromatic plants 65.3 thousand feddans represents 0.43% of the total cropping area.

The aromatic medicinal plants have a major role in achieving the objectives of agricultural policy of the Egyptian increase of the export capacity, meanwhile reducing the import counterpart as well as providing employment opportunities within the agriculture sector. The medicinal and aromatic plants share in the

agricultural sector of Egypt as a component of its exports, contributing those plants by about 5.3%, 13.4% of the total value of exports of agricultural, horticultural, respectively, which estimated with about 1794.3 and 661million pounds, respectively, in terms of the real prices as an average of the period(1995 to 2009).

Problem of the study:

Despite Egypt has a comparative advantage in the production of medicinal and aromatic plants there are annual fluctuations in the area, productivity and total production of these plants in old and new lands. Such fluctuations reflected on the limited export capacity, which is minimized to about 3% of the total value agricultural exports during the period (2006 - 2008). In addition to this obvious fluctuation in the demand market for foreign medicinal and aromatic plants in Egypt.

Study goals

The goal of the study is to know the impact of some economic relations of the most important local variables on the production and export of certain medicinal and aromatic plants through studying and analyzing some important economic indicators affecting the production and export of such plants under study.

2. Methods

Research method and data sources:

The study used the descriptive and quantitative analysis method in achieving its goals simple regression equations to estimate the general trend of indicators of production and some important relationships that affect production. Data were obtained from the Ministry of Agriculture and Land Reclamation, Foreign Trade Database of Central Agency for Public Mobilization and Statistics (data of global trade).

3. Results & Discussion

The study is divided into five parts concerned with:

First: study area and production of crops and the second part indicate the relationship between the net revenue in the previous year and the current area, Third part examine the relationship between the cost per ton and the price per ton, while Fourth part interested in indicators of economic efficiency of medicinal and aromatic plants. While Fifth part five concerned with economic stability of the Egyptian exports to the crops of the study.

First: the crop area of medicinal and aromatic crops:

Data in table (1) show that the area of the medicinal and aromatic plants in old lands was estimated by 55.4 thousand acres represents about 0.46% of crop area, which amounted to an average of about 12,145 thousand feddans during the period (1995-2009). It was observed fluctuations in the cultivated area of medicinal and aromatic plants during the study period reached a minimum figure of about 46.8 thousand feddans in the year 2000 and reached a maximum of about 61.6 thousand feddans in the average in 2004. Also it was estimated that the average area of medicinal and aromatic plants in the new lands was about 7.52 thousand feddans represents about 0.46% of the average of the cropping area, which amounted to about 1619 thousand feddans. Also, fluctuating could be recognized in the cropping area in the new lands similar to the old lands where the minimum area was about 2.9 thousand feddans in 1996, and a maximum of about 13.5 thousand feddans in 2008.

The estimated average area of medicinal and aromatic plants nationwide was about 55.37 thousand feddans represents about 0.40% of the average cropping area, which amounted to 13,764 thousand feddans, and also shows that the minimum area reached about 52.1 thousand feddans in 1997, while the maximum area was about 71.4 thousand feddans in 2004.

Table (1) the cultivated and the cropping (1000Feddans) and the relative importance of medicinal and aromatic plants in Egypt in the period 1995-2009.

Years	Old Lands			New Lands			Total		
	Cultivated area (1)	Cropping area(2)	(2) / (1)	Cultivated area (1)	Cropping area(2)	(2) / (1)	Cultivated area (1)	Cropping area (2)	(2)/(1)
1995	53.2	12602	0.42	2.9	1213	0.24	56.1	13815	0.41
1996	58.3	12271	0.48	5.6	1438	0.41	63.9	13709	0.47
1997	48.5	12322	0.39	3.6	1507	0.24	52.1	13829	0.38
1998	64.4	13261	0.49	3.9	567	0.7	68.3	13830	0.49
1999	61	11707	0.52	4.3	2231	0.2	65.3	13938	0.47
Average	57.1	12432.6	0.46	4.1	1391.2	0.36	61.1	13824.2	0.44
2000	46.8	12528	0.37	5.5	2263	0.24	52.3	14791	0.35
2001	50.1	11823	0.42	5.2	2204	0.24	55.3	14027	0.39
2002	55.8	11954	0.47	6	2396	0.3	61.8	14350	0.43
2003	54.5	12018	0.45	6.3	2455	0.3	60.8	14473	0.42
2004	61.6	12145	0.51	9.8	2406	0.41	71.4	14551	0.5
Average	53.8	12093.6	0.44	6.6	2344.8	0.3	60.3	14438.4	0.42
2005	58.3	12289	0.47	10.2	2616	0.4	68.5	14905	0.46
2006	51.4	12280	0.42	11.2	2640	0.42	62.6	14920	0.42
2007	55	12350	0.45	12	2826	0.42	67	15176	0.44
2008	56	12229	0.46	13.5	3008	0.45	69.5	15237	0.46
2009	55.7	12145	0.5	12.8	3188	0.4	68.4	15360	0.44
Average	55.3	12258.6	0.46	11.9	2855.6	0.42	67.2	15119.6	0.44
G. Average	55.37	11897	0.5	7.52	2129	0.4	62.89	14369	0.44

Source: Ministry of Agriculture and Land Reclamation, the Central Administration of Agricultural Economics, Agricultural Economics Bulletin, various issues.

Table (2) Average production (ton) , net revenue / feddan , price /ton and the cost of production / ton(LE) of medicinal and aromatic plants in Egypt In the period 1995-2009.

Years	Coriander				Fennel				Anise			
	production Average	Net Revenue	Price /ton LE	Production cost/ton LE	production Average	Net Revenue	Price /ton LE	Production cost/ton LE	production Average	Net Revenue	Price/ Ton LE	Production cost/ton LE
1995	0.94	1967	3190	1005	1.12	6142	7099	1605	0.53		3154	1908
1996	1	2125	3250	989	1.27	8292	6663	1474	0.5	1200	4467	2071
1997	0.99	2533	3500	967	1.17	6011	6848	1706	0.42	498	3811	2624
1998	0.96	2027	3500	1552	1.2	5467	6145	1578	0.46	1229	6400	3831
1999	0.94	1838	3500	1579	1.68	11199	7924	1246	0.48	1572	6600	3304
Average	0.97	2098	3388	1218.4	1.288	7422.2	6935.8	1521.8	0.478	1031.8	4886.4	2747.6
2000	0.94	2053	3700	1515	1.31	6493	6595	1638	0.49	1704	6700	3297
2001	0.76	2253	3800	1400	1.23	6788	7287	1768	0.54	2111	6800	2912
2002	0.76	1519	3700	1690	1.4	4233	4100	1078	0.52	1892	6800	3140
2003	0.9	1849	3850	1617	1.41	4496	4275	1100	0.55	2291	7150	3025
2004	0.9	2178	4000	1556	1.43	4759	4450	1122	0.59	2690	7500	2925
Average	0.85	1970.4	3810	1555.6	1.356	5353.8	5341.4	1341.2	0.538	2137.6	6990	3059.8
2005	0.91	2382	4252	1596	1.54	4586	4037	1063	0.59	2634	7518	3076
2006	0.94	2162	4401	2023	1.56	4532	4129	1224	0.57	2247	7723	3760
2007	0.94	3595	6002	2069	1.43	4367	4344	1288	0.57	3177	8940	3819
2008	0.96	3569	6205	2252	1.48	5341	6029	1661	0.52	4326	10210	3685
2009	0.98	4034	6401	1327	1.52	3945	6229	1913	0.56	6709	13596	2374
Average	0.95	3148.4	5452.2	1853.4	1.506	4554.2	4953.6	1429.8	0.562	3818.6	9597.4	3342.8
G..Average	0.92	2406	4217	1372	1.38	10752	9744	1230	0.53	2329	71587	3050

Source: Ministry of Agriculture and Land Reclamation, the Central Administration of Agricultural Economics, Agricultural Economics Bulletin, various issues.

Table (3) Average production (ton) , net revenue / feddan , price /ton and the cost of production / ton(LE) of medicinal and aromatic plants in Egypt In the period 1995-2009.

Years	Cummins				Caraway				Chamomile			
	Average production	Net Revenue	Price /ton . LE	Production cost /ton. LE	Average production	Net Revenue	Price /Ton .LE	Production cost/ ton LE	Average production	Net Revenue	Price /Ton LE	Production cost/ ton LE
1995	0.54	3200	8000	2074	1.08	3138	3900	994	0.84	174	3000	2793
1996	0.46	2677	8500	2680	0.9	1614	3420	1626	0.85	145	2800	2747
1997	0.38	2145	9120	3475	0.96	2195	3510	1224	0.83	711	3640	2784
1998	0.45	2259	9230	4266	0.82	1602	3570	1617	0.83	397	3640	3161
1999	0.49	2697	9500	3962	0.9	1609	3600	1810	0.85	339	3822	3424
Average	0.46	2595.6	8870	3291.4	0.75	2031.6	3600	1454.2	0.84	353.2	3380.4	2982
2000	0.49	2679	9500	4067	0.8	1535	3900	1986	0.8	119	3898	3749
2001	0.49	2905	9900	4030	0.92	2108	4000	1703	0.76	1419	3898	3844
2002	0.48	3004	9900	3706	1.11	3134	4100	1282	0.79	541	3898	3213
2003	0.51	2983	9700	3807	0.99	2738	4250	1476	0.83	1318	2668	2853
2004	0.53	2963	9500	3900	0.87	2342	4400	1723	0.95	2095	4500	2304
Average	0.5	2906.8	9700	3902	0.938	2371.4	4130	1634	0.826	1098.4	3772.4	3193
2005	0.53	3015	9529	3840	0.87	2320	4476	1800	0.84	2137	5188	2634
2006	0.57	3241	9639	3982	0.75	1787	4533	2163	0.83	1799	5282	3106
2007	0.63	5430	12364	3731	0.79	2061	4794	2185	0.83	1871	4156	3109
2008	0.6	6122	15105	4586	0.86	2194	5169	2480	0.89	1567	4832	3429
2009	0.61	6378	15496	3096	0.9	1703	5546	1895	0.85	1965	5227	2266
Average	0.59	4837.2	12427	3847	0.834	2013	4903.6	2104.6	0.848	1867.8	4937	2909
G..Average	0.52	3447	10332	3680	0.84	2139	4211.2	1731	0.84	1021	4029.9	3028

Source: Ministry of Agriculture and Land Reclamation, the Central Administration of Agricultural Economics, Agricultural Economics Bulletin, various issues.

The equation of the general trend of the development of the cultivated area of medicinal and aromatic plants in old lands, reveal that there were statistically significant increases every year with about 0.97 thousand feddans, while the annual growth rate of about 1.9% of the average area during the period (1995-2009). Estimation of the equation of the general trend of the area cultivated medicinal and aromatic plants in the new lands reveal statistically significant

annual increase with about 0.65 thousand feddans with annual growth rate of about 14.1% of the average area during the period (1995-2009). Estimation of the equation of the general trend of the area cultivated medicinal and aromatic plants at the level of the Egypt during the study period (equation3-table4) showed statistically significant annual increases with about 1.6 thousand feddans and annual growth rate of about 2.8% of the average area during the same period.

Table (4) equations of the general trend of the development of the area of medicinal and aromatic plants (1000 feddans) for the period (1995-2009).

Equations No.	Independent variable	Estimated Equations	Period mean	Annual growth rate %	R ²	F
1	Old lands area	$y^{\wedge} = 0.048 + 54.9 xe$ (-0.018)	55.37	0.087	0.002	0.03
2	New lands area	$y^{\wedge} = 0.738 + 0.93 xe$ **(10.7)	7.52	10.3	0.89	60.3
3	Total	$y^{\wedge} = 0.787 + 55.8 xe$ **(2.7)	62.89	0.85	0.35	7.6

Where: y^{\wedge} : the estimated value to the area of medicinal and aromatic plants xe : variable time during the study period, where $e = 1, 2, \dots, 15$, the value between brackets below the regression coefficients = calculated (t) value,

** significant at 0.01, * significant at 0.05.

Source: Ministry of Agriculture and Land Reclamation, the Central Administration of Agricultural Economics, Agricultural Economics Bulletin, various issues.

The data of the production (area x yield/feddan) of medicinal and aromatic plants under study tables (1,2,3), clear increase production at the end of the period compared to the beginning where it was at the beginning of the period of 1995 : 6318, 3510,461, 5216,6223 tons while the production in 2009 was about 6976, 379303, 128107, 10105,11886 tons of crops coriander, fennel, anise, caraway, chamomile, respectively, with an average increase of about 10.4%, 8.1%, 178%, 93.7, 91% for the same crops, respectively while cumin production reduced with about 77.4%.

The equation of the general trend overall time of the average production per feddan of these crops during the period (1995-2009), table (5) indicate that there the annual statistically significant increase in

anise and caraway crops being equivalent to a 6909 and 27109 kg representing about 7.6%, 7.11% of the average production which estimated by 91408, 382303 kg, respectively, while the annual rate of decrease in the production of of cumin was about 16904 kg represents about 5.7% of the average production which estimated at 296707 kg. The increase in the productivity, was not statistically significant in the coriander, fennel and chamomile crops. So the work should continue to increase the average production per feddan of cumin, caraway and chamomile, using new technologies through seed improving as well as improving some agriculture practices and various agricultural operations.

Table (5) equations of general time trend of the average production kg/feddan of medicinal and aromatic plants during the period (1995-2009).

Crop	Equation	R ²	Annual rate of change %	Significance
Coriander	$y^{\wedge} = 115.8 + 6011.5 xe$ (0.58-)	0.03	1.05	-
Fennel	$y^{\wedge} = 2563.4 + 74.3 xe$ (1.6-)	0.16	2.35	-
Anise	$y^{\wedge} = 365.1 + 69.9xe$ **(3.5)	0.49	7.6	**
Cumin	$y^{\wedge} = 4323.6 - 169.4 xe$ *(2.2)	0.48	5.7	*
Caraway	$y^{\wedge} = 1647.4 + 271.9 xe$ *(2.2)	0.27	7.1	*
Chamomile	$y^{\wedge} = 92.2 + 6253.3 xe$ (1.1)	0.09	1.3	-

Where: y^{\wedge} : the estimated value of the variable, xe : as independent variable (1, 2, 3, 4 18).

** Significant at the 1% level. * Significant at the 5% level, the value in brackets below the regression coefficients = value of calculated (t).

Source: Ministry of Agriculture and Land Reclamation, the Central Administration of Agricultural Economics, Agricultural Economics Bulletin, various issues.

Second, the relationship between price/ton and cost per ton of the medicinal and aromatic crops:

It was noted in recent years increasing costs /feddan for most agricultural crops and this increase is assumed that there would be a greater increase in the price of the crop in order to continue the production process. It is clear from the equations in Table (6) that increasing the cost of production per ton of fennel with one pound a corresponding significant increase in the farm price was estimated with 3.22 pounds which considered the highest value, while increasing the cost of production per ton of Chamomile with one pound a corresponding significant increase in the farm price was estimated with 0.405 pounds which considered the lowest value. also increasing the cost of production per

ton of coriander with one pound a corresponding significant increase in the farm price was estimated with 2.45 pounds. In addition, increasing the cost of production per ton of anise with one pound a corresponding significant increase in the farm price was estimated with 1.35 pounds, increasing the cost of production per ton of cumin with one pound a corresponding significant increase in the farm price was estimated with 1.59 pounds. Finally if the increased cost of production per ton of caraway was one pound a corresponding significant increase in the farm price was estimated with 0.922 pounds. This reflects the greater flexibility to fennel and less flexibility to caraway.

Table (6) the relationship between the production cost per ton and the price per ton of medicinal and aromatic plants during the period (1995-2009).

Indicators	Equation	R2	F
Coriander	$y^{\wedge} = 432.2 + 2.4 xe$ **(5.8)	0.72	33.1
Fennel	$y^{\wedge} = 416.2 + 3.22 xe$ **(8.7)	0.85	74.8
Anise	$y^{\wedge} = 3394.3 + 1.35 xe$ *(2.3)	0.29	5.36
Cumin	$y^{\wedge} = 6668.5 + 1.095 xe$ *(2.1)	0.25	4.3
Caraway	$y^{\wedge} = 2614 + 0.922 xe$ **(3.8)	0.53	14.4
Chamomile	$y^{\wedge} = 2439.3 + 0.405 xe$ **(0.93)	0.05	0.97

Where y^{\wedge} : the estimated value of the variable, xe : as the independent variable (1, 2,..... 15),
*Significant at the 1% level, *significant at 5%

Source: Tables (2,3).

Third, the relationship between the net revenue /feddan in the preceding year and the cultivated area in the current year:

The net **revenue** is considered to be one of the most important limiting factors for expansion or reduction in the area devoted to agriculture. The net revenue depends on several factors such as yield /feddan and the farm price level for each of the main and secondary outputs, and input prices. It is clear from the study that the net revenue /feddan as an average of the period estimated by 3239.8, 4873, 3565.3, 5105.6 and 1537 pounds /feddan, . Although such figures are supposed to reflect the increase in cultivated area in the next year, but it is clear from the equations of the

overall time trend for the period (1995-2009) (Table 7) that all the crops have not been significantly affected , except for fennel which was significantly increased Such results indicate that there is an inverse relationship between the net revenue on the previous year and the current cultivated area is also the rest of the crops reflect similar inverse relationship except fennel. This confirms that the highest yield of fennel in response to higher farm price greater than the high cost. Moreover, this reflects the existence of a direct correlation between the net revenue for the previous year and area of the crop in the current year. However this tendency was not true for the rest of the other crops where insignificant reductions occurred.

Table (7) the relationship between the net revenue LE/feddan , the preceding year and current area (feddan) of medicinal and aromatic plants during the period (1995-2009).

Indicators	Equation	R ²	F
Coriander	$y^{\wedge} = 15402.6 - 1.23 xe$ (1.29 -)	0.12	1.7
Fennel	$y^{\wedge} = x 991 + 0.387xe$ (-1.7)	0.19	2.8
Anise	$y^{\wedge} = 1768.2 - 0.032 xe$ (0.16-)	0.002	0.03
Cumin	$y^{\wedge} = 8303.2 - 0.719 xe$ * (2.2)	0.28	4.9
Caraway	$y^{\wedge} = 4519.3 - 0.0443 xe$ (1.3 -)	0.12	1.48
Chamomile	$y^{\wedge} = 6246.3 - 0.063 xe$ (0.9 -)	0.19	3.59

Where y^{\wedge} : the estimated value of the variable, x : e as independent variable (1,2,...15), the value in brackets below the regression coefficients = value (t) calculated. * Significant at the 1% level * significant at 5%

Source: Tabular (2,3).

Fourth, indicators of economic efficiency for the medicinal and aromatic crops:

Table (8) shows that, despite the increase in total revenue per feddan of coriander with about 2% in the second period compared to first , and also the increase the third period with about 53.8% compared to the second period, the revenue of every pound invested in the production of the crop was about 1.82 and greater in the first period (1995-1999) than the second and third periods. For fennel crop total revenue per feddan decreased by about 20.6% in the second period compared to the first one, and the decline continued also the third period the with about 5.4% compared to the second period,, the revenue of every pound invested in the production of the crop was approximately 3.67 which was greater in the first period (1995-2000) than the other two periods. With regard to anise crop the total revenue per feddan increased with about 62.2% in the second period compared to the first one , also it was increased at the third period with about 52.7% compared to the second period. The revenue on the invested pound in the production of the crop was about 1.6 greater in the third period (2005-2009) than the other two periods, the first and II. The total revenue per feddan of cumin increase by about 18.5% in the second period compared to the first one , and it was also increased at the third period with about 54.9% compared to the second period, and the revenue of the pound invested in the production of the crop was about 2.06 greater in the third period (2005-2009) than the other two periods. Also the total revenue reported per feddan of caraway was increased by about 6.3% in the second period compared to the firestone while it was also

increased at the third period with about 11.3% compared to the second period, and the revenue of the pound invested in the production of the crop was about 1.65 greater in the third period (2005-2009) than the periods first and second. Finally the total revenue per feddan of the chamomile crop increased with about 11.5% in the second period compared to the first , and it was also increased at the third period with about 29.3% compared to the second period, and the revenue on pound invested in the production of the crop was about 0.6 greater in the third period (2005-2009) than the other two periods

Fifth, the economic stability of the Egyptian exports of the medicinal and aromatic crops:

This section discusses the determination of the coefficient of instability factor (Dominick , S., Statistics and Econometrics, Mc. Graw Hill, Publisher , New York , 1982 .) for each of the quantity and price and the value of Egyptian exports of the crops in the study using the percentage of the average deviation according to this method is the coefficient of instability could be calculated through the following equation:

$$S = \frac{|y - \hat{y}|}{\hat{y}} * 100$$

Where: Y = the actual value of the variables of the study, \hat{Y} = estimated value of the variables of the study.

It should be noted that according to this method the greatest stable variables when the coefficient is closer to the value of zero.

1 – **Coriander**: Table (9) shows that the coefficient of instability of the quantity of exports of coriander for

the years 1996, 1997 and 1998 was more stable for the exported quantities of the crop in tons where it reached about 5.6, 3.4, 2.7 respectively for the period (1995 to 2009). Also it is noted that the years of 1998, 2005 and 2007 were more stable for the export price (pounds/ton) of the crop where it reached about 11.06, 5.8, 12.3, respectively. In addition it was found that the years

1995, 1996 and 1998 were more stable to the value of exports (1000LE), reaching about 4.6, 2.06, 6.7, respectively for the corresponding years. Finally, the results indicate that the overall exports were more stable than the export price and the value of exports of coriander, which represented about 24.3, 29.4, 28.6, respectively.

Table (8) Comparison of the economic efficiency indicators of the most important medicinal and aromatic plants during the years of the period (1955-2009).

Crop Indicators	Coriander	Fennel	Anise	Cumin	Caraway	Chamomile
1999-1995 Total revenue	3250.2	9013.3	2330.7	4104.4	3364.7	2838.2
Total costs	1152.2	1928.6	1298.6	1508.76	1333.1	2505.1
Net revenue	2098	7084.7	1032.1	2595.6	2031.6	333.1
Total revenue / variable costs	3.6	5.4	2.2	3.3	3.1	1.3
Total revenue total costs/	2.82	4.67	1.79	2.72	2.52	1.13
Revenue of the invested pound	1.82	3.67	0.79	1.72	1.52	0.13
2004-2000- Total revenue	3316.8	7152.8	3779.5	4865	3575.7	3164.3
Total costs	1346.6	1798.9	1641.6	1958.1	1350.2	2574.4
Net revenue	1970.2	5353.9	2137.9	2906.9	2225.5	589.9
Total revenue / variable costs	3.9	5.5	3.3	3.3	4.2	1.5
Total revenue total costs/	2.46	3.98	2.3	2.48	2.65	1.23
Revenue of the invested pound	1.46	2.98	1.3	1.48	1.65	0.23
2009-2005 Total revenue	5102.3	6767.3	5769.8	7536.2	3978.8	4092
Total costs	1862.5	1894.3	2204.6	2430.5	1825.7	2556
Net revenue	3239.8	4873	3565.2	5105.6	2153.1	1537
Total revenue / variable costs	5.5	6.2	4.5	5.1	3.7	2.5
Total revenue total costs/	2.74	3.58	2.6	3.06	2.19	1.6
Revenue of the invested pound	1.74	2.58	1.6	2.06	1.19	0.6

Source: collected and calculated from the data in tables (1.2, 3)

2 - Fennel:

Table (9) shows that the years 1995, 1996 and 2007 were more stable for the quantity of the crop exported (ton), where the coefficient of instability was about 88.5, 86.3, 86.6 respectively for the period (1995-2009). However, in 1995 it was the most stable regarding the export price (pounds/ ton), reaching about 78.5 during the study period. The years 1997, 1998 and 2009 were more stable due to the value of export of the crop (1000LE), reaching about 1.5, 0.5 and 3.9 respectively during this period. The data also show that the value of exports were more stable than the export price and the value of exports which represented about 80.4, 581.7, 29.9, respectively.

3 - Anise:

Data in table (9) that the coefficient of instability for the quantity of exports of anise in tons for the years 1995, 2007 and 2009; the first and third periods were more stable for the quantity exported where it reached about 2.6, 2.3, 0.6 respectively during the period from (1995-2009). Meanwhile, it is clear that the years 2003, 2005 and 2009 in the second and third periods were more stable export price of the crop (pounds/ ton), where the coefficient of instability was about 10.4, 8.2, 0.2 respectively during corresponding years through the study period. The data in the same table show that the years 1999, 2000, 2009 were more stable to the value of exports (1000LE), reaching 8.2, 9.3, 0.01, respectively

during the study period .The data also show that the value of exports were more stable than the export price

and the value of exports which represented about 23.7, 30.5 0.37, respectively.

Table (9) The coefficient of instability for coriander, fennel and anise crops in Egypt during the period (1995-2009).

Years	Coriander			Fennel			Anise		
	Quantity of exports	Price /ton. LE	Value of exports	Quantity of exports	Price /ton. LE	Value of exports	Quantity of exports	Price/ Ton .LE	Value of exports
1995	15.9	65	4.6	88.5	78.5	86.1	2.6	45.9	68.6
1996	5.6	21.3	2	86.3	166	95.5	28.9	71.4	30.9
1997	3.4	21.6	17	93.6	385.7	1.5	12.6	32.3	20.5
1998	2.7	11	6.7	92.3	652.5	5	55.4	16.9	86
1999	13	21.9	23	92.8	2440	32.3	26.8	28.4	8.2
Average	8.1	28.2	10.7	90.7	744.5	44.1	25.3	39	42.8
2000	51.3	35	14.7	93.1	1440	35.6	12.1	19.3	9.3
2001	10	33.2	28.7	93.2	580	50.3	19.6	47.1	58
2002	12.5	39.9	20	92.7	475	42.7	6.8	31.4	36.9
2003	38	26	46.6	92.7	527.3	10.8	57.9	10.4	53.7
2004	38.7	57.2	9	90.7	485.7	20.1	33.3	42.4	61.9
Average	30.1	38.3	23.8	92.5	701.6	31.9	25.9	30.1	44
2005	29.9	5.8	19.4	91.3	388.2	4.7	52.6	8.2	40.5
2006	26.3	41.4	55.6	91.1	350	6.5	2.3	17.8	15.1
2007	51.3	12.3	12.6	86.6	339.1	47.6	28.3	11.9	15
2008	3.7	29.4	117	91.5	351.9	5.6	15.7	74.4	50.4
2009	61.7	20	52.9	91.2	309.8	3.9	0.6	0.2	0.01
Average	34.6	21.8	51.5	90.3	347.8	13.7	19.9	22.5	24.20
G. Average	24.3	55.5	30.7	80.4	581.7	29.9	23.7	30.5	37

Source: Central Agency for Public Mobilization and Statistics, Database of foreign trade.

4 - Cumin:

Table (10) shows that the coefficient of instability of the quantity of exports of coriander for the years 1998, 2005 and 2009 were more stable for the quantity exported from the crop in tons where it reached about 3.01, 1, 0.01, respectively during the period (1995-2009). While the data show that the years 1998, 2003 and 2009 were more stable for the export price of the crop (pounds/ ton), where the coefficient of instability was about 8.7, 4.6, 0.2 respectively during the study period. Also the data revealed that the years 1995, 1996 and 2004 were more stable to the value (1000LE) reaching 6.4, 3.1, 5.8 respectively during the period. Finally, the results indicate that the overall exports were more stable than the export price and the value of exports were about 23, 35.9, 40.3, respectively.

5 – Caraway:

Table (10) shows that the coefficient of instability of the quantity of exports of caraway in tons for the years 1995, 2000 and 2009 was more stable for the quantity exported from the crop in tons where it reached about 4.6, 3.6, 4.7 respectively during the period (1995 - 2009). While the data show that the years 2009, 2008 and 2002 was the most stable regarding the export price

(pounds/ ton) reaching about 0.82, 2.06, 2.24 respectively during the study period. Also it can be noticed that the years 1998, 2000 and 2001 were more stable due to the value of export of the crop (1000LE), reaching 90.5, 99.2, 99.3 respectively during this period. Finally, the results indicate that the average export price was more stable than the quantity of exports and export value of caraway crop, where it reached 15.7, 23.7, 99.1, respectively.

6 - Chamomile:

Table (10) shows that the coefficient of instability of the quantity of exports of caraway in tons for the years of the third period 2007, 2008 and 2009 was more stable for the quantity exported from the crop in tons where it reached about 1.086 1.37, 1.080, respectively during the period (1995-2009). While it became clear that first period years (1996, 1997, 1998) were more stable in terms of export price of the chamomile and reached about 0.11, 13.9, 16.6 respectively during this period. Whereas the years (1995, 1998, 2003) in the first and second periods were more stable to the value of exports of the crop (1000LE) and reached about 24.2, 17.2, 0.8 respectively during the study period. The data also show that the value of exports were more stable

than the export price and the value of exports of chamomile which represented about 12.8, 32.2, 40.1, respectively.

Table (10) The coefficient of instability for cumin, caraway and chamomile crops in Egypt during the period (1995-2009).

Years	Cumin			Caraway			Chamomile		
	Quantity of exports	Price /ton. LE	Value of exports	Quantity of exports	Price /ton. LE	Value of exports	Quantity of exports	Price /ton. LE	Value of exports
1995	19.9	70.8	6.4	4.6	34.5	100	6.7	34.4	24.2
1996	8.9	15	3	46	11.6	101	43.2	0.11	40.7
1997	5.3	57	17.6	55.9	25.8	100	28	13.9	42.8
1998	3	8.7	6.9	26.5	26.4	90.5	1.7	16.6	17.2
1999	11.5	30.4	23.6	55.8	46.7	99.5	0.2	23.7	25.8
Average	9.7	36.4	11.5	37.76	29	98.2	16	17.7	30.1
2000	57.4	47.4	13.2	3.6	25.7	99.2	4	14.9	41
2001	3.8	49.4	30	0.9	15.7	99.3	26.3	35.9	54
2002	24	56.9	21.8	7.6	2.24	99.4	14	34.3	45
2003	29	49	48	7.7	15	99.4	20	26.8	0.8
2004	26.4	4.6	5.8	59.7	7.3	99.3	25.5	49	83.5
Average	28.1	41.5	23.8	15.9	13.18	99.32	18	32.2	44.9
2005	10.8	31.4	22	23.5	12.7	99.7	10.5	55.9	37.4
2006	1	62.9	57	16.7	5	99.7	8.4	78.7	91.5
2007	54.3	22	45.4	34.4	4	99.6	1.086	32.2	31.9
2008	89.4	98.4	195	8.4	2.06	99.7	1.3	35.3	34.5
2009	0.005	0.001	43	4.6	0.82	99.7	1.08	31.7	30.7
Average	31.1	42.9	72.5	17.52	4.9	99.68	4.5	46.8	45.2
G Average	23	40.3	35.9	23.7	15.7	99.1	12.8	32.2	40.1

Source: Central Agency for Public Mobilization and Statistics, a database of foreign trade.

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