



## **An Economic Study of the Impact of the Agricultural Price Policy on Medicinal and Aromatic Plants in Egypt**

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**Abstract:** The research problem is that despite the economic importance of medicinal and aromatic plants in Egypt and the increase in global demand for them, but they did not get enough attention as it is noticed that the cultivated areas of the crops under study are still limited and not commensurate with the economic importance of these crops. The research aims to shed light on the efficiency of the productive and economic performance of the crops under study, and this is done by identifying the productive and economic indicators of the study crops, studying the policy analysis matrix for the crops. The indicators of production and economic efficiency of the crops in the sample of study. Identifying the most important production and marketing problems that farmers face and proposals to overcome them. A multi-stage cluster sample was selected from the study population, where the first stage included dividing the governorate into centers and selecting the two largest centers for the crops according to the relative importance of the cultivated area during the average period (2017-2019). The Bella and Al. hamul center in Kafir El-sheikh governorate were selected for Caraway Crop. And the centers of Etsa and Yusef Al-Siddiq in Fayoum governorate fennel. And the centers of Abnoub, and Al-Fath in Assiut governorate for basil. And the centers of Yusef Al-Siddiq, Eshway in Fayoum governorate for of wormwood. While in the second stage, the two largest villages were selected from each of the sample centers, and in the third stage, the sample items were randomly selected, and the size of the selected sample reached 160 farmers with 20 individuals from each center. The production problems that facing farmers in the study sample are Confined to the high costs of production inputs, the high costs of performing agricultural operations, the small size of agricultural holdings and their dispersion, so the service operations are difficult, the absence of the agricultural extension role of awareness and guiding farmers, the spread of diseases as a result of repeated the cultivation in The land, So that the return decreases. the lack of crop rotation, and the farmer's Un familiarity that with the crop export importance. The marketing problems facing the farmers of the sample are Confined to the merchants' monopoly on the exploitation farmers by purchasing the crop at the lowest prices, the high marketing costs of the crop, the shortage of data and marketing information for farmers. and the lack of factories for the manufacture of medicinal and aromatic plants, which contributes to the high added value of the crop. Then the increase in its export value, and the absence of marketing cooperatives.

[Doaa Samir Mohamed Morsy Ahmed and Amal Abd El Menam Abd El Hamed Mohamed. **An Economic Study of the Impact of the Agricultural Price Policy on Medicinal and Aromatic Plants in Egypt.** *World Rural Observ* 2020;12(2):98-110]. ISSN: 1944-6543 (Print); ISSN: 1944-6551 (Online). <http://www.sciencepub.net/rural>. 10. doi:[10.7537/marswro120220.10](https://doi.org/10.7537/marswro120220.10).

**Keyword:** Production efficiency, Economic efficiency, Policy analysis matrix, production costs, vested pound profitability, Marginal surplus.

### **1. Introduction:-**

Medicinal and aromatic plants are considered as non-traditional promising crops that can contribute significantly to increase the state's foreign exchange earnings, and thus improving the trade balance, especially in shade of the continuous increase of global demand, as they are considered one of the most important strategic materials that enter the pharmaceutical industry. the food industries, the manufacture of fragrances and perfumes, and cosmetics, In addition to that the manufacture of pesticides, and the multiplicity of medicinal and aromatic plants use contributed to the creation of large

markets for medicinal and aromatic plants, where the volume of trade in the global markets exceeds about 60 billion dollars annually, Egypt has about 24.60 million dollars, representing about 0.09% of total Egyptian agricultural exports, which amounted about 26.28 billion dollars during the average period (2015/2019).

The strategy for agricultural development in Egypt 2030 aims to achieve maximum productivity of medicinal and aromatic plants, and work to increase the cultivated area of the new the newly reclaimed

lands, in addition to increasing interest in developing post-harvest Treatments, especially drying, preparation, processing, sterilization and packaging, with the aim of improving quality and reducing pollution level, So farmer's income increase.

### Research problem

Despite the economic importance of medicinal and aromatic plants in Egypt and the increase of global demand, they did not get enough attention despite Egypt enjoying with vantage comparative in their production, in terms of the availability of appropriate conditions for their cultivation, and the expansion of their cultivation, especially in the newly and desert lands, but it is noticed that the crops cultivated areas are still limited and not commensurate with the economic importance of these crops, the statistics data indicate that the cultivated area of medicinal and aromatic plants in Egypt amounted to about 95.34 thousand feddans, representing about 0.60% form area which representing about 1.59 million feddans. And the crops cultivated areas, which are caraway, fennel, basil, wormwood reached about 31.11 thousand feddans, representing about 32.64% form the total area of medicinal and aromatic plants.

During the average period 2016-2018, which necessitates the horizontal expansion by increasing the cultivated area, especially since these crops contribute to reduce the costs of crops that follow them. The vertical expansion by increasing the feddan productivity of the crops, to achieve the desired and outcome level so that Egypt can increase the volume of agricultural exports medicinal from aromatic plants are the subject of study. Increasing the country's foreign exchange earnings and thus improving the trade balance.

### Objective:

The main objective of the research is to shed light on the efficiency of the productive and economic performance of the crops under study, and this is done by studying the following:

- 1- Identify the features and production indicators of the study crops.
- 2- Identify the most important economic indicators of study crops in Egypt.
- 3- Study the policy analysis matrix for the crops study in Egypt.
- 4 -Study the costs of producing medicinal and aromatic plants for crops with the sample of the study.
- 5 -Indicators of productive economic efficiency of crops with the sample of the study.
- 6- The most important production problems facing farmers and proposals to overcome them.

## 2. Method and Data Sources:

The research used descriptive and quantitative statistical analysis methods using mathematical and

statistical methods such as arithmetic average, percentage, and analysis of simple regression in different forms, in addition to using the policy analysis matrix, as well as calculating indicators of the productive and economic efficiency of the crops. The research was based on two sources, the first one was published and unpublished secondary data from the economic affairs sector of the Ministry of Agriculture and Land Reclamation, the Central Authority for Public Mobilization and Statistics, and the directorates of agriculture in the governorates of Kafr Al-Sheikh, Assiut and Fayoum. In addition to that data contained in the research and studies related to the subject of research. The second source was the preliminary data of The study conducted in the aforementioned provinces compiled through a specially designed questionnaire.

### The Study Sample:

A multi-stage cluster sample was selected from the study population, as the first stage included dividing the governorate into centers and selecting the largest two centers for the crops according to the relative importance of the cultivated area during the average period (2017-2019). The two centers in terms of the cultivated area with Caraway in Kafr El-Sheikh governorate are the center of Bella and Al-Hamoul, where about (2.92 and 1.94) thousand feddans were planted in them, representing about (55.01% and 36.55%) of the total cultivated area planted in caraway in the governorate, which amounts about 5.30 thousand feddan.

The highest two centers in terms of the cultivated area planted with fennel in Fayoum governorate were also chosen, there are the center of Etsa and Yusuf Al-Siddiq, where about (0.82,0.74) thousand feddans were planted in them, representing about (36.73% and 32.95%) of the total cultivated area with fennel in the governorate, which amounted about 2.24 thousand feddans.

The highest two centers in terms of the cultivated area with basil in Assiut governorate were chosen, there are Abnoub and Al-Fath, where about (3.41,0.03) thousand feddans were planted in them, representing about (66.95% and 0.62%) of the total cultivated area with basil in the governorate, which amounted to about 5.09 thousand feddans.

The highest two centers in terms of the cultivated area with wormwood in Fayoum governorate are Yusef Al-Siddiq Center and Eshway, where about (4.85 and 4.16) thousand feddans were planted in them, representing about (39.43% and 33.82%) of the total cultivated area with wormwood and chamomile in the governorate, which amounted to about 12.30 thousand feddans. While in the second stage, the largest two villages were selected from each of the sample centers, and in the third stage, the sample

items were randomly selected, and the size of the selected sample reached 160 farmers with 20 individuals from each center.

### 3. Results:

#### First: productivity indicators of the study crops

Table (1) shows the productivity indicators of study crops in Egypt during the period (2007-2018) as it becomes clear from following becomes clear:-

##### 1-Caraway crop

- The general average of the cultivated area from caraway in Egypt was about 7.90 thousand feddans, and the minimum cultivated area reached about 3.51 thousand feddans in 2014, with a decrease percentage about 55.53% from the general average for the study period, and the upper limit of the cultivated area of the crop was about 19.25 thousand feddans in 2018, with an increase about 143.68% over the general average. The estimation of the general time trend equation in Table (2) showed an increase in the cultivated area with caraway, by an annual statistically significant amount about 730 feddans.

- The average productivity per feddan of caraway was about 0.836 tons / feddan annually during the study period, and the minimum was about 0.573 tons in 2008, and the upper limit was about 1.426 tons in 2013. Estimating the general time trend equation in Table (2) showed Increase in the feddan productivity by an annual rate approximately 0.018 tons. The significance of this increase has not been proven which means the relative stability of the feddan productivity around the arithmetic mean.

- The average total production of caraway during the study period was about 6.79 thousand tons annually during the study period, and the minimum reached about 3.172 tons in 2013, with a decrease estimated at 53.29%, while the upper limit reached about 17.33 thousand tons in 2018, with an increase about 155.25% over the general average. The estimation of the general time trend equation in Table (2) showed an increase in total production by a significant annual amount about 773.37 tons.

##### 2-Fennel crop

- The general average of the cultivated area from fennel in Egypt was about 2.95 thousand feddans, and the minimum area cultivated with the crop reached about 1.569 thousand feddans in 2014, a decrease about 46.95% from the general average for the study period, and the upper limit of the cultivated area of the crop reached about 4.52 thousand feddans in 2018, an increase about 52.94% over the general average. The estimation of the general time trend equation in Table (2) showed an increase in the cultivated area with fennel by an annual amount about 101.81 feddans. The significance of this increase was not proven,

which means the relative stability of the cultivated area around the arithmetic average.

- The average productivity per feddan of fennel was about 1.24 tons / feddan annually during the study period, and the minimum reached about 1.026 tons in 2010, and the upper limit was about 1.319 tons in 2014. The estimation of the general time trend equation in Table (2) shown an increase in feddan productivity by an annual rate about 0.018 tons. The significance of this increase has not been proven, which means that the feddan productivity is relatively stable around the arithmetic average.

- The average total production of fennel during the study period was about 3.73 thousand tons annually during the study period, and the minimum reached about 2,070 tons in 2014, with a decrease estimated at 44.48%, while the upper limit reached about 5.84 thousand tons in 2018, with an increase about 56.79 % over the general average. The estimation of the general time trend equation in Table (2) showed an increase in total production by a significant annual amount about 773.37 tons, and the significance of this increase was not proven, which means the relative stability of total production around the arithmetic average.

##### 3-Basil Crop:

- The general average of the cultivated area with basil in Egypt was about 7.06 thousand feddans, and the minimum cultivated area reached about 4.76 thousand feddans in 2008, a decrease about 32.67% of the general average for the study period, and the upper limit of the cultivated area of the crop reached about 10.29 thousand feddans in 2018, an increase about 45.69% over the general average. The estimation of the general time trend equation in Table (2) showed an increase in the cultivated area with basil by an annual statistically significant amount about 282.10 feddans.

-The average productivity per feddan of basil reached about 19.51 tons / feddan annually during the study period, and the minimum reached about 17.60 tons in 2007, and the upper limit reached about 21.34 tons in 2018. The estimation of the general time trend equation in Table (2) shown an Increase feddan productivity by an annual rate about 0.142 tons. The significance of this increase has not been proven, which means the relative stability of feddan productivity around the arithmetic average.

-The average total production of basil during the study period was about 154.57 thousand tons annually during the study period, and the minimum reached about 118.94 tons in 2008, with a decrease estimated at 23.05%, while the upper limit reached about 186.84 thousand tons in 2018, with an increase about 24.16% over the general average. The estimation of the general time trend equation in Table (2) showed an

increase in total production by a significant annual amount about 1.48 thousand tons, and the significance of this increase was not proven, which means the relative stability of total production around the arithmetic average.

#### -4Wormwood crop:

-The general average of the cultivated area with wormwood in Egypt was about 11.17 thousand feddans, and the minimum cultivated area with the crop reached about 8.76 thousand feddans in 2013, with a decrease about 21.57% of the general average for the study period, and the upper limit of the cultivated area of the crop about 15.92 thousand feddans in 2018, an increase about 42.49% over the general average. The estimation of the general time trend equation in Table (2) showed an increase in the cultivated area with wormwood by an annual statistically significant amount of about 466.12 feddans.

-The average productivity per feddan of wormwood was about 0.914 tons / feddan annually during the study period, and the minimum reached about 0.520 tons in 2015, and the upper limit was about 1.51 tons in 2017. The estimation of the general time trend equation in Table (2) shown an increase in feddan productivity by an annual rate about 0.036 tons. The significance of this increase was not proven, which means that the feddan productivity is relatively stable around the arithmetic average.

-The average total production of wormwood during the study period was about 9.74 thousand tons annually during the study period, and the minimum reached about 7.31 tons in 2007, with a decrease estimated at 24.87%, while the upper limit reached about 14.22 thousand tons in 2017, with an increase about 46.05% of the general average. The estimation of the general time trend equation in Table (2) showed an increase in total production by a significant annual amount about 497.91 tons.

**Table (1): Production developments for caraway, fennel, basil and chamomile in Egypt during (2007-2018).**

Years	Caraway			Fennel			Basil			wormwood		
	Area (Fed.)	Yield (Ton/Fed.)	Production (tons)	Area (Fed.)	Yield (Ton/Fed.)	Production (tons)	Area (Fed.)	Yield (Ton/Fed.)	Production (tons)	Area (Fed.)	Yield (Ton/Fed.)	Production (tons)
2007	5545	0.788	4367	3736	1.429	5338	6016	17.61	151563	8793	0.74	7315
2008	4544	0.573	3249	2649	1.223	3239	4758	19.63	118942	9304	0.861	7588
2009	7606	0.768	6287	2089	1.254	2619	8033	19.62	191919	11502	0.843	9700
2010	12150	0.671	9536	2667	1.027	2738	6355	18.23	150959	10236	0.866	8873
2011	5196	0.72	3983	2906	1.131	3287	6695	19.59	146625	10038	0.858	8612
2012	4427	0.88	3816	2935	1.212	3556	6536	20.28	158481	11549	0.866	10004
2013	3713	1.426	3172	2087	1.233	2574	5700	20.02	145995	8763	0.853	7475
2014	3514	0.908	3189	1569	1.319	2070	7986	20.27	166658	11099	0.869	9642
2015	6379	0.881	5621	1943	1.319	2562	6576	18.26	123058	9136	0.521	7585
2016	7837	0.601	6994	4030	1.274	5136	7091	20.78	142509	12661	0.929	11763
2017	14653	0.86	13939	4355	1.235	5778	8764	18.46	171404	15071	1.51	14220
2018	19254	0.952	17333	4523	1.259	5846	10296	21.34	186842	15920	1.251	14056
Average	7902	0.84	6791	2957	1.24	3729	7067	19.5	154580	11173	0.91	9736

**source:** The data collected and calculated from the Ministry of Agriculture and Land Reclamation, Central Administration of Agricultural Economy, agricultural economy bulletin, various issues.

**Table (2): Statistical indicators of developments in the crops of caraway, fennel, basil and wormwood in Egypt during the period (2007-2018).**

Statement	Variables	Coefficient (a)	Coefficient (b)	calculated value (t)	Determination coefficient ( $T^2$ )	The computed (q) value	growth rate (%)
Caraway	Area (Fed.)	3156.5	730	*(1.99)	0.28	3.97*	9.24
	Yield (Ton/Fed.)	0.713	0.018	-1.01	0.1	1.02	2.15
	Production (tons)	1763.6	773.4	*(2.41)	0.37	5.81*	11.39
Fennel	Area (Fed.)	2295.6	101.8	-1.26	0.14	1.59	3.44
	Yield (Ton/Fed.)	1.23	0.001	-0.172	0.002	0.03	0.08
	Production (tons)	2807.1	141.8	-1.24	0.13	1.55	3.8
Basil	Area (Fed.)	5233.5	282.1	(2.94)**	0.46	8.64**	3.99
	Yield (Ton/Fed.)	18.58	0.142	-1.58	0.2	2.52*	0.728
	Production (tons)	144978	1477	-0.78	0.1	0.61	0.955
Wormwood	Area (Fed.)	8142.9	466.1	(3.20)**	0.5	10.22**	4.17
	Yield (Ton/Fed.)	0.678	0.036	-1.96	0.28	3.85*	3.93
	Production (tons)	6499.7	497.9	(3.45)**	0.54	11.92**	5.11

**Source:** Compiled and calculated from table (1) at search.

-The average productivity per feddan of wormwood was about 0.914 tons / feddan annually

during the study period, and the minimum reached about 0.520 tons in 2015, and the upper limit was

about 1.51 tons in 2017. The estimation of the general time trend equation in Table (2) An increase in feddan productivity by an annual rate about 0.036 tons, and the significance of this increase was not proven, which means that the feddan productivity is relatively stable around the arithmetic average.

-The average total production of wormwood during the study period was about 9.74 thousand tons per year during the study period, and the minimum reached about 7.31 tons in 2007, with a decrease percentage estimated at 24.87%, while the upper limit reached about 14.22 thousand tons in 2017, with an increase about 46.05% of the general average. The estimation of the general time trend equation in Table (2) showed an increase in total production by a significant annual amount about 497.91 tons.

### Second: The Geographical distribution and the relative importance of the crops under the study in Egypt:-

Table (3) showed the geographical distribution of the cultivated area, the feddan productivity and the

total production of the study crops in Egypt during the average period (2016-2018), and the following shows:

- Caraway cultivation is concentrated in five governorates with a total area about 12.06 thousand feddans, representing about 86.69% of the total cultivated area with caraway of the Arab Republic of Egypt, which is about 13.91 thousand feddans during the study period, and these governorates are Kafr El Sheikh, Minya, Fayoum, Beheira, and Assiut. These governorates contributed with an area of about 28.62%, 18.48%, 17.14%, 15.83% and 6.63% for each of them, respectively, of the total cultivated area of caraway, as it was evident that the feddan productivity of caraway in Fayoum governorate reached about 1,130 tons / feddan, while it decreased in Kafr El-Sheikh, where it reached about 0.715 tons / feddan. These five governorates contributed about 86.96% of the total production of caraway in Egypt, which amounted to about 12.75 thousand tons during the average study period.

**Table (3): the geographical distribution of cultivated area, feddan productivity, and total production of study crops in Egypt during the average period (2016/2018).**

Crop	Provinces	Area	%	Yield	%	Production	%
		fed.		Tons /fed.		Tons	
Caraway	Kafr El Sheikh	3980.67	28.62	0.715	80.45	2801.33	21.96
	Menia	2570.33	18.48	0.94	105.67	2422.67	19
	Fayoum	2383.67	17.14	1.13	127.05	2706.33	21.22
	Behairah	2202.67	15.83	0.843	94.78	1854.33	14.54
	Assuit	921.67	6.63	0.864	97.18	1307	10.25
	<b>Total</b>	<b>13910.3</b>	<b>100</b>	<b>0.889</b>	<b>100</b>	<b>12754</b>	<b>100</b>
Fennel	Fayoum	2079.33	50.55	1.239	100.97	2579	48.09
	Qena	1153.33	28.04	1.409	114.86	1637	30.53
	Assuit	547.67	13.31	1.583	128.99	859	16.02
	<b>Total</b>	<b>4113.67</b>	<b>100</b>	<b>1.227</b>	<b>100</b>	<b>5362.33</b>	<b>100</b>
Basil	Assuit	3996	48.26	18.375	100.83	78632	49.9
	Beni Suef	3626	43.79	17.445	95.73	65867.67	41.8
	Menia	366.67	4.43	18.833	103.34	6750	4.28
	<b>Total</b>	<b>8279.67</b>	<b>100</b>	<b>18.224</b>	<b>100</b>	<b>157587</b>	<b>100</b>
Wormwood	Fayoum	11612.33	79.81	0.869	70.72	10103	75.7
	Beni Suef	2777.33	19.09	1.412	114.83	3206	24.02
	<b>Total</b>	<b>14550.7</b>	<b>100</b>	<b>1.229</b>	<b>100</b>	<b>13346.3</b>	<b>100</b>

**Source:** The data collected and calculated from the Ministry of Agriculture and Land Reclamation, Central Administration of Agricultural Economy, agricultural economy bulletin, various issues for the period (2016-2018).

-Fennel cultivation is concentrated in three governorates, with a total area about 3.78 thousand feddans, representing about 91.89% of the total cultivated area with fennel of the Egypt, amounting about 4.11 thousand feddans during the study period, and these governorates are in Fayoum, Qena and Assiut. These governorates have contributed an area of about 50.55%, 28.04%, and 13.31% for each of them, respectively, of the total cultivated area from

fennel, and the feddan productivity has reached about (1,239, 1,409, 1,583) tons /feddan for each of them respectively, and these governorates have contributed about 94.64% of the total production of fennel in Egypt, which is about 5.36 thousand tons during the average study period.

-The cultivation of basil is concentrated in three governorates, with a total area about 7.99 thousand feddans, representing about 96.48% of the total

cultivated area with basil of the Egypt, which is about 8.28 thousand feddans during the study period, and these governorates are in Assiut, BeniSuef, and Minya. These governorates contributed with an area of 48.26%, 43.79% and 4.43% each, respectively, of the total cultivated area from basil, and the feddan productivity reached about (18.375, 17.445, and 18.83) tons/feddan for each of them, respectively, and these governorates contributed about 95.98% of the total production of basil in Egypt, which is about 157.59 thousand tons during the average study period.

-The cultivation of wormwood is concentrated in two governorates with a total area about 14.39 thousand feddans, representing about 98.89% of the total cultivated area with wormwood of the Egypt, which is about 14.55 thousand feddans during the study period. The governorate of Fayoum and BeniSuef contributed with an area of about 79.81%, 19.09 % Of the total cultivated area of wormwood and chamomile, with productivity per feddan amounting about (0.869 and 1.412) tons /feddan for each of them respectively, and these governorates contributed about 99.72% to the total production of wormwood and chamomile in Egypt, which is about 13.35 thousand tons during the average study period.

### **Third: The development of the most important economic returns of the crops under study in Egypt:**

The data of Table (4.5) showed the development of the most important economic returns of the study crops in Egypt during the period (2007-2018) where the following becomes clear:

#### **1-Caraway crop:**

-The average agricultural price per ton of caraway in Egypt was about 9.59 thousand pounds, with a minimum amount about 4.79 thousand pounds in 2007, and a maximum about 29.07 thousand pounds in 2018, and the price of a ton of caraway in 2017/2018 increased significantly over years studying. The estimation of the general time trend equation showed an increase in the agricultural price of caraway seeds by a statistically significant annual amount about 1.72 thousand pounds / ton.

-The average total costs of caraway were about 3.79 thousand pounds, with a minimum amount about 1.73 thousand pounds in 2007, and a maximum about 9.64 thousand pounds in 2018, and the total costs of caraway in the years 2017/2018 increased significantly over the years of studied. The estimation of the general time trend equation showed an increase in the total caraway costs by an annual statistically significant amount about 549.8 pounds.

-The average total return was about 8.58 thousand pounds during the study period, with a minimum about 3.69 thousand pounds in 2008, and a maximum about 27.91 thousand pounds in 2017. As

indicated by the estimation of the general time trend equation, the total return of caraway has increased by a statistically significant annual amount. about 1.67 thousand pounds.

- The average return over variable costs amounted about 6.40 thousand pounds during the study period, with a minimum amount about 2.45 thousand pounds in 2008, and a maximum about 24.35 thousand pounds in 2017. As evidenced by the estimation of the general time trend equation, the total return of caraway increased by a statistically significant annual amount, about 1.38 thousand pounds.

- The average net return was about 4.79 thousand pounds during the study period, with a minimum amount about 1.66 thousand pounds in 2008, and a maximum about 20.19 thousand pounds in 2017. As evidenced by the estimation of the general time trend equation, the total return of caraway has increased by a statistically significant annual rate about 1.13 thousand pounds.

-The average return on the invested pound was about 1.01 pounds during the study period, with a minimum about 0.40 pounds in 2015, and a maximum about 2.62 pounds in 2017. As evidenced by the estimation of the general time trend equation, the total return of caraway has increased by an annual, statistically insignificant amount about 0.05 pounds, and the significance of this increase was not proven, which means that it is relatively stable around the arithmetic average.

#### **2-Fennel crop:**

-The average farm price per ton of fennel in Egypt was about 6.65 thousand pounds, with a minimum about 4.34 thousand pounds in 2007, and a maximum about 8.49 thousand pounds in 2018. As evidenced by the estimation of the general time trend equation, the increase in the agricultural price of fennel by a statistically significant annual amount about 281.85 pounds / ton.

-The average total costs of fennel amounted to about 3.80 thousand pounds, with a minimum amount of about 1.84 thousand pounds in 2007, and a maximum of about 9.74 thousand pounds in 2018. As evidenced by the estimation of the general time trend equation, the total costs of fennel increased by a statistically significant annual amount of about 529.74 pounds.

-The average total return was about 8.21 thousand pounds during the study period, with a minimum amount about 6.21 thousand pounds in 2007, and a maximum about 11.23 thousand pounds in 2017. As evidenced by the estimation of the general time trend equation, the total return of fennel increased by a statistically significant annual amount about 378.55 pounds.

-The average return over variable costs was about 6.02 thousand pound during the study period, with a minimum amount about 5.14 thousand pounds in 2007, and a maximum amount about 8.12 thousand pounds in 2017. As indicated by the estimation of the general time trend equation, the total return of fennel increased by an annual amount of about 86.28 pounds, and this increase was not statistically proven to be significant, which means its relative stability around the arithmetic mean.

-The average net return was about 4.41 thousand pounds during the study period, with a minimum amount about 1.29 thousand pounds in 2018, and a maximum about 5.34 thousand pounds in 2008. As evidenced by the estimation of the general time trend equation, the total yield of fennel decreased by a statistically insignificant annual rate. It is around 15.2 pounds, which means its relative stability around the arithmetic mean.

-The average return on the invested pound was about 1.52 pounds during the study period, with a minimum amount about 0.13 pounds in 2018, and a maximum amount about 2.63 pounds in 2008. As evidenced by the estimation of the general time trend equation, the total return of the fennel increased by an annual statistically significant amount about 0.19 pounds.

### 3- Basil crop:

- The average agricultural price per ton of basil in Egypt was about 540.50 pound, with a minimum amount about 206 pounds in 2007, and a maximum amount about 762 pounds in 2018. As evidenced by the estimation of the general time trend equation, the increase in the agricultural price of basil by an annual statistically significant amount about 44.89 pound/ton.

-The average total costs of basil were about 4.29 thousand pound, with a minimum amount about 2.39 thousand pound in 2007, and a maximum about 8.37 thousand pound in 2018. As evidenced by the estimation of the general time trend equation, the increase in the total costs of basil by an annual statistically significant amount about 470.18 pound.

-The average total return was about 11.77 thousand pounds during the study period, with a minimum amount about 5.35 thousand pounds in 2007, and a maximum amount about 15.94 thousand pounds in 2013. As evidenced by the estimation of the general time trend equation, the total return of basil increased by a statistically significant annual amount about 633.45 pounds.

-The average return over variable costs was about 9.01 thousand pounds during the study period, with a minimum amount about 3.88 thousand pounds in 2007, and a maximum amount about 13.65 thousand pounds in 2013. As indicated by the estimation of the general time trend equation, the total

return of basil increased by an annual amount about 311.74 pounds, and this increase did not prove its significance statistically, which means its relative stability around the arithmetic mean.

-The average net return was about 7.48 thousand pounds during the study period, with a minimum amount about 2.95 thousand pounds in 2007, and a maximum amount about 12.47 thousand pounds in 2013. As evidenced by the estimation of the general time trend equation, the total return of basil increased by an annual non-statistically significant amount. It reached about 0.50 pounds, which indicates the relative stability around the arithmetic average.

-The average return on the invested pound was about 1.99 pounds during the study period, with a minimum amount about 0.60 pounds in 2018, and a maximum amount about 3.59 pounds in 2013. As evidenced by the estimation of the general time trend equation, the total return of basil increased by an annual amount about 0.08 pounds, This increase was not statistically proven significant, which means relative stability around the arithmetic mean.

### 4- Wormwood Crop:

-The average agricultural price per ton of wormwood in Egypt was about 5.68 thousand pounds, with a minimum amount about 4.15 thousand pounds in 2007, and a maximum amount about 9.95 pounds in 2017. As evidenced by the estimation of the general time trend equation, the increase in the agricultural price of artemisia by an annual statistically significant amount about 440.24 pounds / ton.

-The average total costs of wormwood amounted about 2.60 thousand pounds, with a minimum amount about 2.58 thousand pounds in 2007, and a maximum about 8.63 thousand pounds in 2018. As evidenced by the estimation of the general time trend equation, the increase in the total costs of artemisia by a statistically significant annual amount reached about 452.10 pounds.

-The average total return was about 5.22 thousand pounds during the study period, with a minimum amount about 3.45 thousand pounds in 2007, and a maximum about 9.45 thousand pounds in 2017. As evidenced by the estimation of the general time trend equation, the total yield of artemisia increased by an annual statistically significant amount about 421.86 pounds.

-The average return over variable costs amounted about 2.62 thousand pounds during the study period, with a minimum about 1.73 thousand pounds in 2015, and a maximum about 5.82 thousand pounds in 2017. As evidenced by the estimation of the general time trend equation, the total yield of artemisia increased by a statistically significant annual amount about 196.23 pounds.

-The average net return was about 925.50 pounds during the study period, with a minimum about 201 pounds in 2018, and a maximum about 1.72 thousand pounds in 2017. As evidenced by the estimation of the general time trend equation, the total return of artemisia increased by a statistically insignificant annual amount about 30.22 pounds, which indicates its relative stability around the arithmetic average.

-The average return on the invested pound was about 0.25 pounds during the study period, with a minimum about 0.02 pounds in 2018, and a maximum 0.53 pounds in 2010. As evidenced by the estimation of the general time trend equation, the total return of artemisia decreased by a statistically significant annual amount about 0.03 pounds.

**Table (4): The evolution of the most important economic returns for the caraway and Fennel crops in Egypt during the period (2007-2018).**

Years	Caraway								Fennel							
	Average Price (pound/ton)	Variable * Cost (pound/fed.)	Total Cost (pound/fed.)	Total Revenue (pound)	Revenue over variable costs (pound)	The net return (pound)	Relative profitability(%)	Return on the invested pound	Average Price (pound/ton)	Variable * Cost (pound/fed.)	Total Cost (pound/fed.)	Total Revenue (pound)	Revenue over variable costs (pound)	The net return (pound)	Relative profitability(%)	Return on the invested pound
2007	4794	973	1726	3787	2814	2061	73.24	1.19	4344	1064	1841	6208	5144	4367	84.9	2.37
2008	5165	1238	2024	3693	2455	1669	67.98	0.82	6029	1244	2032	7373	6129	5341	87.14	2.63
2009	5362	1277	2196	4461	3184	2265	71.14	1.03	6126	1282	2271	7682	6400	5411	84.55	2.38
2010	5546	1461	2573	4276	2815	1703	60.5	0.66	6229	1452	2452	6397	4945	3945	79.78	1.61
2011	5795	1615	2769	5030	3415	2261	66.21	0.82	6382	1621	2786	7218	5597	4432	79.19	1.59
2012	5849	1721	2950	5954	4233	3004	70.97	1.02	6438	1846	3182	7803	5957	4621	77.57	1.45
2013	5953	1760	2984	5102	3342	2118	63.38	0.71	6535	1958	3304	8149	6191	4845	78.26	1.47
2014	6037	2110	3371	5500	3390	2129	62.8	0.63	6570	2074	3430	8666	6592	5236	79.43	1.53
2015	6049	2511	3804	5341	2830	1537	54.31	0.4	6623	2345	3662	8133	5788	4471	77.25	1.22
2016	6412	2495	3765	5745	3250	1980	60.92	0.53	7631	2427	3868	8683	6256	4815	76.97	1.24
2017	29077	3563	7719	27914	24351	20195	82.93	2.62	8454	3115	7068	11235	8120	4167	51.32	0.59
2018	29079	5490	9636	26200	20710	16564	79.98	1.72	8491	5864	9741	11038	5174	1297	25.07	0.13
Average	9593	2185	3793	8584	6399	4791	67.86	1.01	6654	2191	3803	8215	6024	4412	73.45	1.52
B	1723	300.4	549.8	1676	1375	1126	0.309	0.05	281.9	292.3	529.7	378.6	86.28	-151.2	-3.65	-0.19
(t) Values	(2.95)**	(5.32)**	(4.61)**	(3.08)**	(2.73)**	(2.39)**	(0.43)	(1.12)	** (6.69)	(4.42)**	(4.26)**	(5.61)**	(1.25)	(-1.84)	(-3.52)**	(-0.99)**
R2	0.47	0.74	0.68	0.49	0.43	0.4	0.018	0.11	0.82	0.66	0.68	0.76	0.14	0.25	0.35	0.87
F	8.70**	28.29**	21.23**	9.47**	7.465**	6.723**	0.18	1.265	44.75**	19.51**	21.37**	31.42**	1.57	3.39*	12.40**	65.48**
Rate of change	17.96	13.75	14.49	19.53	21.49	23.5	0.46	4.94	4.24	13.34	13.93	4.61	1.43	-0.34	-4.97	-12.52

**Source:** The data collected and calculated from the Ministry of Agriculture and Land Reclamation, Central Administration of Agricultural Economy, Agricultural Economy bulletin, various issues for the period (2007-2018).

(1) Net return per feddan = total return - total costs. (2) return over variable costs = return - variable costs. (3) relative profitability = net return ÷ return over variable costs x 100. (4) return on invested pound = net return feddan ÷ total productive costs per feddan. (5) rate of change = (B) ÷ arithmetic mean x 100.

\*\* significant at the level of 1% \* significant at the level of 5%.

**Table (5) The most important economic returns per feddan for the crops of basil, and wormwood, in Egypt during the period (2007-2018)**

Years	basil								wormwood							
	Average Price (pound/ton)	Variable * Cost (pound/fed.)	Total Cost (pound/fed.)	Total Revenue (pound)	Revenue over variable costs (pound)	The net return (pound)	Relative profitability(%)	Return on the invested pound	Average Price (pound/ton)	Variable * Cost (pound/fed.)	Total Cost (pound/fed.)	Total Revenue (pound)	Revenue over variable costs (pound)	The net return (pound)	Relative profitability(%)	Return on the invested pound
2007	206	1467	2390	5348	3881	2958	76.22	1.24	4156	1587	2587	3458	1871	871	46.55	0.34
2008	311	1809	3001	7832	6023	4831	80.21	1.61	4376	1815	2815	3571	1756	756	43.05	0.27
2009	376	1862	3039	9245	7383	6206	84.06	2.04	4920	1836	2836	4148	2312	1312	56.75	0.46
2010	473	1800	2966	11346	9546	8380	87.79	2.83	4532	1965	2965	4532	2567	1567	61.04	0.53
2011	515	2099	3273	11266	9167	7993	87.19	2.44	4570	2102	3502	4570	2468	1068	43.27	0.3
2012	574	2264	3441	14078	11814	10637	90.04	3.09	4562	2427	3857	4741	2314	884	38.2	0.23
2013	613	2287	3473	15944	13657	12471	91.32	3.59	4585	2611	4046	4734	2123	688	32.41	0.17
2014	652	2669	3896	13717	11048	9821	88.89	2.52	5505	2690	4130	4795	2105	665	31.59	0.16
2015	660	2908	4187	12423	9515	8236	86.56	1.97	5524	2973	4137	4712	1739	575	33.06	0.14
2016	663	3613	5923	13338	9725	7415	76.25	1.25	5538	3071	4350	5145	2074	795	38.33	0.18
2017	681	4729	7497	13285	8556	5788	67.65	0.77	9952	3634	7730	9454	5820	1724	29.62	0.22
2018	762	5667	8373	13424	7757	5051	65.12	0.6	9939	4544	8635	8836	4292	201	4.68	0.02
Average	540.5	2765	4288	11771	9006	7482	81.77	1.96	5680	2605	4299	5225	2620	925.5	38.21	0.25
B	44.89	321.7	470.2	633.5	311.7	163.3	-1.01	0.08	440.2	225.6	452.1	421.9	196.2	-30.22	-3.12	-0.03
(t) Values	10.63**	6.51**	5.87**	3.76**	-1.52	0.70	-1.45	-1.06	3.89**	9.29**	5.07**	4.21**	2.28*	-0.83	-3.93**	-3.48**
R2	0.92	0.81	0.77	0.59	0.19	0.05	0.17	0.1	0.6	0.9	0.72	0.64	0.34	0.06	0.61	0.55
F	113.02**	42.34**	34.40**	14.12**	2.3	0.25	2.1	1.13	15.11**	86.22**	25.74**	17.75**	5.18**	0.68	15.47**	12.13**
Rate of change	8.31	11.64	10.96	5.38	3.46	2.18	-1.24	4.01	7.75	8.66	10.52	8.07	7.49	-3.27	-8.16	-11.88

**Source:** The data collected and calculated from the Ministry of Agriculture and Land Reclamation, Central Administration of Agricultural Economy, Agricultural Economy bulletin, various issues for the period (2007-2018).

(1) Net return per feddan = total return - total costs. (2) return over variable costs = return - variable costs. (3) relative profitability = net return ÷ return over variable costs x 100. (4) return on invested pound = net return feddan ÷ total productive costs per feddan. (5) rate of change = (B) ÷ arithmetic mean x 100.

\*\* significant at the level of 1% \* significant at the level of 5%.

#### Fourth: Policy analysis matrix for the crops under study in Egypt:

The agricultural policy analysis matrix is used to evaluate the impact of the followed policies on the efficiency of the use of agricultural resources, the



profitability of agricultural producers, the prices of productive resources, the requirements of agricultural production, the prices of human and land resources, and the net returns of the productive activity, by comparing the returns and costs of the crops under study financially evaluated, according to prices of market and economically according to shadow prices, to follow up on agricultural economic policies by measuring each of the Nominal Protection Coefficient inputs, Output, the Effective protection coefficient, and the Domestic Resource Cost.

The data of Table (6) which showed the results of the policy analysis matrix for the crops under study in Egypt during the period (2007-2018) as the following shows:

The Nominal Protection Coefficient inputs of caraway, fennel, and wormwood in Egypt during the study period was about (0.93, 0.94, 0.94, 0.95) for each of them, respectively, during the study period, and this means a decrease in the percentage of support that producers receive for crops under of the study in Egypt, and this is consistent with the trends of agricultural policy, which tend to gradually subsidies on production requirements to be in line with their economic costs, and this is confirmed by the research results.

The nominal protection Coefficient outputs of the output was about 0.74 for the crops under study, and this means that the producers of the crops under study receive the equivalent only about 74% of the value of their output and thus they bear implicit taxes, while consumers receive a subsidy estimated at 26% of the yield during the study period.

The value of the effective protection factor was about (0.72, 0.72, 0.72, 0.70) for each of them respectively, during the study period, which means that the impact of the economic policy in this period on both the product markets and production requirements for the crops under study. It was represented in the producers' submission to these crops received indirect taxes on production and its obligations at a rate about (28%, 28%, 6% and 30%) for each of them respectively, which means that the

added value at market prices for these crops amounted about (72%, 72%, 72%, 70%) only of the added value at shadow prices.

The value of the Domestic Resource Cost was about (0.27, 0.26, 0.19, 0.48) for each of them respectively during the study period, and the decrease in the value of this coefficient from one, which indicates to the provision of foreign currency as a result of the local production of these crops because they have a comparative advantage in production. It is better to increase the domestic production of these crops.

#### **Fifth: The relative importance of the cost items of crop production in the field study sample: -**

Table (7) indicates the items of production costs of the crops under study in the sample for the agricultural season 2018/2019. And from it, the fixed production costs per feddan of the crops (the time of the crop stays in the land) from planting to harvest, which is represented in rent, while the variable costs include both the price of production inputs and the costs of performing production processes, in addition to other expenses. The items of production requirements were the value of seeds, municipal fertilizers, chemical fertilizers, and pesticides. The following shows:

#### **1- Caraway crop**

It is clear from the table that the costs of performing the various agricultural operations come in the forefront of the items of the costs of producing the caraway crop in Kafr El-Sheikh Governorate, at a rate of about 42.81% of the total costs, which amount to about 12.73 thousand pounds /feddan, in which human labor represents about 23.17%, while the automated labor represents about 19.64%, followed by the importance of the land lease, which amounted to about 39.28% of the total costs, followed by the production input costs at a rate of about 16.38% of the total costs, including about 11.90% for chemical fertilizers, 2.36% for seeds, 1.18% for pesticides, 0.94 % Of municipal fertilizer from the total costs of caraway crop in the study sample.

**Table (6): The results of the financial and economic evaluation and the agricultural policy analysis matrix for crops developed during the period (2007-2018).**

Statement	Caraway			Fennel			basil			wormwood		
	Financial evaluation	Economic evaluation	policy Impact	Financial evaluation	Financial evaluation	Economic evaluation	Impact policy	Financial evaluation	Financial evaluation	Economic evaluation	Impact policy	Financial evaluation
Production requirements	854.1	914.6	(60.55)	805.4	858.9	(53.53)	1100	1169	(69.65)	1091	1148	(57.46)
Land Item	1777	1777	0	1591	1591	0	1524	1524	0	1695	1695	0
Work Item	1330	1087	243.7	1399	1104	294.8	1665	1313	351.6	1514	1130	383.2
Total domestic resources	3108	2864	243.7	2990	2695	294.8	3189	2837	351.6	3208	2825	383.2
Total return	8584	11588	(3004.25)	8215	11091	(2875.40)	11771	15890	(4119.68)	5225	7053	(1828.63)
Net return feddan	4622	7809	(3187.41)	4421	7537	(3116.70)	7482	11884	(4401.62)	925.5	3080	(2154.41)
The Value added	7730	10673	(2943.70)	7410	10232	(2821.87)	10671	14721	(4050.02)	4134	5905	(1771.17)
Nominal Protection Coefficient Input	0.93			0.94			0.94			0.95		
Nominal Protection Coefficient Output	0.74			0.74			0.74			0.74		
Effective Protection Coefficient	0.72			0.72			0.72			0.7		
Effective Protection Rate	0.28			0.28			0.28			0.3		
Domestic Resource Cost	0.27			0.26			0.19			0.48		

\* The economic prices (shadow prices) were reached by using Transfer factors that were mentioned in previous studies were used: 1.05 for seeds, 1.10 for chemical fertilizers, 1.20 for pesticides, 0.67 for labor, 1.1 for machines. ( ) Numbers in parentheses are negative.

(1) value added = revenue - value of production domestic (2) Nominal Protection Coefficient Input= value of production inputs at market price (financially) ÷ value of production inputs at shadow price (economically). (3) Nominal Protection Coefficient Output= crop yield at market price (financially) ÷ crop yield at shadow price (economically). (4) Effective protection factor = value added at market price (financially) / value added at shadow price (economically). (5) Domestic Resource Cost= value of domestic resources at shadow price÷ value added at shadow price (economically).

**Source:** The data collected and calculated from the Ministry of Agriculture and Land Reclamation, Central Administration of Agricultural Economy, agricultural economy bulletin, various issues for the period (2007-2018).

## 2- Fennel crop

It is clear from the table that, the costs of performing the various agricultural operations come in the forefront of the items of the costs of producing fennel in the Governorate, at a rate of 41.44% of the total costs, which amount about 11.27 thousand pounds/feddan in which human labor represents about 25.64%, while automated labor represents about 15.79%, followed by the rent of the land which reaches about 35.49% of the total costs, followed by the costs of production inputs at a rate of 18.63% of the total costs, including about 11.09% for chemical fertilizers, 3.55% for municipal fertilizer, 2.22% for seeds and 1.77% For pesticides, from of the total costs of the fennel crop in the study sample.

## 3-Basil crop

It is clear from the table that the costs of performing the various agricultural operations come in the forefront of the items of the costs of producing basil in the governorate at a rate of 59.94% of the total costs, which amount about 14.31 thousand pounds / feddan, in which human labor represents about

40.87%, while the automated labor represents about 19.07 %, Followed by the costs of production inputs at a rate of 20.17% of the total costs in clouding about 15.10% for chemical fertilizers, 2.27% for seeds, 1.40% for municipal fertilizers and pesticides, followed by the land rent, which amounted about 17.47% of the total costs of basil in the study sample.

## 4-Wormwood Crop

It is clear from the table that, the costs of performing the various agricultural operations come at the forefront of the items of production costs of wormwood f chamomile in the governorate, at a rate of 58.15% of the total costs of about 16.89 thousand pounds / feddan, in which human labor represents about 50.84%, while automated labor represents about 7.31%, followed by of the land rent, which amounted about 20.72% of the total costs, followed by the costs of production inputs at a rate of 18.47% of the total costs, including about 7.22% for chemical fertilizers, 5.33% for municipal fertilizer, 3.26% for seeds 2.66% of pesticides of the total costs of the cultivation of wormwood and chamomile in the study sample.

**Table (7): The items of production costs in pounds per feddan of the crops studied in the study sample for the agricultural season 2018/2019.**

Statement		Caraway		Fennel		basil		Wormwood	
		Value (pound)	Relative importance of total costs (%)	Value (pound)	Relative importance of total costs (%)	Value (pound)	Relative importance of total costs (%)	Value (pound)	Relative importance of total costs (%)
Variable costs	Seeds	300	2.36	250	2.22	325	2.27	450	2.66
	Chemical fertilizer	1515	11.9	1250	11.09	2162	15.1	1220	7.22
	Municipal fertilizer	120	0.94	400	3.55	200	1.4	900	5.33
	Pesticides	150	1.18	200	1.77	200	1.4	550	3.26
	Total costs of production requirements	2085	16.38	2100	18.63	2887	20.17	3120	18.47
	Human labor	2950	23.17	2890	25.64	5850	40.87	8590	50.84
	Automated labor	2500	19.64	1780	15.79	2730	19.07	1235	7.31
	Total costs of performing production processes	5450	42.81	4670	41.44	8580	59.94	9825	58.15
	Other Expenses*	195	1.53	500	4.44	346.5	2.42	450	2.66
	Total variable costs **	9620	75.57	8870	78.7	14354	100.3	16065	95.09
Fixed costs	Land rent	5000	39.28	4000	35.49	2500	17.47	3500	20.72
Total costs		12730	100	11270	100	14314	100	16895	100

\*The other expenses are represented in local taxes and fees, and maintenance work for canals and drains.

\*\* Variable costs = costs of production inputs + costs of performing agricultural operations + other expenses

**Source:** The data calculated and collected from the field study sample data for the agricultural season 2018/2019.

**Sixth: Indicators of economic and productivity efficiency of the crops under study at the sample of the study:-**

The results of Table (8) indicators of economic efficiency for the production of crops under study in the study sample showed the multiplicity of indicators for measuring the economic efficiency of producing the crops under study, as it was found the total revenue index amounted about 18.17 thousand pounds for caraway, about 25 thousand pounds for fennel, and about 18.13 thousand pounds for basil, and about 29.40 thousand pounds for chamomile and wormwood, while the net return per feddan reached

about (5.4, 13.7, 3.82, 12.50) thousand pounds for each of them, respectively. while the total return rate for the total costs was about (142.73%, 221.83%, 126.70 %, 174.02%) for each of them, respectively. The profitability of the invested pound reached about 0.43 pounds for caraway, about 1.22 pounds for fennel, about 0.27 pounds for basil, and about 0.74 pounds for wormwood. By studying the total margin of feddan (pounds) amounted about 10.44 thousand pounds for caraway, about 17.73 thousand pounds for fennel, about 6.32 thousand pounds for basil, and about 16 thousand pounds for wormwood.

**Table (8): Indicators of economic efficiency for the production of crops under study with the sample of the study.**

Statement	Caraway	Fennel	basil	Wormwood
Variable costs	7730	7270	11814	13395
Fixed costs	5000	4000	2500	3500
Total costs	12730	11270	14314	16895
production quantity	0.79	1.25	1.95	0.84
price	23000	20000	9300	35000
Total return (1)	18170	25000	18135	29400
Net return (2)	5440	13730	3821.5	12505
Ratio of total return to total cost (3)	142.73	221.83	126.7	174.02
Invested pound profitability (4)	0.43	1.22	0.27	0.74
Marginal surplus (5)	10440	17730	6321.5	16005

)1) Total return = quantity of production x farm price (2) Net return = return - costs (3) ratio of total costs to total return = Total return ÷ Total costs (4) Invested pound profitability = Net revenue ÷ Total costs (5) Marginal surplus= Total return - Variable costs

Source: The data calculated and collected from the study sample from the agricultural season 2018/2019.

**Seventh: The production problems and obstacles facing farmers and proposals to overcome them with the sample of the field study: -**

Table (9) the production problems and constraints facing crop farmers and proposals to overcome them in the study sample for the agricultural season 2018/2019 as the following shows:-

**Production problems:**

The problem of high production input costs comes at the forefront of the production problems facing caraway farmers, as about 90% of the total number of respondents answered with this, followed by the small size of agricultural holdings and their scattering, which makes the service operations difficult as he answered about 85%, then comes After that the absence of the agricultural extension role in educating and guiding farmers at a rate of about 80%,

then the high costs of performing agricultural operations, and the spread of diseases as a result of repeated cultivation of the crop in the land, at a rate of about 75% for each, respectively, then the rest of problems come after that as shown in the table.

While the problem of high costs of performing agricultural operations comes at the forefront of the production problems facing the farmers of the fennel crop, as answering about 95% of the total number of respondents, followed by the high costs of production requirements, as answered by 90%, then comes the small size of agricultural holdings and their dispersal Which is difficult with the service operations, and the spread of diseases as a result of repeated cultivation of the crop in the ground, at a rate of about 80% for each of them, respectively, then the rest of problems come after that as shown in the table.

**Table (9): the most important production problems and obstacles facing farmers and proposals to overcome them with the sample of the study.**

Statement	Caraway		Fennel		Basil		wormwood		
	Repetition	Relative importance (%)	Repetition	Relative importance (%)	Repetition	Relative importance (%)	Repetition	Relative importance (%)	
Productivity problems	High costs of production requirements	36	90	36	90	40	100	40	100
	High costs of performing agricultural operations	30	75	38	95	40	100	36	90
	The small size of agricultural holdings	34	85	32	80	34	85	32	80
	Low return as a result of repeated cultivation of the crop on the same area	22	55	24	60	32	80	20	50
	The absence of the agricultural extension role in educating and directing farmers	32	80	30	75	34	85	32	80
	The absence of corps rotation	28	70	30	75	30	75	28	70
	The farmers' lack of knowledge of the corp export importance	28	70	30	75	26	65	30	75
	The spread of diseases as a result of repeated cultivation of the crop on the land	30	75	32	80	24	60	24	60
	<b>Total</b>	<b>40</b>	<b>-</b>	<b>40</b>	<b>-</b>	<b>40</b>	<b>-</b>	<b>40</b>	<b>-</b>
Marketing problems	Merchant monopoly of farmers to buy crops at the lowest prices	36	90	34	85	38	95	30	75
	Higher marketing costs of the crop	30	75	30	75	32	80	34	85
	Unavailability of data and marketing information for farmers	34	85	32	80	30	75	32	80
	The lack of factories for the manufacture of medicinal and aromatic plants	30	75	24	60	32	80	32	80
	Lack of marketing cooperatives	28	70	32	80	32	80	34	85
	<b>Total</b>	<b>40</b>	<b>-</b>	<b>40</b>	<b>-</b>	<b>40</b>	<b>-</b>	<b>40</b>	<b>-</b>
Productivity proposals	Supporting production requirements and providing them with agricultural societies	36	90	36	90	40	100	40	100
	Developing new high productivity varieties	30	75	28	70	30	75	32	80
	Attention to the role of agricultural extension in educating farmers	32	80	30	75	32	80	32	80
	Activating the role of contract farming	30	75	32	80	32	80	30	75
	<b>Total</b>	<b>40</b>	<b>-</b>	<b>40</b>	<b>-</b>	<b>40</b>	<b>-</b>	<b>40</b>	<b>-</b>
Marketing proposals	Reducing the monopoly of merchants by activating the role of marketing cooperative societies	38	95	37	92.5	36	90	38	95
	Availability of data and marketing information to farmers	34	85	32	80	30	75	30	75
	Establishing factories for the manufacture of medicinal and aromatic plants	30	75	24	60	32	80	32	80
	<b>Total</b>	<b>40</b>	<b>-</b>	<b>40</b>	<b>-</b>	<b>40</b>	<b>-</b>	<b>40</b>	<b>-</b>

**Source:** The data collected and calculated from the questionnaire forms for the agricultural season 2019/2020.

While the problem of high production input costs and the high costs of performing agricultural operations comes at the forefront of the production problems facing basil farmers, as about 100% of the total number of respondents each of them, respectively, followed by of the small size of agricultural holdings and their scattered matter, So the service operations become difficult, and the absence of the agricultural extension role in educating and guiding farmers at a rate of 85% for each of them respectively, then the decrease in return as a result of repeated cultivation of the crop on the same area by 80% of the total number of respondents, then the rest of problems come after that as shown in the table.

While the problem of high production input costs comes at the forefront of the production problems facing farmers of wormwood, as about 100% of the total number of respondents, followed by the high costs of performing agricultural operations, as by about 90% of the total number of respondents, then the small size of agricultural holdings and their scattered, which makes the service operations difficult, and the absence of the agricultural extension role in educating and guiding farmers, at a rate of 80% for each of them, respectively, of the total number of respondents, then the rest of problems as shown in the table.

It has been shown that the proposals to overcome the production problems facing farmers of caraway,

fennel, basil, and wormwood are limited to supporting production requirements and providing them with agricultural associations, paying attention to the agricultural extension role in educating farmers, developing new high-productivity varieties, and activating the role of contract farming at a rate of (90%, 80%, 75%, 75%) for caraway, about (90%, 75%, 70%, 80%) for fennel, about (100%, 80%, 75%, 80%), and about (100%) 80%, 80%, 75%) for each of them, respectively, of the total number of respondents in the study sample.

#### **Marketing problems:-**

The marketing problems facing farmers of the study sample for the crops under study are limited to the merchants' monopoly of farmers by purchasing the crop at the lowest prices, the high marketing costs of the crop, the lack of data and marketing information for farmers, and the lack of factories for the manufacture of medicinal and aromatic plants, which contributes to the high value added of the crop, then its export value increased, and the absence of marketing cooperatives about (90%, 75%, 85%, 75%, 70%) for caraway, about (85%, 75%, 80%, 60%, 80%) for fennel, about (95%, 80%, 75%, 80%, 80%) for basil, and about (75%, 85%, 80%, 80%, 85%) of wormwood for each of them, respectively, of the total number of respondents in the sample of the study.

the proposals to overcome the marketing problems facing farmers of caraway, fennel, basil, and wormwood are limited to limit the monopoly of merchants by activating the role of marketing cooperative societies, the availability of data and marketing information for farmers, and the establishment of factories for the manufacture of medicinal and aromatic plants at a rate of (95 %, 85%, 75%) for caraway about (93%, 80%, 60%) for fennel, and for basil about (90%, 75%, 80%), and wormwood about (95%, 75%, 80%) for each of them respectively of the total number of respondents in the study sample.

#### **The recommendations: -**

1- The need for horizontal expansion by increasing the cultivated areas with medicinal and aromatic plants under study, in addition to the vertical expansion by developing high productivity and disease-resistant varieties, with the aim of maximizing the production, then increasing agricultural exports of these crops.

2- Providing production requirements at an affordable price for farmers. Paying attention to

educate farmers about the economic and export importance of the crops under study.

3- Encouraging investors to expand the establishment of factories for medicinal and aromatic plants and manufacture them instead of exporting them in the form of raw materials to benefit from the added value and increase the return from exporting them.

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