



**An economic study of some leafy vegetable crops in Sharkia Governorate (A case study of parsley and watercress crops)**

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**Abstract:** Parsley and watercress are leafy vegetables are grown on all types of lands and are found throughout the year. In the cultivation of leafy vegetables, the months of extreme heat and cold should be avoided, so the best time for planting, in general, is at the beginning of September and March, and with the beginning of summer. The area cultivated for the parsley crop in the Sharkia Governorate was about 449 feddan in the winter season, and 435 feddan in the summer season, while the area cultivated for the watercress crop reached about 89 feddan in the winter season, and 63 feddan in the summer season in 2020. The most important results: The study recommends the adoption and expansion of leafy vegetable crops, especially parsley and watercress, and through the results of the economic efficiency indicators, it is possible to plant parsley in the winter season, and watercress in the summer season to get the highest economic efficiency. By studying the marketing efficiency indicators of the parsley and watercress crops in the winter and summer seasons, it became clear that the marketing efficiency of the farmers in the two marketing paths was weak. It requires studying the vegetable market, especially leafy vegetables, to raise the weakness of the marketing efficiency of the farmers. The most important recommendations: 1- Inventory and register the small areas of leafy vegetable crops and provide data and statistics about them. 2- Due to the high yield of leafy vegetable crops, they must be grown in small areas to increase the family's income compared to other field crops. 3- Leafy vegetable crops provide direct and indirect job opportunities for rural women, enabling them to empower their families economically. 4- The agricultural extension educates farmers about the appropriate dates for cultivation, agricultural operations, and modern methods of control infectious diseases, and provides them with technical expertise in harvesting and marketing. [Kamel Salah El-Din, Heba Abd El Kareem Fawzy and Rasha Abd El-Hady Naiel **An economic study of some leafy vegetable crops in Sharkia Governorate (A case study of parsley and watercress crops)**. *J Am Sci* 2022;18(11):95-112]. ISSN 1545-1003 (print); ISSN 2375-7264 (online). <http://www.jofamericanscience.org>. 8. doi:[10.7537/marsjas181122.08](https://doi.org/10.7537/marsjas181122.08).

**Key words:** Parsley and watercress crops, the economic efficiency indicators, the marketing efficiency indicators, marketing paths.

**Introduction:**

Vegetable crops are an important food for humans. They are second to cereal crops in nutritional importance. It contains essential vitamins and minerals. Vegetable crops are fast-growing and more profitable than other crops because of their availability all year round. It is also affected by climatic fluctuations, so its prices are unstable, especially for leafy vegetable crops such as watercress and parsley. Parsley and watercress are leafy vegetables grown on all types of lands and found throughout the year. In the cultivation of leafy vegetables, the months of extreme heat and cold should be avoided because the percentage of seed germination in those months is low and takes a long time, increasing the production of the vegetative mass, so the best time for planting, in general, is at the beginning of September and

March, and with the beginning of summer, the number of weeds decreases (Abdel Gaied, 2017). The area cultivated for the parsley crop in the Sharkia Governorate was about 449 feddan in the winter season, and 435 feddan in the summer season, while the area cultivated for the watercress crop reached about 89 feddan in the winter season, and 63 feddan in the summer season in 2020. Workers have an important role in vegetable cultivation, and it requires special care, continuous follow-up, and many workers to carry out agricultural operations.

**The problem of the study:**

The main study problem is the lack of sufficient data on the production and marketing costs of multi-harvest leafy vegetable crops such as parsley and watercress. Despite the importance of

these crops as a daily income for the farmer and family employment in the family, especially the role of rural women in marketing the crop, they face some problems and challenges in the production and marketing stages.

#### **The objective of the study:**

The study aims to estimate the production and marketing costs and indicators of production, economic, and marketing efficiency of the parsley and watercress crops in the winter and summer seasons and to study the most important production and marketing problems.

#### **Research method and data sources:**

The study relied on descriptive and quantitative methods in analyzing data and presenting the results, including indicators of productive, economic, and marketing efficiency of the parsley and watercress crops. The study also relied on two main sources of data: the first is secondary data published by the Ministry of Agriculture and Land Reclamation, the Economic Affairs Sector, the Agricultural Statistics Bulletin, and the other is unpublished data from the Directorate of Agriculture in Sharkia Governorate (Agricultural Affairs Department, Statistics Department). The second is preliminary data for a field study through a specially designed questionnaire that was collected with personal interviews of parsley and watercress farmers with the field study sample, amounting to 30 farmers during the 2022 agricultural season.

#### **Selection of the field study sample:**

Due to the lack of accurate statistics about cultivation with the two crops of the study, the places that are famous for their cultivation were searched and were found in the village of Mahdia in the center of Hahia, and the cultivation with the study crops reached (52.5 feddan of parsley and watercress), representing about 10% of the total cultivated area of leafy Vegetable crops in the village, amounting to 525 feddan in 2022. Thirty farmers were deliberately selected from the farmers of the two crops in the village, with an area of not less than 6 carats.

#### **First: Agricultural service operations:**

Parsley and watercress farmers practice the same service operations due to their great similarity. Municipal fertilizers are transported,

spread, and placed once in the winter. Chemical fertilizers are added with them before plowing and during the preparation of the land at 25% of the required quantity. The rest of the chemical fertilizer is added with nitrogen fertilizer after planting and after each harvest. The land is plowed twice and the third is equalizing the land's surface. Then the land is planned with a width of one meter, channels are opened in the land, and the seeds are planted in lines on the land's surface. The first irrigation is heavy (more irrigation hours) until the whole land is saturated with water. Then followed by irrigation According to the plant's need, once with each harvest in winter and twice each harvest in summer. In the process of harvesting and tying, the wage of the worker is calculated in the number of (Sheilas) per day for the worker. The Shilah also called the Khisha, is approximately 25 Tora and 100 bundles. The process of harvesting the plant from above the land. The roots must not be taken off and then tied to the plant in groups for sale.

#### **Parsley crop:**

The data in Table (1) show that the agricultural service operations for the parsley crop start from preparing the land for planting, and end with the two processes of harvesting and tying in the winter season while extending to the stages of seed harvesting and separating in the case of the summer season. By studying the costs of agricultural service operations for feddan of parsley, it was found that the most important of them are harvesting and tying, which amounted to about 23 thousand pounds, representing about 85.02%. Followed by irrigation operations, which amounted to 840 pounds per feddan, representing about 3.10%, and then the process of preparing the land for agriculture (plowing), which amounted to 820 pounds per feddan, representing about 3.03%, where they together amounted to 91.15% of the total costs of agricultural service operations amounting to 27100 pounds per feddan. The significant increase in the costs of harvesting and tying is due to their repetition several times in one season, in addition to being one of the direct costs of the crop.

**Table (1): The relative importance of agricultural service operations costs per feddan of the parsley crop in the winter and summer seasons in a field study sample during the agricultural season 2021/2022.**

Agricultural Operations	Summer Parsley		Winter Parsley	
	Costs/pound	%	Costs/pound	%
Transporting and spreading Municipal fertilizers	450	1.66	200	1.41
chemical fertilizers with superphosphate	300	1.11	150	1.05
preparing the land for agriculture (plowing)	820	3.03	820	5.77
equalizing the land's surface with a laser	600	2.21	600	4.22
Opening channels in the land	200	0.74	200	1.41
Planting with seeds	50	0.18	100	0.70
Heavy irrigation	300	1.11	300	2.11
spreading Nitrogen fertilizer	200	0.74	100	0.70
Irrigation	840	3.10	840	5.91
Spraying	300	1.11	300	2.11
harvesting and tying	23040	85.02	9360	65.82
last harvest	0	0	800	5.63
seeds production	0	0	300	2.11
seeds separation	0	0	150	1.05
<b>Total agricultural operations</b>	<b>27100</b>	<b>100.00</b>	<b>14220</b>	<b>100.00</b>

Source: Collected and calculated from field sample data in Sharkia Governorate during the agricultural season 2021/2022.

In the summer season of the parsley crop, the service operations are similar, except that the summer season is characterized by the seed production stage, which is obtained from the last harvest. The data of Table (1) shows that the most important cost items represented in the harvesting and tying processes amounted to about 9360 pounds, representing about 65.82%. Followed by irrigation operations, which amounted to about 840 pounds per feddan, representing about 5.91%, followed by the process of preparing the land for cultivation (plowing) amounted to about 820 pounds per feddan, representing about 5.77%, their ratio together amounted to 77.5% of the total costs of service operations crops, amounting to 14220 pounds per feddan. The significant increase in the costs of harvesting and tying is due to their repetition several times in one season, in addition to being one of the direct costs of the crop.

By comparing the agricultural service operations per feddan with the parsley crop in the winter and summer seasons, it shows an increase in the number of winter harvests compared to the summer, which led to an increase in the total costs of agricultural service operations, which amounted to about 27100 and 14220 pounds, respectively, in addition to the distinction of the summer season with the production of seeds from the last harvest. The results show that the percentage of human labor contribution was the highest in the total agricultural service costs, which amounted to about 24990 pounds, representing about 92.21%, and

about 12260 pounds, representing about 86.22%, for the winter and summer seasons, respectively, while the costs of machines amounted to about 2110 pounds, representing 8.79%, And about 1960 pounds, representing 13.78%, respectively.

#### **Watercress crop:**

The data of Table (2) shows that the agricultural service operations of the watercress crop, which start from preparing the land for planting and end with the harvesting and tying processes in the case of the winter season while extending to the two stages of seed production and separation in the case of the summer season.

The results of agricultural service operations for feddan of watercress show that the most important cost items are the harvesting and tying process, whose costs amounted to about 25920 pounds per feddan, representing about 87.43%, then the land service represented in the plowing process, which cost about 820 pounds per feddan. It represents about 2.77%. It was followed by crop irrigation operations, which amounted to about 630 pounds per feddan, representing about 2.13%. Together, their percentage amounted to 92.33% of the total costs of agricultural service operations, amounting to 29645 pounds per feddan. The significant increase in the costs of harvesting and tying is due to their repetition several times in one season, in addition to being one of the direct costs of the crop.

Watercress crop service operations were discovered to be similar, except that the summer season is characterized by the seed production stage obtained from the last harvest. Table (2) data indicate that the most important cost items are the harvesting and tying processes, which amounted to about 9360 pounds, representing about 65.82%. Followed by irrigation operations, which amounted to about 840 pounds per feddan, representing about 5.91%, followed by the process of preparing the land for agriculture (plowing), which amounted to about 820 pounds per feddan, representing about 5.77%, and together their percentage amounted to 77.5% of the total costs of operations. The agricultural service amounting to 14220 pounds per feddan. The significant increase in the costs of harvesting and tying is due to their repetition several times in one season, in addition to being one of the direct costs of the crop.

By comparing the winter and summer seasons of the watercress crop, it becomes clear that the process of preparing the land for cultivation by plowing, and the process of equalizing the land's surface with a laser are similar. There is no difference between them, but as for irrigation operations, it increases in the summer season than in winter, as the crop needs irrigation twice a month in summer than in winter. The summer season is characterized by the last harvest of seeds, whether for the private use of the farmers or sale in the market. The results show that the percentage of human labor contribution was the costliest, amounting to about 27595 pounds, representing about 93.08%, and about 12260 pounds, representing about 86.22%, for the winter and summer seasons, respectively, while the costs of machines amounted to about 2050 pounds, representing 6.92%, and about 1960 pounds. They represent 13.78% of the total agricultural service costs, which amounted to about 29645 pounds and 14220 pounds, respectively.

### **Second: Production requirements:**

A feddan of watercress needs about 0.5 kg of seeds per carat per year, at a rate of 12 kg per feddan, which are planted once in winter, and 18 kg are planted twice in the summer, to be harvested twice in the summer at most, given that leafy vegetables give flowers with High temperatures in

the summer, and the length of the day, then leave the crop in the ground to give seeds, as well as for parsley, where a feddan needs 12 kg planted once in winter, and 18 kg planted twice in the summer to harvest twice at most, then leave the crop in the ground to give seeds also. Table (3) shows the relative importance of production requirements costs pounds per feddan of the parsley crop in the winter season. The costs of using urea amounted to about 1150 pounds per feddan, representing about 37.22%. Followed by the costs of using municipal fertilizer amounted to about 900 pounds per feddan, representing about 29.13%, then the costs of purchasing seeds amounted to about 420 pounds per feddan, representing about 13.59%, and together their percentage amounted to about 79.94% of the total costs of production requirements, which amounted to about 3090 pounds.

As for the summer season of the parsley crop, Table (3) shows that the costs of using urea amounted to about 650 pounds per feddan, representing about 24.34%. Followed by the costs of purchasing seeds amounted to about 630 pounds per feddan, representing about 23.60%, then the costs of using pesticides amounted to about 500 pounds per feddan, representing about 18.73%, and together their percentage amounted to about 66.67% of the total costs of production requirements, which amounted to about 2670 pounds. The reason for the high relative importance of pesticides in the total value of production inputs is their high price, not their excessive use, as leafy vegetables are infected with insects and pests that harm the quantity of production.

Table (4) shows the relative importance of production requirements costs in pounds per feddan of watercress in the winter season, that the costs of using urea amounted to about 1150 pounds per feddan, representing about 37.22%. Followed by the costs of using municipal fertilizers, which amounted to about 900 pounds per feddan, representing about 29.13%, then the costs of purchasing seeds amounted to about 420 pounds per feddan, representing about 13.59%. Together, they accounted for about 79.94% of the total costs of production requirements, which amounted to about 3090 pounds.

**Table (2): The relative importance of agricultural service operations costs per feddan of watercress in the winter and summer seasons in a field study sample during the agricultural season 2021/2022**

Agricultural Operations	winter watercress		summer watercress	
	Costs/pound	%	Costs/pound	%
Transporting and spreading Municipal fertilizers	450	1.52	200	1.41
chemical fertilizers with superphosphate	225	0.76	150	1.05
preparing the land for agriculture (plowing)	820	2.77	820	5.77
equalizing the land's surface with a laser	600	2.02	600	4.22
Opening channels in the land	200	0.67	200	1.41
Planting with seeds	50	0.17	100	0.70
Heavy irrigation	300	1.01	300	2.11
spreading Nitrogen fertilizer	150	0.51	100	0.70
Irrigation	630	2.13	840	5.91
Spraying	300	1.01	300	2.11
harvesting and tying	25920	87.43	9360	65.82
last harvest	0	0	800	5.63
seeds production	0	0	300	2.11
seeds separation	0	0	150	1.05
<b>Total agricultural operations</b>	<b>29645</b>	<b>100.00</b>	<b>14220</b>	<b>100.00</b>

Source: collected and calculated from field sample data in Sharkia Governorate during the agricultural season 2021/2022.

**Table (3): The relative importance of production requirements costs per feddan of the parsley crop in the winter and summer seasons in the sample of the field study during the agricultural season 2021/2022.**

production requirements	unit	winter Parsley		Summer Parsley	
		Costs/pound	%	Costs/pound	%
Municipal fertilizers	M3	900	29.13	450	16.85
Chemical fertilizers (Calcium superphosphate)	Shikara	120	3.88	240	8.99
Urea	Shikara	1150	37.22	650	24.34
Seeds	kg	420	13.59	630	23.60
Pesticides	liter	300	9.71	500	18.73
Palm Wicker	bundle	200	6.47	200	7.49
<b>Total production requirements</b>	<b>pounds</b>	<b>3090</b>	<b>100.00</b>	<b>2670</b>	<b>100.00</b>

Source: collected and calculated from field sample data in Sharkia Governorate during the agricultural season 2021/2022.

**Table (4): The relative importance of production requirements costs per feddan of watercress crop in the winter and summer seasons in the sample of the field study during the agricultural season 2021/2022.**

production requirements	unit	winter watercress		Summer watercress	
		Costs/pound	%	Costs/pound	%
Municipal fertilizers	M3	900	29.13	450	16.85
Chemical fertilizers (Calcium superphosphate)	Shikara	120	3.88	240	8.99
Urea	Shikara	1150	37.22	650	24.34
Seeds	kg	420	13.59	630	23.60
Pesticides	liter	300	9.71	500	18.73
Palm Wicker	bundle	200	6.47	200	7.49
<b>Total production requirements</b>	<b>Pounds</b>	<b>3090</b>	<b>100.00</b>	<b>2670</b>	<b>100.00</b>

Source: collected and calculated from field sample data in Sharkia Governorate during the agricultural season 2021/2022.

As for the summer season of the watercress crop, Table (4) shows that the costs of using urea amounted to about 650 pounds per feddan, representing about 24.34%. Followed by the costs of purchasing seeds, which amounted to about 630 pounds per feddan, representing about 23.60%, then the costs of using pesticides amounted to about 500 pounds per feddan, representing about 18.73%, their proportion together amounted to about 66.67% of the total costs of production requirements, which amounted to about 2670 pounds. The results show that the costs and the relative importance of production requirements for the parsley and watercress crops, there are no differences between them, due to their similarity in same production characteristics. The increase in the relative importance of pesticides from the total value of production inputs might be related to the

increase in their price, not their excessive use, as leafy vegetables are infected with insects and pests that harm the production quantity.

Table (5) shows the structure of production costs per feddan of the parsley crop in the winter and summer seasons in a field study sample during the agricultural season 2021/2022. that the costs of production requirements amounted to about 3090, and 2670 pounds per feddan, representing about 8.54% and 11.66%, respectively. The direct agricultural service operations costs for the winter and summer seasons amounted to about 25600 and 12970 pounds per feddan, representing about 70.74% and 56.66%, respectively. The costs of indirect agricultural service operations for the winter and summer seasons amounted to about 1500, and 1250 pounds per feddan, representing about 4.14% and 5.46%, respectively.

**Table (5): The structure of production costs per feddan of parsley crop in the winter and summer seasons in the field study sample during the agricultural season 2021/2022.**

item	winter parsley		Summer parsley	
	Costs/pound	%	Costs/pound	%
<b>Production requirements costs</b>	3090	8.54	2670	11.66
<b>Costs of direct agricultural operations</b>	25600	70.74	12970	56.66
<b>Indirect agricultural operations costs</b>	1500	4.14	1250	5.46
<b>Total variable costs</b>	30190	83.42	16890	73.79
<b>Total fixed costs (feddan rent)</b>	6000	16.58	6000	26.21
<b>Total costs</b>	36190	100.00	22890	100.00

Source: collected and calculated from field sample data in Sharkia Governorate during the agricultural season 2021/2022.

It also shows that the total variable costs amounted to about 30190 and 16890 pounds per feddan for the winter and summer seasons, respectively, representing about 83.42%, 73.79% of the total costs, which amounted to about 36190 and 22890 pounds per feddan, respectively. The rent of the land per feddan was about 6000 pounds. The fixed costs amounted to about 6000 pounds for both seasons without any difference. Finally, it becomes clear the difference between the total costs of both seasons, where the winter is greater than the summer, due to the increase in the number of times winter harvests over summer. In comparison, the summer represents about 63.25% of the winter season.

Table (6) shows the structure of production costs per feddan of watercress crop in the winter and summer seasons in a sample of the field study during the agricultural season 2021/2022, that the costs of production requirements amounted to about 3090, 2670 pounds per feddan, representing about 7.98%, 11.66% for each of the winter and summer seasons, respectively. The direct agricultural service operations cost amounted to about 28420 and 12970 pounds per feddan, representing about 73.37% and 56.66%, respectively. While the cost of indirect agricultural service operations amounted to about 1225, and 1250 pounds per feddan, representing about 3.16% and 5.46%, respectively.

**Table (6): The structure of production costs for feddan of watercress crop in the winter and summer seasons in the field study sample during the agricultural season 2021/2022.**

item	winter watercress		Summer watercress	
	Costs/pound	%	Costs/pound	%
<b>Production requirements costs</b>	3090	7.98	2670	11.66
<b>Costs of direct agricultural operations</b>	28420	73.37	12970	56.66
<b>Indirect agricultural operations costs</b>	1225	3.16	1250	5.46
<b>Total variable costs</b>	32735	84.51	16890	73.79
<b>Total fixed costs (feddan rent)</b>	6000	15.49	6000	26.21
<b>Total costs</b>	38735	100.00	22890	100.00

Source: collected and calculated from field sample data in Sharkia Governorate during the agricultural season 2021/2022.

It found that the total variable costs amounted to about 32735, and 16890 pounds per feddan for each winter and summer season, respectively, representing about 84.51% and 73.79% of the total costs, which amounted to about 38735, and 22890 pounds per feddan, respectively. And the rent of the land per feddan amounted to about 6000 pounds. The fixed costs amounted to about 6000 pounds for both seasons without any difference. Finally, the difference between the total costs of both seasons is clear, where the winter season is greater than the summer due to the increase in the number of times winter harvests over summer. Where the summer represents about 59.09% of the winter season.

### Third: The total revenue per feddan:

The parsley crop yields about 6 harvests on average, the first harvest after two months, and 5 harvests, one each month, and the largest number of harvests are in winter and the number is 4 harvests, in summer it gives twice harvest at most, and parsley remains in the ground for a year and a half, The last three months of it are left in the ground to produce seeds, and a carat of parsley gives about 17 Kg of seeds. As for the watercress crop, it gives an average of 5 harvests, the first harvest after two months, and 4 harvests after that, and the difference between each harvest and the next has 45 days, The largest number of harvests is in the winter and there are 3 harvests, but in the summer twice at most, then it is left in the ground to produce seeds, and a carat of the watercress crop gives about 20 Kg of seeds, And about 2500 bundles per carat in winter, and about 1300 bundles per carat in summer for both crops.

As for the marketing of the crop, the farmers prefer to sell to the wholesaler than to sell himself in the market, to sell the whole crop, and to sell in a

group called Al-Tora, which is equal to 4 bundles for both crops. As its price is linked to the year's seasons, its price decreases in the winter and spring seasons due to a large number of production and availability, and the three bundles are sold at one pound for watercress, and four are sold at one pound for parsley. In summer, with high temperatures, their impact on the crop, and the decrease in the number of harvests, two bundles are sold for one pound.

Table (7) shows the total revenue of the parsley crop in the winter and summer seasons in the sample of the field study during the agricultural season 2021/2022, that the average production per feddan amounted to about 240 thousand bundles in winter, and amounted to about 62.4 thousand bundles in summer, the average bundle price was about 0.25-0.50 pounds. This price difference is due to the increase in the supply in winter, its shortage in the summer, due to the high temperatures, and the doubled increase in the number of harvests in winter. As a result, the value of the main product amounted to about 60 thousand pounds in winter, and 31.2 thousand pounds in summer.

As for the average production of seeds per feddan, which characterizes the summer season, it reached about 400 kg per feddan, and the average price per kg was about 25 pounds. A total of 10 thousand pounds per feddan in the summer season led to an increase in the total revenue per feddan to about 41.2 thousand pounds.

Table (8) shows the total revenue per feddan in pounds from the watercress crop in the winter and summer seasons, in the sample of the field study during the agricultural season 2021/2022, the average production per feddan amounted to about 180 thousand bundles in winter, and it amounted to about 62.4 thousand bundles in summer, and the

average bundle price was about 0.32, 0.55 pound. This price difference is due to the increase in the supply in winter, its shortage in the summer, due to the high temperatures, and the increase in the number of harvests in winter by almost double. As a result, the value of the main product amounted to about 57.6 thousand pounds in the winter, and 34.3 thousand pounds in the summer.

As for the average seed production per feddan, which characterizes the summer season, it reached about 500 kg per feddan, and the average price per kg was about 25 pounds. A total of 12.5 thousand pounds per feddan in the summer season led to an increase in the total revenue to about 46.8 thousand pounds per feddan.

**Table (7): Total revenue per feddan of parsley crop in the winter and summer seasons in the field study sample during the agricultural season 2021/2022.**

Item	unit	Winter parsley		summer parsley	
		value	%	value	%
<b>Main product</b>					
<b>Average production per feddan</b>	bundle	240000	0	62400	0
<b>The average price of a bundle</b>	pound	0.25	0	0.50	0
<b>Value of the Main product</b>	pound	60000	100.00	31200	75.73
<b>Secondary product</b>					
<b>Average production of seeds per feddan</b>	Kg	0	0	400	0
<b>The average price of Kg</b>	pound	0	0	25	0
<b>Value of the Secondary product</b>	pound	0	0	10000	24.27
<b>Total revenue per feddan</b>	pound	60000	100.00	41200	100.00

Source: collected and calculated from field sample data in Sharkia Governorate during the agricultural season 2021/2022.

#### **Fourth: Indicators of the economic and technical efficiency per feddan for the production of the parsley crop:**

The Table (9) results show the production and economic efficiency indicators (Soliman and Gaber, 2009) of the parsley crop in the sample of the field study, that the margin over the direct variable costs per feddan in winter amounted to about 31.3 thousand pounds, and amounted to about 25.5 thousand pounds in summer. The net farm income amounted to about 25.3 thousand pounds per feddan in winter, and 19.5 thousand

pounds in summer. The net farm profit amounted to about 23.8 thousand pounds per feddan in winter, and 18.3 thousand pounds in summer, and the product margin was about 39.68% in winter, and 26.63% in summer. The profitability of the pound paid amounted to 69.94 piasters per pound in winter, and 85.45 piasters per pound in summer. Total revenue to total variable costs amounted to 1.99 in winter, and 2.44 in summer. The total revenue to the total production costs amounted to 1.66 in winter, and 1.80 in summer.

**Table (8): The total revenue per feddan of watercress crop in the winter and summer seasons in the sample of the field study During the agricultural season 2021/2022.**

item	unit	Winter watercress		summer watercress	
		value	%	value	%
<b>Main product</b>					
<b>Average production per feddan</b>	bundle	180000	0	62400	0
<b>The average price of a bundle</b>	pound	0.32	0	0.55	0
<b>Value of the Main product</b>	pound	57600	100.00	34320	73.30
<b>Secondary product</b>					
<b>Average production of seeds per feddan</b>	Kg	0	0	500	0
<b>The average price of Kg</b>	pound	0	0	25	0
<b>Value of the Secondary product</b>	pound	0	0	12500	26.70
<b>Total revenue per feddan</b>	pound	57600	100.00	46820	100

Source: collected and calculated from field sample data in Sharkia Governorate during the agricultural season 2021/2022.



It is clear that the production of the parsley crop is profitable for all the economic and technical indicators per feddan. By comparing the indicators of the economic efficiency per feddan with the winter and summer seasons of the crop, it was found that the margin over the variable costs, net farm income, net farm profit, and the margin of the highest value product for the winter season of the crop compared in summer, because of increase in the total revenue in the winter season as a result of the increase in the number of harvests, and the higher productivity per feddan, which achieve higher indicators. This is shown by the agricultural net profit indicator, which expresses the possibility

of expanding the cultivation of the crop, as well as the product margin, which reflects the presence of market incentives for the farmer, despite the decrease in the price of the bundle in the winter, but the costs of its production are lower, to achieve a higher margin in the winter. As for indicators of the profitability of the pound paid, and the ratio of total revenue to both variable costs and total costs, the results were higher for the summer season due to the increase in total costs in the winter season compared to the summer, where the increase in the number of harvest results in an increase in the labor employed and service operations.

**Table (9): Indicators of productive and economic efficiency of parsley crop in the winter and summer seasons with a sample Field study during the agricultural season 2021/2022.**

item	unit	value of the winter parsley crop	value of the summer parsley crop
<b>Total revenue</b>	Pound/feddan	60000	41200
<b>Revenue of the main product</b>	pound	60000	31200
<b>The average quantity of the main product</b>	bundle	240000	62400
<b>The average selling price of a bundle</b>	pound	0.25	0.5
<b>The average production cost of a bundle</b>	pound	0.15	0.37
<b>Total direct variable costs</b>	pound	28690	15640
<b>Total indirect variable costs</b>	Pound/feddan	1500	1250
<b>total variable costs</b>	Pound/feddan	30190	16890
<b>Total direct fixed costs</b>	Pound/feddan	6000	6000
<b>Total costs</b>	Pound/feddan	36190	22890
<b>Margin over direct variable costs <sup>(1)</sup></b>	Pound/feddan	31310	25560
<b>Net farm income <sup>(2)</sup></b>	Pound/feddan	25310	19560
<b>Net farm profit <sup>(3)</sup></b>	Pound/feddan	23810	18310
<b>Product margin % <sup>(4)</sup></b>	%	39.68	26.63
<b>Profitability of the Pound Paid <sup>(5)</sup></b>	Piaster/ pound	69.94	85.45
<b>Total revenue/total variable costs</b>		1.99	2.44
<b>Total revenue/total production costs</b>		1.66	1.80

(1) Margin over direct variable costs = total revenue - total direct variable costs

(2) Net farm income = total revenue - (total direct variable costs + total direct fixed costs)

(3) Net farm profit = total revenue - total costs

(4) Product Margin % = (Average selling price of bundle - Average production cost of bundle) / Average selling price of bundle

(5) Profitability of the pound paid = total costs / net farm income \* 100

Source: It was collected and calculated from the data of tables Nos. (5), (7).

#### **Fifth: Indicators of the economic and technical efficiency per feddan for the production of the watercress crop:**

The results of Table (10) indicators of the economic and technical efficiency of the

production (Soliman and Gaber, 2009) of the watercress crop in the sample of the field study show that the margin over the direct variable costs per feddan in winter amounted to about 26 thousand pounds, and amounted to about 31.1

thousand pounds in summer. Net agricultural income amounted to about 20 thousand pounds per feddan in winter, and 25 thousand pounds in summer. Net farm profit amounted to about 18.8 thousand pounds per feddan in winter, and 23.9 thousand pounds in summer. The product margin was about 32.75% in winter, and 33.3% in summer. The profit of paid pound amounted to 51.87 piasters per pound in winter, and 110 piasters per pound in summer. As for the total revenue to the total variable costs, it amounted to 1.76 in winter, and 2.77 in summer. The total revenue to the total production costs amounted to 1.49 in winter, and 2 in summer.

It is clear the production of the watercress crop is profitable for all economic and technical indicators per feddan. By comparing the indicators

of economic efficiency per feddan in the winter and summer seasons of the crop, the results indicate that the summer season has the highest value for all indicators compared to winter.

By comparing the economic efficiency indicators per feddan for each of the parsley and watercress crops in the winter season, the results indicate that all the efficiency indicators for the winter parsley crop are better than the winter watercress. of summer parsley. Therefore, the study recommends the adoption and expansion of leafy vegetable crops, especially parsley and watercress, and through the results of efficiency indicators, it is possible to plant parsley in the winter season, and watercress in the summer season to get the highest economic efficiency.

**Table (10): Indicators of the productive and economic efficiency of the watercress crop in the winter and summer seasons in the sample of the field study during the agricultural season 2021/2022.**

item	unit	value of the winter watercress crop	value of the summer watercress crop
<b>Total revenue</b>	Pound/feddan	57600	46820
<b>Revenue of the main product</b>	pound	57600	34320
<b>The average quantity of the main product</b>	bundle	180000	62400
<b>The average selling price of a bundle</b>	pound	0.32	0.55
<b>The average production cost of a bundle</b>		0.22	0.37
<b>Total direct variable costs</b>	pound	31510	15640
<b>Total indirect variable costs</b>	Pound/feddan	1225	1250
<b>total variable costs</b>	Pound/feddan	32735	16890
<b>Total direct fixed costs</b>	Pound/feddan	6000	6000
<b>Total costs</b>	Pound/feddan	38735	22890
<b>Margin over direct variable costs <sup>(1)</sup></b>	Pound/feddan	26090	31180
<b>Net farm income <sup>(2)</sup></b>	Pound/feddan	20090	25180
<b>Net farm profit <sup>(3)</sup></b>	Pound/feddan	18865	23930
<b>Product margin% <sup>(4)</sup></b>	%	32.75	33.30
<b>Profitability of the Pound Paid <sup>(5)</sup></b>	Piaster/ pound	51.87	110.00
<b>Total revenue/total variable costs</b>		1.76	2.77
<b>Total revenue/total production costs</b>		1.49	2.05

(1) Margin over direct variable costs = total revenue - total direct variable costs

(2) Net farm income = total revenue - (total direct variable costs + total direct fixed costs)

(3) Net farm profit = total revenue - total costs

(4) Product Margin % = (Average selling price of bundle - Average production cost of bundle) / Average selling price of bundle

(5) Profitability of the pound paid = total costs / net farm income \* 100

Source: It was collected and calculated from the data of tables Nos. (6), (8).

**Sixth: Marketing paths and margins for the parsley and watercress crops in the sample of the field study:**

By studying the marketing paths for the parsley and watercress crops, we found two marketing paths: the first is selling from the farmer

to the wholesaler and to the retailer in the village market and to the consumer, and the second path is selling directly from the farmer to the consumer in the village or city.

#### **Marketing paths for the parsley crop in the sample of the field study in Sharkia Governorate:**

Table (11) shows the marketing paths of the parsley and watercress crops in the winter and summer seasons with the sample of the field study, that the total production of the parsley crop in the winter season amounted to about 240 thousand bundles, representing 100%, the gifts amounted to about 2400 bundles, representing about 1%, and the total directed surplus to The market has about 237.6 thousand bundles, representing about 99%, the quantity sold to the wholesaler is about 178.2 thousand bundles, representing about 75%, and the quantity sold directly from the farmer is about 59.4 thousand bundles, representing about 24% of the total amount of surplus directed to the market. As for the summer season, the total production amounted to about 62.4 thousand bundles, representing 100%, the gifts amounted to about 624 bundles, representing about 1%, and the total surplus directed to the market was about 61.776 thousand bundles, representing about 99%, and the quantity sold to the wholesaler was about 46.332 thousand bundles, representing about 75%, and the

quantity marketed directly from the farms amounted to about 15.444 thousand bundles, representing about 24% of the total amount of surplus directed to the market.

It is clear from the previous table that the total production of the watercress crop in the winter season amounted to about 180 thousand bundles, representing 100%, the gifts amounted to about 1800 bundles, representing 1% of the total production, the total surplus directed to the market amounted to about 178.2 thousand bundles, representing 99%, the quantity sold to the wholesale is about 133.650 thousand bundles, representing 75%, and the quantity marketed directly from the farms is about 44.550 thousand bundles, representing about 24% of the total amount of surplus directed to the market. As for the summer season, the total production amounted to about 62.4 thousand bundles, representing 100%, the gifts amounted to about 624 bundles, representing about 1%, the total surplus directed to the market amounted to 61.776 thousand bundles, representing about 99%, the quantity sold to the wholesaler amounted to about 46.332 thousand bundle, representing 75%, and the quantity marketed directly from the farms amounted to about 15.444 thousand bundles, representing about 24% of the total amount of surplus directed to the market.

**Table (11) Marketing paths of the parsley and watercress crops as a percentage of the total production in the winter and summer seasons.**

crop	Season	Marketing paths	Production quantity per thousand bundle	Present %	Wholesaler %	Retailer %	Consumer %	Total %
Parsley	winter	First:	240	1	75	75	24	100
		Second:	240	1	-	-	99	100
	summer	First:	62.4	1	75	75	24	100
		Second:	62.4	1	-	-	99	100
watercress	winter	First:	180	1	75	75	24	100
		Second:	180	1	-	-	99	100
	summer	First:	62.4	1	75	75	24	100
		Second:	62.4	1	-	-	99	100

Source: collected and calculated from field sample data in Sharkia Governorate during the agricultural season 2021/2022.

#### **Marketing paths, margins, and distribution of consumer's pound for the parsley crop in the sample of the field study in Sharkia Governorate:**

##### **The parsley crop in the winter season:**

Table (12) of the marketing paths and margins and the distribution of the consumer's pound for the parsley crop in the winter and summer seasons, in the sample of the field study during the agricultural season 2021/2022 indicates: Marketing

the parsley crop in the winter season takes two marketing paths, the first: from the farmer to the wholesaler, from the wholesaler to the retailer, and finally from the retailer to the consumer, which represents 75% of the marketed surplus, and the second is from the farmer to the consumer directly, in the first marketing path The farmer's margin amounted to about 15.4 piasters, and the marketing costs including (harvesting and tying) were about 9.6 piasters, and for the wholesaler, the profit margin was about 5 piasters, and the marketing costs were about 30 piasters (the purchase price from the farmer was 25 piasters, transportation costs 5 piasters), and for the retailer, the profit margin was about 5 piasters, and the marketing costs were about 50 piasters (the purchase price from the wholesaler was 35 piasters, transportation costs 5 piasters, and floor costs 10 piasters).

As for the distribution of the consumer's pound for this marketing path, the percentage of farms reached 28%, the wholesaler reached 35.64%, and finally, the retailer reached 36.36%. It is evident that the percentage of farms decreased by this marketing path, even though it is considered the main producer of the crop. As for the second marketing path, from the farmer to the consumer, the production costs amounted to about 5.48 piasters, representing 9.96% of the consumer's pound, the costs of harvesting and tying 9.60 piasters, representing 17.45%, transportation costs about 5 piasters, representing 9.09%, floor costs of 10 piasters, representing about 18.18%, the total Marketing costs amounted to 30.8 piasters, representing 54.69%, and the profit of the farmer in this marketing path amounted to about 24.92 piasters, representing 45.31% of the consumer's pound.

Despite the importance of the second path for the farmer and the increase in his profit in the first path by 9.52 piasters over the second, he prefers to market his crop in the first path (the wholesaler) because of his weak ability to market the crop, and with the increase in the amount of production of the crop, the difficulty of marketing increases, and also, leafy vegetables are perishable.

#### **The Parsley crop in the summer season:**

Marketing the parsley crop in the summer season is the same as the two marketing paths in the winter season, for the first marketing path, Table (12) shows that the farmer's margin amounted to about 35 piasters, the marketing costs,

including (harvesting and tying) about 15 piasters, for the wholesaler, the profit margin was about 20 piasters, the marketing costs were about 55 piasters (the purchase price from the farmer was 50 piasters, the transportation costs were 5 piasters), for the retailer, the profit margin was about 10 piasters, and the marketing costs were about 90 piasters (the purchase price from the wholesaler was 75 piasters). one piaster, transportation costs 5 piasters, and floor costs 10 piasters), As for the distribution of the consumer's pound for this marketing path, the percentage of the farmer reached 35%, the wholesaler reached 40%, and finally, the retailer reached 25%.

As for the second marketing path, from the farmer to the consumer, the production costs amounted to about 22 piasters, representing 22% of the consumer's pound, the costs of harvesting and tying 15 piasters, representing 15%, transportation costs of about 5 piasters, representing 5%, and floor costs of 10 piasters, representing about 10%, total marketing costs amounted to 30 piasters, representing 30%, and the profit of the farmer in this marketing path was about 70 piasters, representing 70% of the consumer's pound. Despite the importance of the second path for the farmer and the high percentage of farmers on the second path, which is twice as much as the first, However, he prefers to market his crop in the first way (through the wholesaler) due to his weak ability to market the crop, as mentioned earlier in the winter season.

#### **Marketing efficiency indicators of parsley crop in the sample of the field study in Sharkia Governorate:**

##### **The parsley crop in the winter season:**

Table (13) indicates the marketing efficiency indicators (Soliman and Gaber, 2008) of the parsley crop in the winter season, in the sample of the field study during the agricultural season 2021/2022, that the ratio of return to costs reached the highest for the farmer in the first marketing path reached about 260.42%, and the lowest for the retailer reached about 110%, As for the return on the pound paid, the highest for the farmer reached about 1.60 pounds, and the lowest for the retailer reached about 0.10 pound. The results indicate that the wholesaler is the most efficient marketing reached 75%, followed by the retailer reached 71.43%, and then the farmer reached about 33.45%.

**Table (12): Paths, marketing margins, and distribution of the consumer's pound for the parsley crop in the winter and summer seasons with the sample of the field study during the agricultural season 2021/2022.**

Item	Winter parsley				summer parsley			
	first path	Distribution of consumer's pound %	Second path	Distribution of consumer's pound %	first path	Distribution of consumer's pound %	Second path	Distribution of consumer's pound %
bundle production costs	5.48	9.96	5.48	9.96	22	22	22	22
harvesting and tying costs	9.60	17.45	9.60	17.45	15	15	15	15
Total marketing costs of farmer	9.60	17.45	*24.60	44.73	15	15	*30	30
Farmer's profit margin	15.40	28.00	**30.40	55.27	35	35	**70	70
Wholesale price	25	45.45	0	0	50	50	0	0
Transportation costs	5	9.09	0	0	5	5	0	0
Total Marketing Costs of Wholesaler	30	54.55	0	0	55	55	0	0
Wholesaler's Profit Margin	5	9.09	0	0	20	20	0	0
Retailer selling price	35	63.64	0	0	75	75	0	0
Transportation costs	5	9.09	5	9.09	5	5	5	5
Land costs	10	18.18	10	18.18	10	10	10	10
Total Marketing Costs of Retail	50	90.91	0	0	90	90	0	0
Retail's Profit Margin	5	9.09	0	0	10	10	0	0
consumer selling price	55	100.00	55	100.00	100	100	100	100

\*Total farmer marketing costs = (harvesting and tying costs + transportation costs + land costs)

\*\* Farmer's profit margin = consumer selling price - total farmer marketing costs

Source: collected and calculated from field sample data in Sharkia Governorate during the agricultural season 2021/2022.

As for the second marketing path, the ratio of return to costs reached about 223.58%, the return on the paid pound reached 1.24 pounds, and the marketing efficiency of the farms reached about 35.35%, and this indicates the weak marketing efficiency of it, which requires the need to study the vegetable market, especially leafy vegetables, which works to raise its efficiency marketing, to adopt the idea of increasing production.

#### The parsley crop in the summer season:

Table (13) indicates that the ratio of return to costs reached the highest for the farmer in the first marketing path about 333.33%, and reached the lowest for the retailer about 111.11%, and for the return on the pound paid, the highest amounted to the farmer about 2.33 pounds, and the lowest amounted to the retailer about 0.11 pounds, the results indicate that the retailer is the most efficient in marketing, with a rate of 78.26%, followed by

the wholesaler with a rate of 68.75%, and then the farmer reached 42.53%.

As for the second marketing path, the return to costs reached about 333.33%, the return on the paid pound reached 2.33 pounds, and the marketing

efficiency reached 34.21%, and this indicates the continued weak marketing efficiency of the farms, which confirms the need to study the leafy vegetable market and work to improve it.

**Table (13): Marketing efficiency Indicators of the parsley crop in the winter and summer seasons in the sample of the field study During the agricultural season 2021/2022.**

item	Parsley crop in winter season		Parsley crop in summer season	
	first path	Second path	first path	Second path
Price difference (Wholesaler - Retailer)	10	0	25	0
Price difference (Farmer – Consumer)	30	55	50	100
Price difference (Retailer – Consumer)	20	0	25	0
Percentage of return on costs for farmer <sup>(1)</sup>	260.42	223.58	333.33	333.33
Percentage of return on costs for Wholesaler <sup>(1)</sup>	116.67	0	136.36	0
Percentage of return on costs for Retailer <sup>(1)</sup>	110.00	0	111.11	0
Return on the pound paid on the farmer <sup>(2)</sup>	1.60	1.24	2.33	2.33
Return on the pound paid on the Wholesaler <sup>(2)</sup>	0.17	0	0.36	0
Return on the pound paid on the Retailer <sup>(2)</sup>	0.10	0	0.11	0
Marketing efficiency of the farmer <sup>(3)</sup>	33.45	35.35	42.53	34.21
Marketing efficiency of the Wholesaler <sup>(3)</sup>	75.00	0	68.75	0
Marketing efficiency of the Retailer <sup>(3)</sup>	71.43	0	78.26	0

(1)Return on costs = selling price / total marketing costs \* 100

(2) Return on the pound paid = profit margin / total marketing costs

(3) Marketing efficiency = 100- [price difference / (price difference + production and marketing costs) \* 100]

Source: collected and calculated from the data of Table No. (12).

### **Marketing paths, margins, and distribution of consumer's pounds for the watercress crop in the sample of the field study in Sharkia Governorate:**

#### **The watercress crop in the winter season:**

Table (14) of the marketing paths, margins, and the distribution of the consumer's pounds for the watercress crop in the winter season, with the sample of the field study during the agricultural season 2021/2022, indicates: Marketing the watercress crop in the winter season was found to take two marketing paths, first: from the farmer to the wholesaler, then from the wholesaler to the retailer, and finally from the retailer to the consumer, which represents 75% of the marketed surplus, The second path is from the farmer directly to the consumer. For the first marketing path, the farmer's margin amounted to about 2.07 piasters,

and the marketing costs, including (harvesting and tying), were about 14 piasters, for the wholesaler, the profit margin was about 13 piasters, the marketing costs were about 37 piasters (purchasing price from the farmer is 32 piasters, and transportation costs are 5 piasters), and for the retailer, the profit margin is about 10 piasters, and the marketing costs are about 65 piasters (the purchase price from the wholesaler is 50 piasters, transportation costs are 5 piasters, and floor costs are 10 piasters). As for the distribution of the consumer's pound for this marketing path, the percentage of farms reached 24%, while the percentage of the wholesaler reached 42.7%, and finally, the percentage of the retailer reached 33.3%, and it is clear that the percentage of farmers for this marketing path was low, despite it being the main product.

**Table (14): Marketing paths, margins, and distribution of the consumer's pounds for the watercress crop in the two winter seasons and summer with a sample of the field study during the agricultural season 2021/2022.**

Item	Winter parsley				summer parsley			
	first path	Distribution of consumer's pound %	Second path	Distribution of consumer's pound %	first path	Distribution of consumer's pound %	Second path	Distribution of consumer's pound %
bundle production costs	2.07	2.8	2.07	2.8	22	15	22	14.67
harvesting and tying costs	14	18.7	14	18.7	15	10	15	10.00
Total marketing costs of farmer	14	18.7	*29	38.7	15	10	*30	20.00
Farmer's profit margin	18	24.0	**46	61.3	40	27	**120	80.00
Wholesale price	32	42.7	0	0	55	37	0	0
Transportation costs	5	6.7	0	0	5	3	5	3.33
Total Marketing Costs of Wholesaler	37	49.3	0	0	60	40	0	0
Wholesaler's Profit Margin	13	17.3	0	0	15	10	0	0
Retailer selling price	50	66.7	0	0	75	50	0	0
Transportation costs	5	6.7	5	6.7	5	3	5	3.33
Land costs	10	13.3	10	13.3	10	7	10	6.67
Total Marketing Costs of Retail	65	86.7	0	0	90	60	0	0
Retail's Profit Margin	10	13.3	0	0	60	40	0	0
consumer selling price	75	100.00	75	100.00	150	100.00	150	100.00

\*Total farmer marketing costs = (harvesting and tying costs + transportation costs + land costs)

\*\* Farmer's profit margin = consumer selling price - total farmer marketing costs

Source: collected and calculated from field sample data in Sharkia Governorate during the agricultural season 2021/2022.

As for the second marketing path, from farms to consumers, production costs amounted to about 2.07 piasters, representing 2.8% of the consumer's pound, harvesting and tying costs 14 piasters, representing 18.7%, transportation costs about 5 piasters, representing 6.7%, floor costs 10 piasters, representing about 13.3%, and the total marketing costs amounted to 29 piasters, representing 38.7%, and the profit of the farmer in this marketing path amounted to about 46 piasters, representing 61.3% of the consumer's pound, Despite the importance of the second path for the farmer, and the increase in

his profit by about a piaster compared to the first path. However, the farmer prefers to market the crop by the first path (the wholesaler), because of his weak ability to market the crop to increase the produced quantity of the crop, and it is difficult for him to market it completely, and the leafy vegetable crops are perishable quickly.

#### **Watercress crop in the summer season:**

Marketing the watercress crop in the summer season follows the same two paths as the winter season. As for the first marketing path, Table (14)

shows that the farmer's margin amounted to about 40 piasters, and the marketing costs, including (harvesting and tying) were about 15 piasters, while the wholesaler's profit margin amounted to about 20 piasters, and the marketing costs amounted to about 55 piasters (purchasing price from Farms 50 piasters, transportation costs 5 piasters), and for the retailer, the profit margin was about 10 piasters, and the marketing costs were about 90 piasters (the purchase price from the wholesaler was 75 piasters, transportation costs 5 piasters, and floor costs 10 piasters). For the distribution of the consumer's pound for this marketing path, the percentage of farmers reached 27%, the percentage of the wholesaler reached 23%, and finally, the percentage of the retailer reached 50%.

In the second marketing path from the farmer to the consumer, the production costs amounted to about 22 piasters, representing 14.67% of the consumer's pound, costs of harvesting and tying 15 piasters, representing 10%, transportation costs of 5 piasters, representing 3.33%, floor costs of 10 piasters, representing about 6.67%, the total marketing costs amounted to 30 piasters, representing 20%, and the profit of the farmer in this marketing path amounted to about 120 piasters,

representing 80% of the consumer's pound. Despite the importance of the second path to the farmer and the higher profit compared to the first. However, he prefers to market the crop by the first path (the wholesaler), due to his weak marketing ability of the crop, as mentioned earlier in the winter season.

### **Marketing efficiency indicators of the watercress crop in the sample of the field study in Sharkia Governorate:**

#### **The watercress crop in the winter season:**

Table (15) marketing efficiency indicators of the watercress crop in the winter season in the sample of the field study during the agricultural season 2021/2022 indicates that the ratio of return to costs reached the highest for the farmer in the first marketing path, about 228.57%, and the lowest for the retailer about 115.38%, As for the return on the pound paid, the highest for the farmer amounted to about 1.29 pounds, and for the retailer, it amounted to about 0.15 pound, and the results indicate that the retailer is the most efficient in marketing, with a rate of 72.22%, followed by the wholesaler with a rate of 67.27%, then the farmer about 27.20%.

**Table (15): Marketing efficiency indicators of the watercress crop in the winter and summer seasons in the sample of the field study During the 2021/2022 agricultural season.**

item	watercress crop in winter season		watercress crop in summer season	
	first path	Second path	first path	Second path
Price difference (Wholesaler - Retailer)	18	0	20	0
Price difference (Farmer – Consumer)	43	75	95	150
Price difference (Retailer – Consumer)	25	0	75	0
Percentage of return on costs for farmer <sup>(1)</sup>	228.57	258.62	366.67	500.00
Percentage of return on costs for Wholesaler <sup>(1)</sup>	135.14	0	125	0
Percentage of return on costs for Retailer <sup>(1)</sup>	115.38	0	166.67	0
Return on the pound paid to the farmer <sup>(2)</sup>	1.29	1.59	2.67	4.00
Return on the pound paid to the Wholesaler <sup>(2)</sup>	0.35	0	0.25	0
Return on the pound paid on the Retailer <sup>(2)</sup>	0.15	0	0.67	0
Marketing efficiency of the farmer <sup>(3)</sup>	27.20	29.29	28.03	25.74
Marketing efficiency of the Wholesaler <sup>(3)</sup>	67.27	0	75.00	0
Marketing efficiency of the Retailer <sup>(3)</sup>	72.22	0	54.55	0

(1)Return on costs = selling price / total marketing costs \* 100

(2) Return on the pound paid = profit margin / total marketing costs

(3)Marketing efficiency = 100- [price difference / (price difference + production and marketing costs) \* 100]

Source: collected and calculated from the data of Table No. (14).



As for the second marketing path, the ratio of return to costs was about 258.26%, the return to the pound paid was 1.59 pounds, and the marketing efficiency of the farms was 29.29%. The ratio indicates the weak marketing efficiency of the farmer in the second marketing path, although it has risen from the first path of the farmer, which requires the need to study the market of vegetables, especially leafy vegetables, which works to raise the efficiency of marketing farms to adopt the idea of increasing production.

#### **Watercress crop in the summer season:**

Table (15) indicates that the ratio of return to costs reached the highest for the farmer in the first marketing path about 366.67%, and reached the lowest for the wholesaler about 125%, and for the return to the pound paid, it was the highest for the farmer about 2.67 pounds, and it was the lowest for the wholesaler is about 0.25 pound. The results indicate that the wholesaler is the most efficient in marketing with a rate of 75%, followed by the retailer with a rate of 54.55%, and then the farmer with a rate of 28.03%.

As for the second marketing path, the return to costs was about 500%, the return to the pound paid was 4 pounds, and the marketing efficiency reached 25.74%, this indicates the continued weakness of the marketing efficiency of the farms, which confirms the need to study the leafy vegetable market and work to improve it.

#### **Production and marketing problems of the study crops and the most important solutions and proposals:**

Table (16) indicates the relative importance of the production and marketing problems of the parsley and watercress crops in the sample of the field study, first the lack of trained workers and the rate of 83.3%, secondly the lack of registration of small areas of these crops so that he can take fertilizers from cooperative societies, at a rate of 73.3%, followed by the lack of availability of good seeds for leafy vegetable crops at a rate of 66.7%, then high prices of pesticides and their unavailability from good sources at a rate of 60%, and the total number of farmers in the field study sample reached 30 farmers.

**Table (16): The relative importance of the production and marketing problems of the parsley and watercress crops in the study sample Field in Sharkia Governorate**

no	problem	frequency	%
1	Lack of trained workers to harvest and tie these crops, and their wages are high	25	83.3
2	lack of registration of small areas of leafy vegetable crops so that farmers can take fertilizers from cooperative societies	22	73.3
3	lack of availability of good seeds for leafy vegetable crops	20	66.7
4	High prices of pesticides and their unavailability from good sources	18	60.0
5	Wholesalers control buying and selling prices for more than 75% of production	14	46.7
6	Lack of outlets to market these crops in cities	11	36.7
7	The crop is affected by climatic fluctuations, including high and low temperatures	10	33.3

Source: collected and calculated from field sample data.

Table (17) indicates The relative importance of the production and marketing problems proposals for the crops of parsley and watercress crops in the sample of the field study. First, research centers must provide farmers with good seeds that are resistant to climate changes, at a rate of 66.7%, secondly, agricultural associations as a reliable source must provide pesticides, at a rate of

56.7%, Followed by the inventory and registration of small areas and the provision of fertilizers to farmers, at a rate of 50%, followed by encouraging farmers to grow the crop and opening marketing outlets for it, at a rate of 36.7%, out of the total proposals submitted by farmers with the sample of the field study, which numbered 30 farmers.

**Table (17): The relative importance of the production and marketing problems proposals for the crops of parsley and watercress in a sample Field study in Sharkia Governorate**

no	problem	frequency	%
1	research centers must provide farmers with good seeds that are resistant to climate changes	20	66.7
2	agricultural associations as a reliable source must provide pesticides	17	56.7
3	the inventory and registration of small areas and the provision of fertilizers to farmers	15	50.0
4	encouraging farmers to grow the crop and opening marketing outlets for it	11	36.7
5	Extension and training courses for leafy farmers	10	33.3

Source: collected and calculated from field sample data.

#### The most important recommendations:

- 1- Inventory and register the small areas of leafy vegetable crops and provide data and statistics about them
- 2- Due to the high yield of leafy vegetable crops, they must be grown in small areas to increase the family's income compared to other field crops
- 3- Leafy vegetable crops provide direct and indirect job opportunities for rural women that enable them to economically empower their families.
- 4- The agricultural extension educates farmers about the appropriate dates for cultivation, agricultural operations, and modern methods of disease control, and provides them with technical expertise in harvesting and marketing.

#### .References:

1. Wael Abdel Fatah Abdel Gaied (2017) "Estimating the main features of the multi-cut vegetables in Greater Cairo markets According to their sources and the quality of irrigation water by sample. "Egyptian Journal of Agricultural Economics" – Volume (27) – Issue (2) – June B.
2. Ibrahim Soliman, Mohamed Gaber (2008), "Agricultural Marketing Systems", Dar Al-Fikr Al-Arabi, First Edition, Cairo.
3. Ibrahim Soliman, Mohamed Gaber (2009), "Fish Farming System Management and Economics", Dar Al-Fikr Al-Arabi, First Edition, Cairo.
4. The Ministry of Agriculture and Land Reclamation, Economic Affairs Sector, Winter Crops Bulletin, 2020.
5. Directorate of Agriculture in Sharkia Governorate, Department of Statistics, Official Records, Unpublished Data, 2021.

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