

## Economic Evaluations for Harvesting Management of Parsley (*Petroselinium Sativum Crispum* (Mill.) Nym) and Dill (*Anithum Graveolens* L.) Plants Under North Sinai Conditions

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**Abstract:** A field experiment was carried out at El-Maghara Research Station, 100 km South El-Arish-Sinai during two successive seasons 2003/2004 and 2004/2005. Seeds for both parsley (*Petroselinium crispum* (Mill.) Nym) and dill (*Anithum graveolens* L.) were sown on 25<sup>th</sup> of September for both seasons. The distances were 60 cm and 35 cm between rows and dripper, respectively. Three treatments for harvesting management had been done, without harvesting (control), one harvest and two harvests. Data on some growth characters, chemical composition and yields were recorded. The data showed that harvesting parsley or dill for one or two times to obtain fresh herb caused reduction in plant weight at flowering stage, consequently less umbels numbers, seed and oil yield/plant comparing to non harvested plants. On the other side the total income fresh herb and seed yield in L.E. was higher than harvested two times before obtaining seeds. This was more obvious for dill plant.

**Key words:** Economic evaluation, growth parameters, Harvesting management, fruits yield, herb yield, essential oil, pigments, Parsley and Dill.

### INTRODUCTION

*Petroselinium crispum* (Mill.) Nym (Parsley) plant belongs to family Apiaceae. It is biennial or short-lived perennial herb up to 70 cm high with crinkly bright green foliage; small greenish-yellow or white flowers appear in compound umbels from May to June and producing small brown seeds. Parsley is native to the Mediterranean region, especially Greece. It is cultivated extensively, mainly in USA, Germany, France, Holland, Hungary and Egypt.

Parsley has many medical uses, antispasmodic, carminative, diuretic. Parsley contains essential oil at 0.3 percent in the leaf, and from 2 to 7 percent in the fruit. The main compound being myristicin (20%); apiole (18%); beta-phellandrene (12%); p-mentha-1,3,8-triene and other predominantly monoterpene compounds. The herb also contains flavonoids including, largely, apigenin. Parsley herb is a good natural source of carotene (provitamin A), vitamins B1, B2, and C, as well as iron and other minerals. Parsley is therefore a good nutrient, especially when combined with bulgur and other ingredients in the tasty Lebanese salad, tabbouleh, but as a medication, the herb is of little worth. When crushed and rubbed on the skin, parsley can reduce itching in mosquito bites. Parsley is part of bouquet garni, a bundle of fresh herbs used to flavor stocks, soups, and sauces.<sup>[1,2,3]</sup>

Dill (*Anethum graveolens*) family Apiaceae is a short-lived perennial herb. Principal dill production areas are India and Pakistan, but Egypt, Mexico, the Netherlands, the United States, Hungary, Germany, and Holland also have commercially productive areas. Dill

seed oil includes d-carvone, d-limonene, d-phellandrene, -pinene, diterpene, d-dihydrocarvone, -phellandrene, -pinene, 1,8-cineole, -myrcene, para-cymene, and -thujone. Dill has a very long history of herbal use going back more than 2,000 years. The seeds are a common and very effective household remedy for a wide range of digestive problems. An infusion is especially efficacious in treating gripe in babies and flatulence in young children. The seed is aromatic, carminative, mildly diuretic, galactagogue, stimulant and stomachic. Used either it as infusion, or by eating the seed whole, the essential oil in the seed relieves intestinal spasms and griping, helping to settle colic. Chewing the seed improves bad breath. Dill will also help to increase the flow of milk in nursing mothers and will then be taken by the baby in the milk to help prevent colic. Dill seeds are used whole or ground as a condiment for flavoring meats, sauces, stews, breads, vinegars, pastries, and vegetable. Dried and fresh leaves are used in sauces, salads, soups, stews, and vinegars. Dill is an important flavoring agent in the pickling of cucumbers. Some dill oil is used in cosmetics and perfumes. Dried dill foliage is commonly called dill weed.<sup>[2,4,5]</sup>

This work was carried out to investigate and evaluate the economic value of cutting management on both of seeds and herb yields for both parsley (*Petroselinium crispum* (Mill.) Nym) and dill (*Anethum graveolens*) under cultivated in Maghra – North Sinai conditions. Aiming to add a new window for profit or increase gaining income through redistribute retail of cultivated unit using harvesting management.

## MATERIALS AND METHODS

A field experiment was carried out at El-Maghara Research Station, Desert Research Center, 100 km South El-Arish City in the Middle of Sinai-Egypt during the two successive seasons (2003/2004 and 2004/2005). Seeds were sown on 25<sup>th</sup> of September in rows for both seasons. The distances were 60 cm and 35 cm between rows and dripper, respectively. After 3 weeks from germination, the plants were thinned on one plant per hill. The distances were 15 cm between hills at a rate 2 hill per dripper. The final number of plants in faddan was 40000 plants per faddan. Drip irrigation system was used in this experiment with drippers (2.0 l/h) in the whole period of both seasons for only one hour every day.

**The Fertilization Included the Following: Nitrogen:** at the rate of 600 kg / fed. Ammonium Sulphate (20.5 % N), Phosphorus: at the rate of 200 kg /fed. Calcium super phosphate (16 % P<sub>2</sub>O<sub>5</sub>), Potassium: at the rate of 50 kg / fed. Potassium sulfate (48 % K<sub>2</sub>O) were added. Fertilization with Calcium Super Phosphate and Poultry manure at 10 m<sup>3</sup>/feddan was conducted before planting in each season in one dose during land preparation. As for nitrogen and potassium fertilizers, they were applied in five equal doses in both seasons. The first was added 30 days from appearance of the real leaves then every two weeks.

### Harvesting:

#### A – Parsley

- 1- Without cutting: (no cutting during season and the harvest had been done at the end of the season). Harvesting was carried out for the full flowering at 25<sup>th</sup> May in the first and second seasons.
- 2- One cut : (one cut only had been done during season,) harvesting was carried out on 10<sup>th</sup> December in the first and second seasons, respectively.
- 3- Two cuts only had been done during season, the first cut on 10<sup>th</sup> December and second cut on 20<sup>th</sup> January in the first and second seasons, respectively.

#### b- Dill

- 1- Without cutting: (no cutting during the season were had been done at the end of the season). Harvesting was carried out for completion of the flowers at 25<sup>th</sup> April in the first and second seasons.
- 2- One cut: (One cut only had been done during the season). Harvesting was carried out on 10<sup>th</sup> December in the first and second seasons respectively.

- 3- Two cuts: (Two cuts had been done during season the first cut on 10<sup>th</sup> December and the second cut on 20<sup>th</sup> January in the first and second seasons, respectively.

### The Following Data Were Recorded:-

#### A-Vegetative growth characters:

- 1- Number of branches per plant.
- 2- Fresh weights per plant (g/ plant).
- 3- Plant fresh and dry weight for the full flowering stage.

#### B- Yield Components:

- 1- Number of umbels per plant
- 2- Fruits and oil yield per plant (ml/ plant)

**C- Essential oil:** Determination of oil percentage of the fruits was conducted according to British Pharmacopoeia [6]

**Statistical Analysis:** Complete randomized block design was used in the experiments. The experiment contained 3 treatments with four replicates and each replicate had 10 hills. The statistical analysis was carried out according to Costat Statistical Software [7]. The values of L.S.D. at 5% level was calculated to compare the means of treatments.

## RESULTS AND DISCUSSIONS

**1- Vegetative Growth of Parsley:** Data in Table (1) show that yield of fresh herb per plant of parsley as affected by number of cuttings. The yield/plant of one harvest at 10<sup>th</sup> December was 95.00&92.50 gm/plant fresh herb during the two seasons, respectively; while the summation of the two harvests was 223.75&215.00 gm/plant during the two seasons. This was reflected on the fresh weight of plant at flowering stage, and resulted in low fresh and dry weight of plant which recorded from the plants that harvested one or two times 437.50&431.25 and 338.75&323.75 gm fresh herb/plant, during the two seasons, respectively. All of these types of harvest resulted in less significant plant weight at flowering stage comparing to the unharvested plants which resulted in 675.00&695.00 gm fresh weight/plant.

**2- Flowering, Seed and Oil Yield:** The effect of number harvest on number of umbels, seed yield and oil yield/plant illustrated in Table (2) and declare that harvesting process either one or two times resulted in less significant values for the above mentioned parameters except oil percentage in the seeds which was not significantly affected.

**3- the Income from Parsley:** Considering the fresh herb yield per feddan (4200m<sup>2</sup>) in Table 3, the yield of

one harvest of fresh herb was 3.80-3.90 ton/feddan, while the yield of two harvests was 8.95&8.60 ton/feddan for the two seasons, respectively.

The seeds and oil yield per feddan was less for the harvested plants comparing to unharvested ones and recorded the least values with the plants which harvested two times. The income was calculated considering the price of fresh herb of parsley as 500 L.E./ton and the price of seeds as 15000 L.E./ton<sup>[8]</sup>. The data in Table (4) indicate that two harvests obtained 8984 L.E./fed. from the yield of fresh herb and seeds while seeds only attained 8703 L.E. per fed. On the other side, one harvest of fresh herb in addition to seed yield gave the least income 7908 L.E./fed. Similar findings were reported by many investigators<sup>[9,10,11]</sup>

**4- Vegetative Growth of Dill:** Data in Table (5) show the yield of fresh herb per plant of dill as harvested one and two times. The yield per plant of one harvest at 10<sup>th</sup> December was 57.50&60.00 gm/plant fresh herb during the two seasons, respectively; while the summation of the two harvests was 168.75&167.50 gm/plant during the two seasons. This was reflected on the fresh weight of plant at flowering stage. Less significant fresh and dry weight of plant was recorded from the plants which harvested or two times 350.0&361.25 and 283.75&292.50 gm fresh herb/plant during the two seasons, respectively. All of those types of harvesting resulted in less significant plant weight at flowering stage comparing to the non harvested plants which resulted in 513.75&512.50 gm fresh weight/plant.

**5- Flowering, Seed and Oil Yield:** The effect of number of harvest on the number of umbels, seed and oil yield/plant in Table (6) declare that harvesting process either one or two ice times resulted in less significant values for the above mentioned parameters except oil percentage in the seeds which did not significantly affect.

**6- The Income from Dill:** Considering the fresh herb yield per feddan (4200m<sup>2</sup>) in Table (7), the yield of one harvest of fresh herb was 2.30&2.40 ton/fed., while the yield of two harvests was 6.75&6.70 for the two seasons, respectively.

The seed and oil yield per feddan was less for the harvested plants comparing to un harvested ones, and recorded the least values with the plants which harvested two times.

The income was estimated considering the price of fresh herb of dill as 800 L.E./ton and the price of seeds as 15000 L.E./ton<sup>[8]</sup>. The data in Table (8) indicate that obtaining two harvests attained 8773 L.E. from the yield of fresh herb and seed, while obtaining one harvest of fresh herb in addition to seed yield gave less income (6968 L.E.) on the other side, the plants which did not harvested and produced seeds only resulted in the least income as 6380 L.E./fed.<sup>[10]</sup>

**Recommendations:** The recorded data exhibit that, take two cuts from plant fresh herb in addition to seed's yield at the end of cultivation season gave the maximum income per feddan in both parsley (8984 LE per feddan) or dill (8773 LE per feddan) cases. Comparing with only one fresh herb cut or without any cut (fruits yield only).

**Table 1:** Effect of number of cuttings on herb fresh weight per plant, herb fresh weight for completion of the flowers and herb dry weight for the completion of the flowers during (2003/2004 and 2004/2005 seasons) for parsley plants under North Sinai conditions.

Treatments	Plant fresh weight (gm/plant)		Plant fresh weight for full flowering stage (gm/ plant)		Plant dry weight for full flowering stage (gm/ plant)	
	First season	Second season	First season	Second season	First season	Second season
Without cutting (Control)	0.00	0.00	675.00	695.00	53.78	54.60
Herb of one cut	95.00	92.50	437.50	431.25	45.31	41.10
Herb of two cuts	223.75	215.00	338.75	323.75	27.71	28.31
L.S.D. at 5%	19.73	15.79	45.93	40.44	4.72	4.15

**Table 2:** Effect of number of cuttings on number of umbels per plant, fruits weight per plant, oil percentage and oil yield per plant during (2003/2004 and 2004/2005 seasons) for parsley plants under North Sinai conditions

Treatments	Number of umbels (Umbel/plant)		Fruits weight (gm// plant)		Oil percentages (%)		Oil yield (ml/plant)	
	First season	Second season	First season	Second season	First season	Second season	First season	Second season
Without cutting (Control)	34.75	34.50	14.76	14.25	3.54	3.53	0.52	0.50
Herb of one cut	23.50	24.75	10.23	9.88	3.52	3.51	0.36	0.35
Herb of two cuts	21.25	22.25	7.53	7.79	3.52	3.54	0.26	0.28
L.S.D. at 5%	2.85	3.64	1.37	1.74	N.S.	N.S.	N.S.	N.S.

**Table 3:** The yield of fresh herb seeds and oil/fed. of parsley plant per feddan (4200m<sup>2</sup>)

Treatments	Herb yield (ton/fed.)		Seed yield (kg/fed.)		Oil yield Liter/fed.	
	First season	Secondseason	First season	Secondseason	First season	Second season
*Without cutting (Control)	0.00	0.00	590.4	570.0	20.8	20.0
Herb of one cut	3.80	3.70	409.2	395.2	14.4	14.0
Herb of two cuts	8.95	8.60	301.2	311.6	10.4	11.2

\* Did not harvested and left to produce seeds.

**Table 4:** The income in L.E. of fresh herb and seeds/fed of parsley (average of the two seasons)

Treatments	Fresh herb income (L.E.)	Seed income (L.E.)	Total (L.E.)
*Without cutting (Control)	0.00	8703	8703
Herb of one cut	1875	6033	7908
Herb of two cuts	4388	4596	8984

\* The income was from seeds only.

**Table 5:** Effect of number of cuttings on herb fresh weight per plant, herb fresh weight for completion of the flowers and herb dry weight for the completion of the flowers during (2003/2004 and 2004/2005 seasons) for dill plants under North Sinai conditions.

Treatments	Plant fresh weight(gm/plant)		Plant fresh weight for full flowering stage (gm/ plant)		Plant dry weight for full flowering stage (gm/ plant)	
	First season	Second season	First season	Second season	First season	Second season
Without cutting(Control)	0.00	0.00	513.75	512.50	35.78	36.23
Herb of one cut	57.50	60.00	350.00	361.25	28.51	29.10
Herb of two cuts	168.75	167.50	283.75	292.50	20.10	22.43
L.S.D. at 5%	14.04	13.85	35.12	40.50	1.94	3.00

**Table 6:** Effect of number of cuttings on number of umbels per plant, fruits weight per plant, oil percentage and oil yield per plant during (2003/2004 and 2004/2005 seasons) for dill plants under North Sinai conditions.

Treatments	Number of umbels(Umbel/plant)		Fruits weight(gm// plant)		Oil percentages(%)		Oil yield (ml/plant)	
	First season	Second season	First season	Second season	First season	Second season	First season	Second season
Without cutting (Control)	40.00	42.00	10.76	10.51	2.17	2.23	0.23	0.23
Herb of one cut	28.50	30.75	8.73	8.23	2.17	2.23	0.19	0.18
Herb of two cuts	22.50	20.00	5.78	5.53	2.13	2.12	0.12	0.12
L.S.D. at 5%	2.64	2.05	0.92	0.82	N.S.	N.S.	N.S.	N.S.

**Table 7:** The yield of fresh herb seeds and oil/fed. of dill plant

Treatments	Herb yield (ton/fed.)		Seed yield (kg/fed.)		Oil yield (Liter/fed.)	
	First season	Secondseason	First season	Secondseason	First season	Secondseason
*Without cutting (Control)	0.00	0.00	430.4	420.4	9.20	9.20
Herb of one cut	2.30	2.40	349.2	329.2	7.60	7.20
Herb of two cuts	6.75	6.70	231.2	221.2	4.80	4.80

\* Did not harvest and left to produce seeds.

**Table 8:** The income in L.E. of fresh herb and seeds/fed. of dill plant (average of the two seasons)

Treatments	Fresh herb income (L.E.)	Seed income(L.E.)	Total (L.E.)
*Without cutting (Control)	0.00	6381	6380
Herb of one cut	1880	5088	6968
Herb of two cuts	5380	3393	8773

\* The income was from seeds only.

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