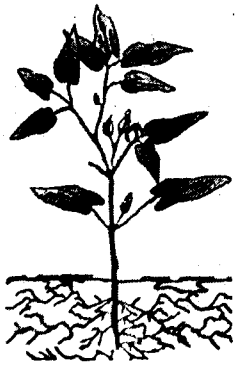

151
Annals
Agric. Sci.,
Ain Shams Univ.,
Cairo, 54(1), 151-164, 2009

EFFECT OF SOLARIZATION AND ORGANIC FERTILIZER ON YIELD AND QUALITY OF ROCKET AND PARSLEY FRESH HERBS

[12]

Rehab A.M. Shaddad[1]; R.E.I. El-Bassiouny[2]; A.M. El-Asdoudi[3] and M.M.F. Abdallah[3]

1- Ministry of Agriculture and Land Reclamation, Giza, Egypt.
2- Vegetable Handling Res. Dept., Hort. Res. Institute., ARC, Giza. Egypt.
3- Hort. Dept., Fac. of Agric., Ain Shams Univ., Shoubra El-Kheima, Cairo, Egypt.

Keywords: Solarization, Organic, Visual quality, Chlorophyll, Rocket, Parsley

ABSTRACT

These studies were conducted at the Vegetable Experimental Farm, Ain Shams University and Horticulture Research Institute, Agricultural Research Center (ARC) in 2005/2006 and 2006/2007. Solarization for 6 weeks reduced significantly total weeds/m^2 after 21 days from rocket and parsley seed sowing compared with non-solarized treatment. Also solarization improved rocket and parsley yield and quality. Organic fertilizer showed significant decrease in total weeds/m^2 and significant increase in rocket and parsley yield and quality. Also yield and quality of rocket and parsley increased by combined treatment of solarization with organic fertilizer over control treatment and maintained visual quality, freshness, chlorophyll reading percentage (SPAD) and dry matter percentage and reduced the weight loss percentage and decay. From the previous results it can be generally concluded that solarization for 6 weeks after adding organic fertilizer is a successful method to control weeds without using pesticides and increasing yield and keeping quality for rocket and parsley fresh herbs.

INTRODUCTION

Leafy vegetables constitute an important part of the daily diet for consumers. The cultivated area of rocket (*Eruca sativa* Mill) in Egypt reached 2877 fed. with an average yield 6.07 tons/fed., while the cultivated area of parsley (*Petroselinum crispum* Mill) in Egypt reached 3020 fed. with an average yield 11.18 tons/fed. in 2006 **(Agricultural Statistics for Winter Crops, 2006)**.

Knowledge of the growth pattern of these leafy vegetables is important for better understanding of their production requirements as well as determining the ideal harvesting age from the nutritional storage ability. Also, information on the ideal storage condition for the leafy vegetables would extend their shelf-life **(Abdel-Monem, 1967)**.

Soil solarization is a method of heating moisture soil by covering with transparent plastic sheets to trap solar radiation during the hot summer months. This high temperature could be used to prevent and kill soil pathogens and weeds and improve growth as well as crop yield **(Horowitz *et al* 1983; Katan, 1997 and Abdallah, 2000b)**.

Abdallah, (2000b) reported that soil solarization for 6 weeks improved parsley, dill and coriander plant growth characters at the green harvest stage. Solarized treatment gave an increase of fresh and dry weight of plants that reached 62% and 52% for parsley over that of the control, respectively.

Also, organic fertilizers play an important role in improving soil physical, chemical and biological properties which lead to increase of vegetative growth, yield and yield components of crops **(Kurt & Emir, 2004 and Gelsomino & Cacco, 2006)**. In

(Received March 2, 2009)
(Accepted March 28, 2009)

addition to reducing cost of production and decreasing pollution of environment occurring from used chemicals **(Verma, 1990)**.

Leafy vegetables are characterized by a relative short storage life which is affected by harvesting quality, storage temperature, relative humidity and ventilation. Storage life is measured by deterioration rate, compositional change and water loss, i.e. storage at 0°C and about 85% relative humidity doubled the shelf life of parsley compared to parsley kept at room temperature. Water loss and decay were major parameters for deterioration judgment of leafy vegetables **(Wally *et al* 1978)**.

Chlorophyll degradation was the most serious postharvest alteration in rocket leaves resulting in yellowish colour. This process was significantly retarded at the lower storage temperatures probably due to reduced overall metabolic activity. It is concluded that rocket leaves can be stored successfully at 0°C with maximum storage life of 16 days while at 5°C slight quality deterioration was observed and shelf-life reduced by 3 days **(Athanasios *et al* 2007)**. A higher concentration of dry matter was observed in the leaves harvested in the spring (14.37%) compared to the leaves harvested in the autumn (9.75%) **(Francke, 2004)**.

Therefore, the present study was undertaken to evaluate the effect of solarization and organic fertilizer on yield and quality of rocket and parsley fresh herbs.

MATERIALS AND METHODS

Two types of field experiments and two storage experiments were carried out at the Experimental Farm of the faculty of Agriculture, Ain Shams University, Shubra El-Khemia, Kalubia, Egypt and Horticulture Research Institute, Agricultural Research Center (ARC) during two seasons 2005/2006 and 2006/2007.

Part (1) Field Experiments

The two field experiments were carried out to determine the effect of organic, chemical fertilizer and soil solarization on growth, yield and quality of rocket and parsley using a separate experiment for each crop. In late July of both seasons, the field was cleaned, ploughed, leveled and divided into 1.0 × 2.0m plots. Each experiment included four treatments which were the combinations of two levels of organic fertilizer and solarization (with and without) as follows:

A- Organic fertilizer treatments

1. Organic fertilizer: chicken manure applied at rate of 70 kg N/fed. + rock phosphate at rate of 250 kg/fed. + rock potassium at rate of 250 kg/fad.
2. No organic fertilizer (control): using recommended chemical fertilizer as follows:

- Ammonium sulphate (20.5%N) at rate (100 kg/fad.).
- Calcium super phosphate (15.5% P_2O_5) at rate (600 kg/fad.).
- Potassium sulphate (48% K_2O) at rate (150 kg/fad.).

B- Soil solarization treatments

Soil in each experiment was cleaned, leveled and divided into plots 1.0 × 2.0 m^2.

Organic manure, for organic treatment, was added and plots were irrigated for three days before covering with clear polyethylene traps of 50 µm thickness for 6 weeks during August and September. The control was left uncovered, after which the plastic sheets were removed.

Final treatments for each crop were as follows:

1. Organic fertilizer + solarization.
2. Without organic fertilizer + solarization.
3. Organic fertilizer without solarization.
4. Chemical fertilizer without solarization.

Rocket and parsley seeds were sowing at mid October in all experimental plots using a separate experiment for each crop. The experimental plots were arranged in complete randomized block design (CRBD) with four replications.

Data recorded

1. Field weeds

Weed species were hand pulled randomly in area of 1 m^2 of each plot at 4 weeks after sowing rocket and parsley seed. Number of weeds and fresh and dry weight were used as indication of weed infestation.

2. Yield

Rocket and parsley plants were harvested (cut) two times per season. The first cut was 5 weeks after sowing followed by the second cut after 4 weeks. The harvested leaves were put in plastic boxes and weighted, then total yield was calculated as kg/m^2 in each cut before transferred to storage experiment.

Part (2) Storage Experiments

Harvested rocket and parsley cut leaves of different treatments were transferred to Vegetable Handling Laboratory (ARC). After simple precooling using plastic boxes kept over night at 0-2°C with 90-95% relative humidity (RH), the cut leaves were base trimmed at morning.

Selected homogenous cut leaves with a capacity of 100 (g) were rolled in transparent polyethylene sheets and bunched using one rubber band and left open as flower pocket.

Each 8 pockets (two of each treatment) packed in 3 kg carton box (30 W × 20 L × 10 cm) represented one replicate. Packed four cartons (represented four replication) were then stored at 0°C with 90-95% R.H.

Samples were taken from each replicate for physical and chemical quality measurements at the beginning of the experiment (zero day) and at 5, 10 and 15 days during the storage period as follows:

1. **Physical characters**

A- **Weight loss percentage:** was estimated according to the equation

$$\text{Weight loss \%} = \frac{\text{Initial weight of leaves} - \text{weight of leaves at sampling date}}{\text{Initial weight of leaves}} \times 100$$

B- **Visual quality:** was determined using scoring system.

9= excellent; 7= good; 5= fair; 3= poor and 1= non salable

This scale depends on the morphological effects such as wilted leaves, colour changes of leaves... etc. **(Kader *et al* 1973)**.

C- **Decay:** was determined using scoring system of 1= none; 2= slight; 3= moderate; 4= moderately severe and 5= severe

This scale depends on the morphological effects such as colour changes of leaves, any microorganisms' effect, smell and decay percentage on plant...etc.

D- **Freshness:**determined using scoring system of 1= none; 2= slight; 3= moderate; 4= moderately full and 5= full typical fresh.

This scale depends on fresh and marketable leaves.

2. **Chemical characteristics**

A-Chlorophyll reading in leaves (%): chlorophyll was measured by using nondestructive Minolta chlorophyll SPAD 501 (SPAD is an acronym for plant analysis development, it measures the relative amounts of chlorophyll present by measuring the transmittance of the leaf in two wave bands 600-700 and 400-500nm).

Statistical analysis

Regular analysis of variance for CRBD according to the procedures outlined by **(Snedecor and Cochran, 1980)** was performed for the data of each season and also combined analysis for both seasons.

RESULTS AND DISCUSSION

I. Effect of soil solarization, organic fertilizer and their interactions on weed distribution in rocket and parsley plants

A- Soil solarization

The fresh and dry weight and number of weeds per unit area could be used as a reliable index to distribution at 21 days after rocket and parsley seed sowing. Data presented in **(Table 1)** showed that soil solarization of wet plots for a period of 6 weeks during August and September reduced significantly number, fresh and dry weight of weed/m^2 after 21 days from rocket and parsley seed sowing in both growing seasons compared with the non-solarized treatment. These findings confirmed the previous results obtained by **Farag, (1994); Abdallah, (1998, 1999 and 2000 a & b)**.

B- Organic fertilizer

Organic fertilizer reduced significantly number and dry weight of weed/m^2 after 21 days from rocket seed sowing and number, fresh and dry weight of weed/m^2 after 21 days from parsley seed sowing.

The interaction of solarization with organic fertilizer showed significantly reduction of fresh and dry weight of weed/m^2 after 21 days from parsley seed sowing, while the interaction showed no significant effects on weed density (number, fresh and dry weight) in both growing seasons of rocket field. It could be concluded that solarization of the soil for 6 weeks before rocket and parsley seed sowing can be used as a non-chemical method for weed control in rocket and parsley fields.

II. Effect of soil solarization, organic fertilizer and their interaction on rocket and parsley yield

Data in **(Table 2)** showed that soil solarization increased significantly cut leaf yield by about 32% and 37.8% for rocket and parsley, respectively

Table 1. Effect of soil solarization, organic fertilizer and their interaction on number and fresh and dry weight per square meter of total weeds after 21 days from rocket and parsley seed sowing (Combined data of two seasons)

Crop		Rocket			Parsley		
Treatments		Total weeds			Total weeds		
		Number/ m^2	Fresh weight g/m^2	Dry weight g/m^2	Number/ m^2	Fresh weight g/m^2	Dry weight g/m^2
Non-organic	Non – Solarized	34.00	50.59	11.26	46.50	75.80	15.27
	Solarized	7.500	8.840	1.820	12.00	19.25	4.270
Organic	Non-Solarized	24.50	38.96	8.520	29.50	43.13	9.090
	Solarized	4.000	4.650	0.690	6.000	8.010	1.515
Non-organic		20.75	29.71	6.540	29.25	47.53	9.770
Organic		14.25	21.81	4.600	17.75	52.57	5.310
	Non-Solarized	29.25	44.77	9.890	38.00	59.47	12.18
	Solarized	5.750	6.750	1.260	9.000	13.63	2.900
L.S.D. 0.05							
Organic f.		5.652	N.S	1.638	5.125	8.893	1.512
Solarization		5.652	9.138	1.638	5.125	8.893	1.512
Solarization × organic. F		N.S	N.S	N.S	N.S	12.58	2.138

N.S = Not Significant ($p< 0.05$)

Table 2. Effect of soil solarization, organic fertilizer, number of leaf cuts and their interaction on rocket and parsley cut leaf yield (kg/m^2) (Combined date of two seasons)

Treatments		Rocket			Parsley		
		Cut leaf yield (kg/m^2)			Cut leaf yield (kg/m^2)		
		1st cut *	2nd cut **	Mean	1st cut *	2nd cut **	Mean
Non-organic	Non-Solarized	1.221	1.303	1.262	1.284	1.105	1.195
	Solarized	1.664	1.670	1.667	1.879	1.706	1.793
Organic	Non-Solarized	1.311	1.432	1.372	1.450	1.311	1.381
	Solarized	2.245	2.165	2.205	2.403	2.290	2.347
Non-organic		1.443	1.486	1.465	1.582	1.406	1.494
Organic		1.778	1.799	1.789	1.927	1.801	1.864
	Non-Solarized	1.266	1.368	1.317	1.367	1.208	1.288
	Solarized	1.954	1.918	1.936	2.141	1.998	2.070
Mean		1.610	1.643		1.754	1.603	
L.S.D 0.05							
Organic f.		0.0678			0.1425		
Solarization		0.0678			0.1425		
Leaf cut		N.S			N.S		
Organic f. × Solarization		0.0957			0.2015		
Organic f. × Leaf cut		N.S			N.S		
Solarization × Leaf cut		N.S			N.S		
Organic f. × Solarization × Leaf cut		N.S			N.S		

N.S = Not Significant ($p< 0.05$)

*1st cut = 5 weeks from rocket and parsley seed sowing

**2nd cut = 9 weeks from rocket and parsley seed sowing

compared with non-solarized treatment. Increased yield with soil solarization was reported by **Abdallah, (2000b)** on parsley.

Organic fertilizer resulting in increasing this character by about 18.1% and 17.8% for rocket and parsley, respectively over non-organic fertilizer. Similar results were recorded by **Palada *et al* (2004)** on thyme and **Khalid and Shafei, (2005)** on dill.

On the other hand, no significant differences were obtained between 1st and 2nd cut on cut leaf yield per square meter of both crops.

The interaction between organic fertilizer with solarization showed significant effect on cut leaf yield of plants. Solarization with organic fertilizer recorded the highest yield (2.205 and 2.347 kg/m^2) for rocket and parsley, respectively.

Rocket and parsley leaf yields were increased coupled with increasing dry matter content of plants (Table 8). However, other interactions showed no significant effects.

III. Effect of soil solarization and organic fertilizer on physical and chemical characters of rocket and parsley cut leaves at different storage periods.

Harvested rocket and parsley cut leaves of field experiments were stored at 0°C and 90-95 RH for 0, 5, 10 and 15 days for both cuts.

1- Physical characters

A- Weight loss percentage

The results in **(Table 3)** showed that the weight loss percentage of storage rocket and parsley leaves significantly decreased by solarization and organic fertilizer, and increased as the time of storage period increased. This may be attributed to solarization which killed fungi and bacteria in soil and organic fertilizer which produced more healthy plants. Similar results for the effect of storage period on weight loss percentage were recorded by **Parson, (1959)** on cabbage; **Wally *et al* (1978)** on parsley; **Nicola *et al* (2004)**, **Athanasios *et al* (2007)** and **Kim-Sunju and Ishii, (2007)** on rocket. The interaction between organic fertilizer with solarization and storage period with organic fertilizer or solarization affected rocket and parsley weight loss percentage significantly. Also, the interaction between organic fertilizer with solarization and storage period affected rocket weight loss percentage without significant differences on parsley.

B- Visual quality

The data in **(Table 4)** showed that values of visual quality of storage rocket and parsley leaves significantly increased by solarization and organic fertilizer and decreased with increasing storage period.

The highest value of visual quality was recorded with solarized treatment (8.661 and 8.844) for rocket and parsley, respectively vs. non-solarized (8.063 and 8.422). Also organic fertilizer recorded higher value of visual quality (8.528 and 8.735) for rocket and parsley, respectively vs. non-organic treatment (8.196 and 8.531).

Concerning storage period, data revealed that visual quality score of rocket and parsley leaves decreased with prolongation of storage period.

Maximum loss in visual quality occurred at the end of storage period (15 days) with non-solarized treatment (6.860 and 7.563) for rocket and parsley leaves and with non-organic treatment (7.173 and 7.750) for rocket and parsley, respectively.

The interaction between organic fertilizer and solarization showed significant effect on rocket, and no significant effect on parsley. A significantly lower score of visual quality was found with increase in storage period. These results are nearly similar to those obtained by others; **Kmiecik *et al* (2001)** on dill and **Kim-Sunju and Ishii, (2007)** on rocket.

C- Decay

Data in **(Table 5)** showed that the decay of rocket and parsley leaves significantly decreased by solarization and organic fertilizer, and increased with increasing storage period. The maximum decay occurred at the end of storage period in non-solarized treatment. Non-solarization gave the maximum decay because it gave the chance for bacteria and fungi to multiply in soil and attack plants.

The interactions between organic fertilizer with storage period affected parsley but not rocket.

Similar results were found by other workers; **Parson, (1959) and (1960)** on cabbage and celery and **Wally *et al* (1978)** on parsley.

D- Freshness

Data in **(Table 6)** showed that freshness of rocket and parsley leaves significantly increased by solarization and organic fertilizer, and decreased as storage period prolonged. Similar

Table 3. Effect of soil solarization (Sol.), organic fertilizer (OF), storage period (SP) and their interactions on weight losses percentage of leaf cut of rocket and parsley (combined data of two seasons)

Treatments		Rocket					Parsley				
		Storage period (days)				Mean	Storage period (days)				Mean
		0	5	10	15		0	5	10	15	
Non-organic	Non-Solarized	0.000	1.172	1.609	2.380	1.290	0.000	0.982	1.445	1.968	1.099
	Solarized	0.000	0.677	0.808	1.054	0.635	0.000	0.592	0.830	1.093	0.629
Organic	Non-Solarized	0.000	0.936	1.125	1.423	0.871	0.000	0.790	1.104	1.501	0.849
	Solarized	0.000	0.511	0.634	0.740	0.471	0.000	0.449	0.708	0.891	0.512
Non-organic		0.000	0.924	1.209	1.717	0.963	0.000	0.787	1.137	1.531	0.864
Organic		0.000	0.724	0.880	1.082	0.671	0.000	0.620	0.907	1.197	0.681
	Non-Solarized	0.000	1.054	1.367	1.902	1.081	0.000	0.886	1.275	1.735	0.974
	Solarized	0.000	0.594	0.721	0.897	0.553	0.000	0.520	0.769	0.992	0.571
Mean		0.000	0.825	1.044	1.400		0.000	0.703	1.022	1.364	
L.S.D 0.05											
		OF	0.0367	OF × Sol.		0.0533	OF	0.0367	OF × Sol.		0.0519
		Sol.	0.0367	OF × SP		0.0755	Sol.	0.0367	OF × SP		0.0734
		SP	0.0533	Sol. × SP		0.0755	SP	0.0519	Sol. × SP		0.0734
				OF × Sol. × SP		0.1066			OF × Sol. × SP		N.S

N.S = Not Significant ($p < 0.05$)

Table 4. Effect of soil solarization (Sol.), organic fertilizer (OF), storage period (SP) and their interactions on visual quality of leaf cut of rocket and parsley (combined data of two seasons)

Treatments		Rocket					Parsley				
		Storage period (days)				Mean	Storage period (days)				Mean
		0	5	10	15		0	5	10	15	
Non-organic	Non-Solarized	9.000	8.250	7.500	6.563	7.828	9.000	9.000	8.000	7.250	8.313
	Solarized	9.000	9.000	8.469	7.782	8.563	9.000	9.000	8.750	8.250	8.750
Organic	Non-Solarized	9.000	8.813	8.219	7.157	8.297	9.000	9.000	8.250	7.875	8.532
	Solarized	9.000	9.000	8.813	8.219	8.758	9.000	9.000	9.000	8.750	8.938
Non-organic		9.000	8.625	7.985	7.173	8.196	9.000	9.000	8.375	7.750	8.531
Organic		9.000	8.907	8.516	7.688	8.528	9.000	9.000	8.625	8.313	8.735
	Non-Solarized	9.000	8.532	7.860	6.860	8.063	9.000	9.000	8.125	7.563	8.422
	Solarized	9.000	9.000	8.641	8.001	8.661	9.000	9.000	8.875	8.500	8.844
Mean		9.000	8.766	8.251	7.431		9.000	9.000	8.500	8.032	
	L.S.D 0.05										
		OF	0.1051	OF × Sol.		0.1485	OF	0.1258	OF × Sol.		N.S
		Sol.	0.1051	OF × SP		0.2101	Sol.	0.1258	OF × SP		0.2516
		SP	0.1485	Sol. × SP		0.2101	SP	0.1779	Sol. × SP		0.2516
				OF × Sol. × SP		N.S			OF × Sol. × SP		N.S

N.S = Not Significant ($p < 0.05$)

Table 5. Effect of soil solarization (Sol.), organic fertilizer (OF), storage period (SP) and their interactions on decay of leaf cut of rocket and parsley (combined data of two seasons)

Treatments		Rocket					Parsley				
		Storage period (days)				Mean	Storage period (days)				Mean
		0	5	10	15		0	5	10	15	
Non-organic	Non-Solarized	1.000	1.000	1.422	1.844	1.317	1.000	1.000	1.500	1.750	1.313
	Solarized	1.000	1.000	1.125	1.282	1.102	1.000	1.000	1.000	1.250	1.063
Organic	Non-Solarized	1.000	1.000	1.250	1.594	1.211	1.000	1.000	1.250	1.500	1.188
	Solarized	1.000	1.000	1.094	1.204	1.075	1.000	1.000	1.000	1.000	1.000
Non-organic		1.000	1.000	1.274	1.563	1.210	1.000	1.000	1.250	1.500	1.188
Organic		1.000	1.000	1.172	1.399	1.143	1.000	1.000	1.125	1.250	1.094
	Non-Solarized	1.000	1.000	1.336	1.438	1.194	1.000	1.000	1.375	1.625	1.250
	Solarized	1.000	1.000	1.110	1.243	1.088	1.000	1.000	1.000	1.125	1.031
Mean		1.000	1.000	1.223	1.341		1.000	1.000	1.188	1.375	
L.S.D 0.05											
		OF	0.0457	OF × Sol.		N.S	OF	0.0561	OF × Sol.		N.S
		Sol.	0.0457	OF × SP		N.S	Sol.	0.0561	OF × SP		0.1152
		SP	0.0650	Sol. × SP		0.0911	SP	0.0795	Sol. × SP		0.1152
				OF × Sol. × SP		N.S			OF × Sol. × SP		N.S

N.S = Not Significant ($p < 0.05$)

Table 6. Effect of soil solarization (Sol.), organic fertilizer (OF), storage period (SP) and their interactions on freshness of leaf cut of rocket and parsley (combined data of two seasons)

Treatments		Rocket					Parsley				
		Storage period (days)				Mean	Storage period (days)				Mean
		0	5	10	15		0	5	10	15	
Non-organic	Non-Solarized	5.000	5.000	4.438	4.016	4.614	5.000	5.000	4.500	4.125	4.656
	Solarized	5.000	5.000	4.829	4.438	4.817	5.000	5.000	4.875	4.688	4.891
Organic	Non-Solarized	5.000	5.000	4.704	4.266	4.743	5.000	5.000	4.625	4.375	4.750
	Solarized	5.000	5.000	4.907	4.594	4.875	5.000	5.000	4.938	4.938	4.969
Non-organic		5.000	5.000	4.634	4.227	4.716	5.000	5.000	4.688	4.407	4.774
Organic		5.000	5.000	4.806	4.430	4.809	5.000	5.000	4.782	4.657	4.860
	Non-Solarized	5.000	5.000	4.571	4.141	4.678	5.000	5.000	4.563	4.250	4.703
	Solarized	5.000	5.000	4.868	4.516	4.846	5.000	5.000	4.907	4.813	4.930
Mean		5.000	5.000	4.720	4.329		5.000	5.000	4.735	4.532	
	L.S.D 0.05										
		OF	0.0417	OF × Sol.		N.S	OF	0.0627	OF × Sol.		N.S
		Sol.	0.0417	OF × SP		0.0835	Sol.	0.0627	OF × SP		0.1251
		SP	0.0588	Sol. × SP		0.0835	SP	0.0886	Sol. × SP		0.1251
				OF × Sol. × SP		N.S			OF × Sol. × SP		N.S

N.S = Not Significant ($p < 0.05$)

Table 7. Effect of soil solarization (Sol.), organic fertilizer (OF), storage period (SP) and their interactions on chlorophyll reading percentage (SPAD) of leaf cut of rocket and parsley (combined data of two seasons)

Treatments		Rocket					Parsley				
		Storage period (days)				Mean	Storage period (days)				Mean
		0	5	10	15		0	5	10	15	
Non-organic	Non-Solarized	35.05	34.47	32.87	30.51	33.23	33.71	30.76	29.83	27.81	30.49
	Solarized	40.85	40.20	37.91	35.84	38.70	37.83	35.48	33.81	31.44	34.64
Organic	Non-Solarized	37.10	36.76	35.34	33.78	35.75	36.51	33.35	32.04	29.73	32.91
	Solarized	43.76	42.70	39.96	37.51	40.98	38.52	36.46	34.88	33.96	35.96
Non-organic		37.95	37.34	35.39	33.18	35.97	35.77	33.05	31.82	29.63	32.57
Organic		40.43	39.73	37.65	35.65	38.37	37.52	34.90	33.47	31.85	34.44
	Non-Solarized	36.08	35.62	34.11	32.15	34.49	35.11	31.99	30.94	28.78	31.72
	Solarized	42.31	41.45	38.94	36.68	39.85	38.17	35.97	34.35	32.70	35.30
Mean		39.20	38.54	36.53	34.42		36.64	33.98	32.64	30.74	
L.S.D 0.05											
		OF	0.6669	OF × Sol.		N.S	OF	0.8414	OF × Sol.		N.S
		Sol.	0.6669	OF × SP		N.S	Sol.	0.8414	OF × SP		N.S
		SP	0.0943	Sol. × SP		N.S	SP	0.1897	Sol. × SP		N.S
				OF × Sol. × SP		N.S			OF × Sol. × SP		N.S

N.S = Not Significant ($p < 0.05$)

Table 8. Effect of soil solarization (Sol.), organic fertilizer (OF), storage period (SP) and their interactions on dry matter percentage of leaf cut of rocket and parsley (combined data of two seasons)

Treatments		Rocket					Parsley				
		Storage period (days)				Mean	Storage period (days)				Mean
		0	5	10	15		0	5	10	15	
Non-organic	Non-Solarized	14.35	13.21	11.63	10.90	12.52	14.69	12.56	11.10	10.05	12.10
	Solarized	16.45	15.12	13.59	12.54	14.43	16.27	15.02	13.76	12.55	14.40
Organic	Non-Solarized	15.51	14.33	12.53	11.77	13.54	15.31	13.98	12.81	11.87	13.49
	Solarized	18.29	16.51	14.81	13.59	15.80	16.87	16.01	15.00	13.59	15.46
Non-organic		15.40	14.17	12.61	11.72	13.48	15.48	13.80	12.44	11.30	13.25
Organic		16.90	15.42	13.67	12.68	14.67	16.10	15.00	13.91	12.91	14.48
	Non-Solarized	14.93	13.77	12.08	11.34	13.03	15.00	13.27	11.96	10.96	12.80
	Solarized	17.37	15.82	14.20	13.07	15.12	16.57	15.52	14.39	13.25	14.93
Mean		16.15	14.80	13.14	12.21		15.79	14.40	13.17	12.11	
	L.S.D 0.05										
		OF	0.1034	OF × Sol.		0.1464	OF	0.1298	OF × Sol.		0.1836
		Sol.	0.1034	OF × SP		0.2069	Sol.	0.1298	OF × SP		0.2598
		SP	0.1464	Sol. × SP		0.2069	SP	0.1836	Sol. × SP		0.2598
				OF × Sol. × SP		N.S			OF × Sol. × SP		N.S

N.S = Not Significant ($p < 0.05$)

results for the effect of storage period on freshness were recorded by **Kmiecik *et al* (2001)** on dill; **Nicola *et al* (2004)** and **Athanasios *et al* (2007)** on rocket.

Storage period interaction with organic or with solarization affected parsley leaf freshness significantly. On the other hand, the interaction between organic with solarization and both with storage periods showed no significant effect on rocket and parsley leaf freshness. Solarization gave the best freshness because of decrement of pathogens in soil.

2- Chemical characteristics

A- Chlorophyll reading percentage (SPAD)

Such character is desirable for better quality of rocket leaves which are characterized by the appearance and colour as well as internal quality.

The data in **(Table 7)** recorded that chlorophyll reading (%) in rocket leaves significantly increased with solarization and with adding organic fertilizer, while it decreased as the time of storage periods increased. Effect of storage period was also confirmed by **Kmiecik *et al* (2001)** on dill; **Ferrante *et al* (2004)** and **Athanasios *et al* (2007)** on rocket. However, all other interaction treatments were insignificant.

B- Dry matter (%)

The influence of different treatments on percentage of dry matter content on rocket and parsley leaves is summarized in **(Table 8)**. Percentage of dry matter significantly increased by solarization and organic fertilizer, while it decreased as the time of storage period increased. Similar results for the effect of storage period were recorded by **Bottcher and Gunther, (2002)** on parsley.

The interaction between organic fertilizer and solarization and storage period with organic fertilizer or with solarization affected rocket and parsley dry matter significantly. On the other hand, all other interactions were insignificant.

REFERENCES

Abdallah, M.M.F. (1998). Improving vegetable transplants using soil solarization. II. Onion "*Allium cepa*". 7th Conf. Agric. Dev. Res. Fac., Agric., Ain Shams Univ., Cairo. Sp Issue, 3: 831-843.

Abdallah, M.M.F. (1999). No tillage sweet corn production following solarized faba bean and effect of *Orobanche* seedling depth. Bull. Fac. Agric., Cairo Univ., 50: 416-435.

Abdallah, M.M.F. (2000a). Increasing onion, garlic and carrots yield and quality and controlling weeds by soil solarization. J. Agric. Sci. Mansoura Univ., 25(7): 2611-2625.

Abdallah, M.M.F. (2000b). Improving yield and quality of spinach, radish, parsley, dill and coriander and weed control by soil solarization. J. Agric. Sci. Mansoura Univ., 25(9): 5867-5875.

Abdel-Monem, A.S. (1967). Factors Affecting the Keeping Quality of Some Leafy Vegetables Crops. pp. 1-2. Ph.D. Thesis, Fac. of Agric., Ain Shams Univ., Cairo, Egypt.

Agricultural Statistics for Winter Crops. (2006). pp. 106-107. Ministry of Agriculture and Land Reclamation, Cairo.

Athanasios, K.; A.S. Sigmos and E. Sfakiotakis. (2007). Post harvest CO_2 and ethylene production and quality of rocket (*Eruca sativa* Mill) leaves as affected by leaf age and storage temperature. Postharvest Biology and Technology, 46(2): 167-173.

Bottcher, H. and I. Gunther. (2002). Physiological postharvest response of leaf parsley (*Petroselinum crispum* Mill). Zeitschrift fur. Arznei und Gewurzpflanzen, 7(2): 336-341.

Farage, I.A. (1994). Studies on soil solarization. I. Effect of soil solarization treatments on weed control and yield of faba bean. Assuit J. of Agric. Sci., 25(5): 205-220.

Ferrante, A.; L. Incrocci; R. Maggini; G. Serra and F. Tognoni. (2004). Colour changes of fresh-cut leafy vegetables during storage. Journal of Food Agriculture and Environment, 2(3/4): 40-44.

Francke, A. (2004). Effect of cultivation time and soil kind on yielding of garden rocket (*Eruca sativa*). Folia Universitatis Agruculturae Stetinensis, Agricultura (95): 81-85.

Gelsomino, A. and G. Cacco. (2006). Compositional shifts of bacteria groups in a solarized and amended soil as determined by denaturing gradient gel electrophorsis. Soil Biology and Biochemistry, 38(1): 91-102.

Horowitz, M.; Y. Regev and G. Herzlinger. (1983). Solarization for weed control. Weed Sci., 31: 170-179.

Kader, A.A.; W.J. Lipton and L.L. Morris. (1973). System for scoring quality for postharvest lettuce. Hort. Science, 8: 408-409.

Katan, J. (1997). Soil solarization: Integrated control aspects. In: **Principles and Practice of Managing Soil Borne Plant Pathogens, pp. 250-278.** Robert Hall (Ed.) APS Press, Minnesota.

Khalid, K.H.A. and A.M. Shafei. (2005). Productivity of dill (*Anethum graveolens* L.) as influenced

by different organic matter rates and sources. **Arab Univ. J. Agric. Sci., Ain Shams Univ., Cairo, 13(3): 901-913.**

Kim-Sunju and G. Ishii. (2007). Effect of storage temperature and duration on glucosinolate, total vitamin C and nitrate contents in rocket salad (*Eruca sativa* Mill). **Journal of the Science of Food and Agriculture. 87(6): 966-973.**

Kmiecik, W.; Z. Lisiewska and G. Jaworska. (2001). Effect of storage conditions on the technological value of dill (*Anethum graveolens* L.). **Folia Horticulturae, 13(1): 33-43.**

Kurt, K. and B. Emir. (2004). Effect of soil solarization, chicken litter and viscera on populations of soil borne fungal pathogens and pepper growth. **Plant Pathology Journal, 3(2): 118-124.**

Nicola, S.; J. Hoeberechts and E. Fontana. (2004). Rocket (*Eruca sativa* Mill) and corn salad (*Valerianella olitorial* L.) production and shelf-life of two leafy vegetables grown in a soilless system. **Acta Horticulturae, 633: 509-516.**

Palada, M.C.; A.M. Davis; S.M.A. Crossman; C. Rables and E.A. Chichester. (2004). Sustainable crop management practices for improving production of culinary herbs in the virgin island. **Acta Horticulturae, 629: 289-298.**

Parson, C.S. (1959). Effect of temperature and packaging on the quality of stored cabbage. **Proc. Am. Soc. Hort. Sci., 74: 616-621.**

Parson, C.S. (1960). Effect of temperature and packaging and sprinkling on the quality of stored celery. **Proc. Am. Soc. Hort. Sci., 75: 463-469.**

Snedecor, G.W. and W.G. Cochran. (1980). Statistical Method. 7th Ed., Iowa State Univ. Press, Ames, Iowa, USA.

Verma, L.N. (1990). Role of bio technology in supplying plant nutrients. **Fertilizer News, 35: 87-97.**

Wally, Y.A.; M.A. Sharaf and M.A. Maksoud. (1978). Effect of harvesting date storage temperature on the storageability of leafy vegetables. **Egypt J. Hort., 5(1): 65-74.**

حوليـــات العلـــوم الزراعية
جامعة عين شمس ، القاهرة
مجلد(٥٤)، عدد (١)، ١٥١-١٦٤، ٢٠٠٩

تأثير التعقيم الشمسي والتسميد العضوي على المحصول والجودة للعشب الطازج للجرجير والبقدونس

[١٢]

رحاب عبد العزيز محمود شداد[١] - راوية البسيوني إبراهيم البسيوني[٢] -
عبد الحميد محمود الأسدودي[٣] - ممدوح محمد فوزي عبدالله[٣]

١- وزارة الزراعـــة واستصـــلاح الأراضـــي - الجيـــزة - مصـــر
٢- قسم بحوث تداول الخضر - معهد بحوث البساتين - مركز البحوث الزراعية - الجيزة - مصر
٣- قسم البساتين - كلية الزراعة - جامعة عين شمس - شبرا الخيمة - القاهرة - مصر

الملخص العربـــى

أجريت تجربتين حقليتين وتجربتين تخزين لدراسة تأثير التعقيم الشمسي والتسميد العـضوي والتفاعـل بينهما على المحصول والجودة والقـدرة التخزينيـة للجرجير والبقدونس في مزرعـة التجـارب بكليـة الزراعة - جامعة عين شمس - محافظة القليوبيـة ، ومعهد بحوث البساتين - مركز البحـوث الزراعيـة بالجيزة خـلال موسـمي ٢٠٠٥/ ٢٠٠٦ ، ٢٠٠٦/ ٢٠٠٧.

وقد أوضحت النتائج أن استخدام التعقيم الشمـسي لمدة ٦ أسابيع أدى إلى نقص معنـوي فـي أعـداد الحشائش الكليـة المـصاحبة لمحـصول الجرجيـر والبقدونس بعد ٢١ يوم من الزراعة مقارنـة بعـدم التعقيم كما أدى التعقيم الشمسي أيـضا إلـى تحـسن محصول وجودة كلا من الجرجير والبقدونس.

ومن ناحية أخرى أدى التسميد العضوي (سـماد الكتكوت) إلى نقص معنوي في أعداد الحشائش الكلية المصاحبة لمحصول الجرجير والبقدونس بعد ٢١ يوم من زراعة البذور ، وزيادة معنوية فـي محـصول وجودة كلا من الجرجير والبقدونس الطازج.

هذا وقد حدثت زيادة فـي المحـصول والجـودة للجرجير والبقدونس عند المعاملة بالتعقيم الشمسي مع التسميد العضوي ، بالإضافة إلـى المحافظـة علـى الجودة المظهرية والطزاجة والكلوروفيـل والمـادة الجافة وتقليل النسبة المئوية للفقد في الوزن والتلف.

وتخلص النتائج المتحصل عليها ، إلى أن التعقـيم الشمسي لمدة ٦ أسابيع عقب إضافة السماد العضوي طريقة ناجحة لمقاومة الحشائش بالتربة دون اللجـوء إلى استخدام المبيدات مع زيادة المحصول والمحافظة على الجودة للعشب الأخضر الطازج من الجرجيـر والبقدونس.

تحكيـم: أ.د سعيد عبد الله شحاته
أ.د محمـد هاشـم الديب