

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

EFFECT OF FOLIAR NUTRITION (SAHARA) SPRAY ON THE GROWTH AND ACTIVE INGREDIENT OF *Petroselinum sativum*.

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ABSTRACT

The present investigation was conducted in the Experimental Farm of Medicinal and Aromatic Plants Section, Dokki, Cairo, to study the effect of foliar spray fertilizer (Sahara) on the vegetative parsley growth, oil percentage and the chemical composition of oil during different of cuts. Foliar spray (Sahara) was sprayed in four concentrations (0, 1.5, 3.0 and 4.5 gm/L.), the plants received three sprays. It contains Zn 5.0 %, Mn 3.5 % and Fe 1.7 %.

The data indicated that, treating parsley plants by Sahara fertilizer at different concentrations had a significant effects on vegetative growth and oil percentage during different cuts. G. L. C. analysis of extracted oil showed that, the chemical composition of oil was Limonene, Terpene, Cymine and Caruophellene and the different compounds of extracted oil had affected with different concentrations..

INTRODUCTION

The increasing demand for medicinal plants as a source of national income nowadays, encouraged investigators to performs leading to increase the quantity and enhance the quality of the extracted active ingredient of parsley plant *Petroselinum sativum*.

Parsley plant family Umbelliferae is originating from Europe. It has been known since early times and mentioned the works of pling and Dioscorides. Now cultivated in every where as a biennial with characteristic appearance stems tall, 15-50 cm (6-20 in.) leaves, trpinnate, dark green and glossy, sometimes very crisped. Flowers greenish-yellow in an umbels, the plant has a strong characteristic small the flowering season in June to August.

Concerning the active constituents, the whole plant (seed in particular) contains an essential oil, containing apiol and myristion parsley also contains, apiine, pinene, vitamin C and the provitamin A.

Parsley is a first class condiment and widely used. It is diuretic, stomachic, carminative, anneragonic, expectorant and aphrodisiac. It can be used as an abortive. It considered as an infusion of the seed and leaves, as well as fresh juice, is used for jaundice dropsy, coughs, asthma a menovrhoea and dismenorrhoea. The juice has produced good results in cased of comjunctivitis and blepharitis. Paris(1977)

El-Shorbagy (1979) sprayed anise plants with 0.2 or 0.3 g/L zinc sulphate or 1.5 or 5.0 g/L manganese sulphate. He found that, both concentrations effectively increased plant height, leaf number of primary branches, leaf dry matter, as well as, yield component characters and

essential oil percentage and yield. Eid (1983) on *Foeniculum capillacum* (Gillib) and Khater *et al.*, (1988a) on *Foeniculum vulgar*, reported that, zinc treatment at 100 ppm increased the weight of seeds, yield, oil percentage and components per plant. Khater *et al.*, (1988b) reported that, foliar spray of Mn at 100 ppm on *Coriandrum sativum*, L. increased yield of fruits and seeds, weight of seeds as well as percentage and total volatile oil yield per plant and plot. Zayed (1993) studied the effect of some micronutrients (Sahara, applied four times at the rate of 1.5 g/L.), he found that, the growth, yield and volatile oil per cumin plant and/or plot were increased in comparison with control. Ahmed (1995) on *Nigella sativa*, L. found that, spraying plants with zinc sulphate, manganese sulphate and iron sulphate at the rate of 100 ppm significantly resulted in positive effects on plant height, branch number, fresh and dry weights of aerial parts of the plant and seeds weight as well as percentage and yield of fixed and volatile oil.

Under natural conditions absorption of mineral salts through the aerial organs of plant rarely occurs. In spraying the aerial organs with dilute solutions a practice which involves the absorption of the solution directly through the leaves or stems. This practice has been followed most successfully as means of supplying certain micro metabolic elements to plants. Manganese is often supplied to some plants by spraying the foliage with a dilute solution of salt of the metal which is to be supplied (Mayer and Anderson, 1956).

MATERIALS AND METHOD

This investigation was conducted at the farm of Medicinal and Aromatic Plants Section, Dokki, Egypt during the two successive seasons (1998-1999) to study the effect of spraying foliar (Sahara) compounds on vegetative growth, oil percentage and chemical composition of the oil of parsley during different cuts.

Seeds were sown on 14th April after soaking them in water for 24 hours. When plants reached 5-6 cm, they were thinned to two plants in the hill, the distance at 15 cm.

The experimental plot (3.2 X 3.0 m.) contained 5 rows, the width of the ridges was 60 cm.

Foliar spray (Sahara) was sprayed in four concentrations (0.0, 1.5, 3.0 and 4.5 gm/L). the first spray was after one month from planting and the others were afterwards at 15 days intervals, plant received three sprays.

Sahara compound contains Zn 5.0%, Mn 3.5% and Fe 1.7%.

The plants received all the agricultural practices. The design of the experiment was split plot, the main plot was different concentration of Sahara, while the sub plot was the different cuts (4 cuts) with three replicates. Four cuts were taken from the plants during the season, the first cut was after two months from sowing the seeds and the others were one month intervals afterwards .

The following data were recorded in every cut, plant height, fresh weight, oil percentage and its chemical composition. Oil percentage was estimated according to the method described by Person (1962).

Changes on the major chemical constituents of parsley oil in the different cuts as influenced by different concentrations of foliar spray were carried out using G.L.C. apparatus Model GCVPYe under the following conditions: °C/min chart 1.cm/min and sample size 2 11.

The following equation was used for the quantitative estimation of each fraction:

$$A_i \% = \frac{A_i}{A} \% 100$$

Where A_i - Faek area at each component.

A= sum of area of all peaks.

The statistical analysis were recorded according to Snedecor (1967).

RESULTS AND DISCUSSION

Effect of Sahara fertilizer treatments and different cuts on the vegetative growth of parsley plants :-

1-Plant height :-

Data presented in Table (1) showed that, spraying parsley plants with different concentrations of Sahara compound had a significant effect on plant height than control. The data also indicated that, plant height significantly increased by increasing the date of cut and reached its maximum at fourth cut. These results were true for the two seasons.

Table (1): Effect of Sahara compound on plant height of *Petroselinum sativum* during different cuts in 1998 and 1999 seasons.

Concentration Cuts/plant	1 st season					2 nd season				
	Con.	1.5	3.0	4.5	Mean	Con.	1.5	3.0	4.5	Mean
1 st cut	21.6	31.3	28.0	26.3	26.8	18.3	26.0	22.1	16.5	20.7
2 nd cut	24.3	33.3	23.3	30.3	27.8	18.6	25.3	19.1	21.7	21.2
3 rd cut	28.6	31.3	23.3	37.0	30.1	21.1	21.1	22.3	19.0	21.0
4 th cut	28.6	35.0	36.6	37.3	34.4	18.0	17.0	20.1	21.7	19.2
Mean	25.8	32.7	27.8	32.2		19.0	22.4	20.9	19.7	

L.S.D. at 5% for Sahara

1.3

1.5

L.S.D. at 5% for Cuts

0.4

0.6

L.S.D. at 5% for Inter.

1.7

1.0

Manganese probably plays a direct role in the oxidation reduction phenomena, especially in relation to iron compounds : Somer and Shive (1942) revealed that, manganese plays the role of such an oxidizing agent and an excess of manganese may therefore induce symptoms of iron deficiency by converting the available iron in the physiologically inactive ferric

condition. Hewitt (1963) stated that, manganese is considered as an activator in enzyme systems of the carboxylic acid cycle and carbohydrate metabolism.

As for the role of zinc in the physiological process in plant, Amberger (1974) concluded that, zinc functions as a part or cofactor for a lot of enzymes especially carbonic anhydrase, dehydrogenase, hexokinase, peptidase and so on. It is also necessary for RNA and protein-synthesis, as it controls auxin metabolism via tryptophan and blocks phosphate utilization.

Iron is a necessary element for plant nutrient, the role of iron in plant metabolism was achieved by Ambergar (1974) who reported that, iron is closely connected to chlorophyll protein complex of biosynthesis of chlorophyll. He added that, the role of iron in plant metabolism is various, its main function concern growth, respiration, chlorophyll synthesis and photosynthesis, symbiotic fixation of molecular nitrogen and some others interaction.

2-Fresh weight per plant :-

Data in Table (2) showed that, spraying parsley plant with different concentrations of Sahara compounds increased fresh weight than control, this increase was insignificant in the first season, while it was significant in the second one. The data also indicated that, by increasing the concentration, the fresh weight increased.

The fresh weight also significantly increased by increasing the date of cut up to the third cut, then the fresh weight significantly decreased.

The highest yield of fresh weight was obtained when the plant received the concentration of 4.5 gm/L in the third cut.

Table (2) Effect of Sahara compound on fresh weight per plant (kg.) of *Petroselinum sativum* during different cuts in 1998 and 1999 seasons.

Concentration	1 st season					2 nd season					
	Con.	1.5 g	3.0 g	4.5 g	Mean	Con.	1.5 g	3 g	4.5 g	Mean	
1 st cut	0.163	0.228	0.267	0.306	0.241	0.157	0.221	0.277	0.315	0.243	
2 nd cut	0.232	0.242	0.278	0.341	0.273	0.223	0.250	0.344	0.332	0.287	
3 rd cut	0.246	0.382	0.421	0.613	0.415	0.184	0.296	0.339	0.380	0.299	
4 th cut	0.160	0.263	0.364	0.372	0.276	0.161	0.200	0.215	0.247	0.205	
Mean	0.199	0.279	0.333	0.408		0.181	0.242	0.249	0.303		
L.S.D. at 5% for Sahara						N.S.					
L.S.D. at 5% for Cuts						0.008					
L.S.D. at 5% for Inter.						0.016					

II Effect of spraying Sahara compound and different cuts on volatile oil :-

1-Oil percentage :-

Data in Table (3) indicated that, oil percentage significantly increased by increasing the concentration of Sahara than the control. The data also indicate that, oil percentage significantly increased up to the fourth cut, i.e., the highest percentage was obtained in the fourth cut.

The increase in oil content of plant may be due to the increase of total carbohydrates caused by using Zn, Mn and Fe. These results were obtained by Mohamed *et al.*, (1988) on *Tagetes patula*, by using Zn, Mn and Fe.

2- Effect of Sahara treatments and different cuts on the chemical composition of volatile oil:-

The gas liquid chromatography determinations of extracted oil obtained from fresh herb of parsley plant was shown in Tables (4 & 5) and Fig. (1 to 8) indicated that, chemical composition of parsley oil was Limonene, Terpene, Cymine and Caryophellene.

The data also indicated that, the chemical compositions of volatile oil did not show any trends with different concentrations of Sahara compound in different cuts . Some compound increased with concentrations and another decreased.

From this study it could be recommended to spray parsley plant with 4.5 gm/L Sahara compound to obtain the maximum yield of fresh weight and harvest four cuts .

Table (3): Effect of Sahara compound on volatile oil % of *Petroselinum sativum* during different cuts in 1998 and 1999 seasons.

Concentration g/L	1 st season					2 nd season				
	Con.	1.5	3.0	4.5	Mean	Con.	1.5	3.0	4.5	Mean
1 st cut	0.04	0.05	0.05	0.06	0.05	0.02	0.03	0.04	0.12	0.05
2 nd cut	0.07	0.10	0.10	0.13	0.10	0.10	0.15	0.15	0.16	0.14
3 rd cut	0.01	0.01	0.02	0.02	0.02	0.04	0.04	0.11	0.15	0.09
4 th cut	0.01	0.06	0.03	0.05	0.04	0.10	0.12	0.11	0.18	0.13
Mean	0.06	0.06	0.05	0.062		0.07	0.09	0.10	0.15	
L.S.D.at 5% for Sahara					N.S					N.S
L.S.D.at 5% for Cuts					.007					.005
L.S.D.at 5% for Lnter					.015					.010

Table4+5

fig1

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تأثير التسميد الورقى بمركب (صحارى) على النمو والمادة الفعالة لنبات البقدونس
ملكة إبراهيم عيد ، شادية قطب أحمد
قسم بحوث النباتات الطبية والعطرية-معهد بحوث البساتين-مركز البحوث الزراعية

تمت هذه الدراسة فى مزرعة قسم بحوث النباتات الطبية والعطرية بالدقى فى موسمين زراعيين ١٩٩٨ ، ١٩٩٩ وذلك لدراسة تأثير الرش بمركب صحارى (وهو من الأسمدة الورقية) على النمو الخضرى ونسبة الزيت والتركيب الكيماوى للزيت
إستخدمت أربعة تركيزات من المركب (صفر ، ١,٥ ، ٣ ، ٤,٥ جم / لتر) ، وقد توصلت الدراسة إلى أن:

- ١-معاملة نبات البقدونس بمركب صحارى أدى إلى زيادة معنوية فى النمو الخضرى ونسبة الزيت عند زيادة التركيز فى خلال الحشاشات المختلفة بالمقارنة بالكنترول - كما أن زيادة التركيز أدت إلى زيادة فى المقاييس السابقة خلال الحشاشات المختلفة .
- ٢-أظهر التحليل الكروماتوجرافى لزيت البقدونس خلال الحشاشات المختلفة إلى احتوائه على ليمونين - تيربين - سيمين و كاريوفيللين ، وقد تأثرت هذه المكونات بالرش بالمركب وكذلك بمواعيد أخذ الحشاشات.
- ٣-ونصح باستخدام السماد الورقى صحارى بتركيز ٤,٥ جم/لتر للحصول على محصول من العرش الطازج .