

EFFECT OF ADDING ORGANIC AND MINERAL FERTILIZERS ON PRODUCTIVITY AND QUALITY OF JEW'S MALLOW LEAVES

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ABSTRACT

The research was conducted during 2005 and 2006 in Almriyaia, Deir Ezzor to determine the effects of adding organic and mineral fertilizers on the contents of NO_2 and NO_3 in Jew's mallow leaves.

Results show that absence of NO_2 in first and second harvests for all studied treatments was obvious. While, using urea and cow manure yielded high productivity of leaves and low content of NO_3 . The treatment of balanced solvable NPK was the second in productivity, of leaves and contained low concentration of NO_3 .

On the other hand, using NH_4NO_3 and $(\text{NH}_4)_2\text{SO}_4$, resulted in low yield and increased content of NO_3 in Jew's mallow leaves.

INTRODUCTION

Tiliaceae family is well known to comprise 40 genus and 400 species of trees, shrubs and grasses which is grown in sub and tropical areas. Jew's mallow is the only edible vegetable of this species. Its popularity in foods dishes is known for both green and dried one. Believing that the natural habitat of this crop is Africa and India, this crop is planted in Egypt during summer season, it is 1-1.5 M long with alternate leaves. This kind of food is popular in Arabic, Indian, japons countries. Old Egyptians call it Menwa or Monah. It was a clue mentioned Bracken's dictionary indicting of its originality. And some craves were found in pharos temples. In 1978 Professor Imorry at Takoshowko University in Japan was the first man to bring its seeds to Japan. At the rein of Al Hakkem Be Amer Ella, he issued a decision of banning from popular class dishes.

Each 100 gram of leaves contain 3.83% protein, 280 MG. calcium, 119 MG. magnesium, iron, phosphors and 12550 I.U of vitamin A that protect from cancer and other well known benefits, although maintained in cooking and drying process. It has medical properties in anti constipation, ulcers, jaundice, heart weakness, treating derma disorders and skins, and Blagerr disease. Also, it contains Glycosides and Allinozeds and vitamin D which help strong bones formation. Jew's mallow has a mucilage material that has medical effects for intestines ulcers. The source of bitterness is chemically called Koerken in small leaves and seeds.

The main aim of this research was to study the effects of adding organic and mineral fertilizers on productivity of Jew's mallow leaves. According, the present study was undertaken to investigate the effect of N-organic and N-mineral fertilization on productivity of Jew's mallow.

MATERIALS AND METHODS

This research was conducted in Almriyaia, Deir Ezzor for the period of during two years 2005 and 2006. The soil was disc harrowing, fining and leveling for Seed beds; then seeds dispersed and covered with thin layer of soil which followed by irrigation. Variety called pharos, the most well known type, with its strong, wide leaves, good height, greenish glossy leaves, and pointed end and also has small noticeable ears was planted. Herbicide of Travlant was used before sowing to control weeds.

Experiment treatments

M₁- Urea and P.K fertilizers

M₂- Organic manure and P.K fertilizers

M₃- Without fertilizers (control)

In the first treatment, the application of N fertilizer was

50 Kg. Urea / Dounem

20 Kg. The phosphorus fertilizer rate was Super phosphates/ Dounem

12.5 Kg. The potassium fertilizer rate was potassium Sulphates/ Dounem.

In the second treatment amounts of fertilizers

2250 Kg. organic fertilizer / Dounem was used

20 Kg. super phosphates / Dounem was used

12.5 Kg. Potassium sulphates / Dounem was used

The seed rate was 400 grams per plot

The area of plot, the replication area was 3x4 M²

The studied attributes:

Forty five plant samples were taken from each experiment plot in order to study the following parameters:

- 1- Height in cm.
- 2- Number of leavers
- 3- Productivity
- 4- The net rate

Statistical analysis

With three replications, RCBD statistical model was implemented; and the analysis was done carried out according to usual standards. Then the F test was calculated in order to determine the significant differences on L.S.D 0.05 levels.

RESULTS AND DISCUSSIONS

Jew's mallow is fast maturing crop. Plants reach its consumption maturity after 60 to 70 days of sowing date. Seeds were sowing in 12 of April. And plants were germinated after 10 days from planting where the first real leaf formed after 25 days of sowing. Crop was harvested after 50-60 days.

Jew's mallow is summer crop which tolerates high temperatures and it is sensitive to coolness, although it can be germinated in low temperature, but plants need to high temperature. The ideal temperature is 30 C in day and 20 C in night by which the rate of leaves increase against stems (Hajjie and Shtaway, 1999).

Table (1): shows the contents nutrients in 100 MG. of Jew's mallow leaves.

Contents	Green Jew's mallow	Dried Jew's mallow
Proteins	3.83%	22.88%
Fats	0.41%	2.44%
Carbohydrates	8.03%	47.98%
Fibers	1.71%	10.21%
Ash	2.76%	16.49%

Table (2): Shows the stages of plant development from sowing date (In days).

Sowing Date	Germination	Forming first real leaf	To harvest
12 April	8-10 days	25 days	50-60 days

Data in table No.3 show that the average of minimum and maximum temperature, lights hours in the region of this study. We find that the minimum temperature 11.9C, maximum 25.6 and 8.5 day light hours are ideal conditions for Jew's mallow.

Table (3): Metrological data for Jew's mallow crop.

Metrological Conditions requirements	January	February	March	April	May	June	July	August	September	October	November	December
Minimum Temp.	2.6	3.9	7.1	11.9	17	22	25.1	40	20.2	14	7.8	3.9
Maximum Temp.	12.8	15.6	19.8	25.6	3.5	37.3	40.3	47.8	35.4	29.4	21.3	14.7
Light hours/Day	5	6.3	7.3	8.5	10.1	13.2	13.5	11.9	10.7	8.4	7.2	5.2

A close look at above table shows that April month is perfect time to grow this crop. 45 plants were selected from each experimental plot to count the leaves numbers.

Table (4): Number of leaves per plant of Jew's mallow plants.

Date Replicate No.	15/5				25/5				4/6			
	R ₁	R ₂	R ₃	Average	R ₁	R ₂	R ₃	Average	R ₁	R ₂	R ₃	Average
Treatments												
1 st Treatment	6	5	6	6	18	20	18	19	34	29	31	31
2 nd Treatment	4	6	5	5	10	12	15	12	17	20	23	20
3 rd Treatment (control)	6	6	6	6	50	46	50	48	95	80	95	90

R: replicate

From the above table we see that the number of leaves increased with time. The number of leaves in all treatments at first harvest was almost the same. On the other hand, in second harvest we noticed that the number of leavers was more than second and third treatment. At the third harvest we found the same results with some differences of first treatment in increasing number of leaves against second and third treatment. Therefore, it is

possible to say that first form is the best which we can recommend. Also, we noticed that the quality of the (treatment control) leaves was greenish glossy and big in size. In contrast (the third treatment) the quality of leaves was bad and leaves were thick and dark greens and the second treatment was in the middle of first and third treatments.

The height of plant was measured by ruler, three measurements were taken with the average of 15 plants/replication.

Table (5): The height of Jew's mallow plant Cm.

Date Replicate No.	15/5				25/5				4/6			
	R ₁	R ₂	R ₃	Average	R ₁	R ₂	R ₃	Average	R ₁	R ₂	R ₃	Average
Treatments												
1 st Treatment	6	5	8	6	14	12	17	14	34	29	31	31
2 nd Treatment	4	6	5	5	10	12	15	12	17	20	23	20
3 rd Treatment (control)	6	6	6	6	23	20	22	21	45	40	44	43

R: replicate

The above findings shows: a close looking data we conclude that the height of stems get longer with time and the number of leaves in all treatments at first harvest was almost the same. On the other hand, in second harvest we noticed that the number of leavers was more than second and third treatment. And the third harvest we found the same results with some differences of first treatment in increasing number of leaves against second and third treatment. Therefore, it is possible to say that first form is the best which we can recommend. Also, we noticed that the quality of the (treatment control) leaves was greenish glossy and big in size. In contrast (the third treatment) the quality of leaves was bad and leaves were thick and dark greens and the second treatment was in the middle of first and third treatments. This proves our conclusions of first treatment.

The net productivity

It can be calculated from the following equation:

Net productivity % = leaves weight/plant weight x100

We can conclude from the table 6 and 7 that the control treatment has better results in contrast to the other treatments. And the net productivities were 43.8%, 38% and 27% for the three treatments, respectively.

Table (6): The net productivity of Jew's mallow crop.

Treatments	1 st Harvest				2 nd Harvest				3 rd Harvest			
	R ₁	R ₂	R ₃	Average	R ₁	R ₂	R ₃	Average	R ₁	R ₂	R ₃	Average
1 st Treatment	25	40	45	36.5	37	42	28	31	41	40	41	40.5
2 nd Treatment	25	33	28	28.5	27	33	28	29.5	14	28	27	23
3 rd Treatment (control)	44.5	47.5	44.5	45.5	44	42.95	42.85	43.5	44	42	41.5	42.5

R: replicate

Table (7): shows the net productivity% of the average of three harvests.

Treatments	1 st Harvest average	2 nd Harvest average	3 rd Harvest average	Total yield average
1 st Treatment	36.5	31	40.5	36
2 nd Treatment	28.5	29.5	23	27
3 rd Treatment (control)	45.5	43.5	42.5	43.8

Productivity

Productivity was calculated in each harvest for three replications in particular when plants reached appropriate length after 50-60 days of sowing date. We took in to account in harvesting that leaves should be not rough, not leaving them to grow bigger which make their properties deteriorating and become full of fibers and increasing the mucilage during cooking. Calculation had been done by weighing complete plant (stems and leaves) in M² and then converted into Dounem. Table 8 control treatment reflected a significant differences in which first treatments was better than second one. Its average was 6160 Kg/Dounem with increasing 4950 Kg./Dounem in third one. And LSD was 450 Kg/Dounem. Also, it was noticed that there was significant differences in second treatment with increasing about 3520 Kg/Dounem Table 10.

Table (8): Productivity for three treatments (Kg/m²) at different dates.

Date	15/5				25/5				4/6			
Replicate No.	R ₁	R ₂	R ₃	Average	R ₁	R ₂	R ₃	Average	R ₁	R ₂	R ₃	Average
	Treatments											
1 st Treatment	0.41	0.58	0.66	0.55	0.75	0.38	0.75	0.77	1.41	1.16	1.41	1.32
2 nd Treatment	0.20	0.33	0.37	0.3	0.25	0.5	0.75	0.5	0.33	0.33	0.58	0.41
3 rd Treatment (control)	1.08	1.16	1.08	1.10	1.91	1.58	2.29	1.9	3	3.08	3.41	3.16

R: replicate

Table (9): The average of productivity for three harvests of Jew's mallow leaves.

Treatments	Average of the First Harvest	Average of the second Harvest	Average of the Third Harvest	Total productivity, Kg/m ²	Leaves and stems, Kg/Dounem	Net productivity of leaves KG/Dounem
1 st Treatment	0.55	0.77	1.32	2.64	2640	950.5
2 nd Treatment	0.3	0.5	0.41	1.21	1210	327
3 rd Treatment (control)	1.1	1.9	3.16	6.16	6160	2648

Table (10): Economic feasibility of one Dounem cultivated with Jew's mallow crop.

Treatments	Plant productivity		Net productivity Kg/Dounem	Income, Syrian pound	Income, Syrian pound	Expenditure per Dounem, S.P.	Net profit, S.I.
	Leaves+ Stems, Kg/m ²	Leaves+ Stems, Kg/ Doun.		Leaves+ Stems, 5Sp /Kg	Leaves, 15 Sp/Kg		
1 st Treatment	2.64	2640	950.5	13200	1425	2000	12257
2 nd Treatment	1.21	1210	327	6050	4905	2000	2905
3 rd Treatment (control)	6.16	6160	2648	30800	34340	2000	32340

Conclusion and Recommendation

The effects of organic and minerals fertilizers was studied to determine the best economic productivity. We concluded that we recommend using the first treatment that has the maximize and also yield with high profit it

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تأثير إضافة الأسمدة العضوية والمعدنية على إنتاجية وجودة أوراق الملوخية

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نفذ البحث في قرية المريمية التابعة لمحافظة نينوى بسوريا خلال عامي ٢٠٠٥-٢٠٠٦ م، حيث تمت دراسة تأثير إضافة الأسمدة المعدنية والمضوية على إنتاجية نبات الملوخية ونوعية وجودة الأوراق الناتجة، وتم في الدراسة استخدام ثلاث معاملات هي:

المعاملة الأولى : سماد يوريا + سماد بوتلسي وفوسفاتي

المعاملة الثانية : سماد عضوي + سماد بوتلسي وفوسفاتي

المعاملة الثالثة : بدون سماد (الكنترول)

وقد أظهرت نتائج البحث أن المعاملة الأولى قد تفوقت على المعاملة الثانية و الثالثة في صدد الأوراق وارتفاع اللبنة ونسبة التصافي والإنتاجية ونوعية وجودة الأوراق وإن قلل المعاملات هي الثالثة (الكنترول).

لذلك نوصي بتطبيق المعاملة الأولى من التجربة عند زراعة نبات الملوخية لكونها أعطت أفضل النتائج وكذلك أعلى مردود مادي.