

## Study of response *Trigonella foenum- graecum* to spraying with high potassium (Miller) and high phosphor (Agroleaf)

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### Abstract

The experiment was conducted in one of horticulture station through the season 2013-2014 , to study the response of *Trigonella foenum - graecum* to spraying with high potassium Miller and high phosphor Agroleaf , the experiment was including six treatment comparison was results from the interaction between two factors , the first one spraying with high potassium Miller with three levels (0, 250, 400) gm. 100L<sup>-1</sup>, The second spraying with high phosphor Agroleaf in two levels (0, 400) gm, 100 L<sup>-1</sup>, replicated three times gave eighteen experiment units. R.C.B.D. was chosen in factorial experiment , the results compared in Duncan test at 5%. Results are summarized that high potassium spraying (400gm . 100L<sup>-1</sup>) and high phosphor Agroleaf spraying second level 400gm. 100L<sup>-1</sup> gave highest value (35.58, 5.66, 12.16, 11.5, 305.5) and (36.05, 5.77, 11.33, 11.11, 297.3) compared with the control treatment in vegetative growth characters and yield (plant height , branches numbers , bods numbers, seeds numbers, total yield), interaction between high potassium spraying miller 400gm 100L<sup>-1</sup> + agroleaf 400gm 100L<sup>-1</sup> gave increasing to other treatment in all vegetative growth characters and yield (39, 7.33, 18.33, 14, 310.7) .

**Keywords:** Graecum , Miller , Agroleaf .

### Introduction

The *Trigonella foenum – graecum* is a family member of leguminous Fabaceae, it contain several components of food supplement and chemicals, which is rich in protein, fat and carbohydrates, saponins in addition to containing nutrients such as potassium, calcium, magnesium, phosphorus, iron, manganese, etc., also contain vitamins such as vitamin a, b and c [1]. Fenugreek is used as expectorant and reduce cholesterol inflammation in the blood and is used by diabetics to reduce sugar because it contains the active fiber and other active ingredients [2].

Although legumes benefit from atmospheric nitrogen, which is fixed by bacteria root ganglia, which coexist with the plant but we find response to add nitrogen fertilizer as well as phosphorus and potassium [3], also the plant, in many cases do not benefit from the fertilizer added to the soil, especially in basal soils where still most of the elements making them not ready to plant [4]. Or exposed to volatilization or washing in Light soils [5]. Therefore, the nutrients sprayed on the vegetative part of the plant played an important role in equipping nutrients, as is the leaf have the physical and chemical interactions process of transpiration and photosynthesis [6] and thus works to bridge the shortfall of Ground fertilization. [7] It has been found That sprayed plants licorice nutrients N, P and K have outperformed significantly in leaf area and weight of dry leaves and an increase of 99.28% and 160.18%, respectively, compared to the treatment comparison. The seeds growing period nutrients because they will be large nutrient storage and vegetative or obtained nitrogen fixation may be insufficient during this period, which requires speed up the plant nutrients processing [ 8].

And when [9] The sprayed plants fenugreek nutrients NPK 15-45-35 kg.d<sup>-1</sup> has given the highest results in plant height and number of branches and the number of bods and total yield. [10] proved that the addition

of 400 kg P<sub>2</sub>O<sub>5</sub>. Hectare<sup>-1</sup>, to fenugreek has given the significant increase in characters plant height and number of branches and the number of bods, wet and dry weight of the root, and dry weight of seeds in hectare. In a study [11] found that the addition of potassium level of 75 kg.d<sup>-1</sup> K. hectares<sup>-1</sup> to plant Peas, have been given the highest results in the qualities of plant height and number of branches and the number of bods and total yield of seeds. In a study on the effect of spraying Agroleaf on the Fenugreek [12] was the plant that treated gave a significant increase in all the traits, plant height and number of branches, number of leaves and number bods and total yield seeds.

And for the importance of fenugreek in the medical and agricultural sector and the fact that it's low products in Iraq This experiment was conducted in order to improve the production of seeds treated through two types of fertilizer Miller and Agroleaf .

### Materials and methods of work

The experiment carried out in the agricultural season 2013 - 2014 in the horticultural research / Faculty of Agriculture / University of Tikrit station In gypsum soil and the table (1) shows some of physical and chemical properties .

**Table (1) some of physical and chemical properties of soil**

Characters	Value
pH	7.20
Ec dese semmens.m <sup>-1</sup>	1.20
Gibbs gm.kg <sup>-1</sup>	10.40
NO <sub>3</sub> mlg.kg <sup>-1</sup>	10.30
Phosphor mlg.kg <sup>-1</sup>	6.09
Potassium mlg.kg <sup>-1</sup>	155
Sand gm.kg <sup>-1</sup>	678
Silt gm.kg <sup>-1</sup>	172
Clay gm.kg <sup>-1</sup>	150

Included experiment on two factors, first factor spraying fertilizer Miller High potassium (0, 250.400) g. 100 liters<sup>-1</sup> of water, and the second factor spraying high-phosphorus fertilizer Agroleaf (0.400) g. 100 L<sup>-1</sup> water, resulting from the interaction between the three factors of spraying fertilizer Miller High potassium and two factors of spraying with Agroleaf High phosphorus, six synthetic transactions repeated three times and thus become our 18 experimental units, The soil was tilling and divided into three sectors, each sector contains six shingles, shingles space 4m<sup>2</sup>, the distance between lines 50 cm and between the plants 30 cm. Seeds are planting in 11/09/2013 in holes, the hole contain 3-5 seed at a depth of 3-4 cm were irrigating the soil after farming using drip irrigation method. Sprayed plants Miller High potassium fertilizer, which is fertilizer compound NPK 9-15-30 also contains micronutrients (boron 0.02%, 0.05% copper, 0.10% iron, 0.05% manganese, Moulibodiom 0.0005%, zinc 0.05%), and composting Agroleaf High phosphorus, a fertilizer compound NPK 12-52-5 according to micronutrients (boron 0.030%, 0.070% copper, 0.140% iron, manganese 0.070%, Molebednom 0.001%, 0.070% zinc) by transactions, in two adding , the first spray

upon arrival plant height of 15 cm on 22/12/2013, and the second two months after the first spray on 25/02/2014. Conducted agricultural processes followed by irrigation and weeding eased plants into two plants in the hole. Conducted experimental measurements of vegetative growth at end of growing season on 04/05/2014 five plants were taken randomly from each experimental unit included plant cm.plant<sup>-1</sup>, number of branch. branch.plant<sup>-1</sup>, number of Pods pod. plant<sup>-1</sup>, and number of seeds seed. plant<sup>-1</sup>, total yield kg.hectar<sup>-1</sup>. After taking measurements and arranged and classified Statistical analysis was performed using a polynomial Duncan test at the level of probability of 0.05% [13].

**Results and discussion**

The table (2) shows the effect of spraying fertilizer Miller High potassium in some characters vegetative growth and yield of fenugreek plan, plant height, branches number, bods number, seeds number and total yield of seeds, the table shows that the spraying fertilizer Miller in the level of 400 g. 100 liters<sup>-1</sup> of water, was gave significant increase in the mentioned characters compared with the comparison treatment.

**Table (2) the effect of spraying fertilizer Miller High potassium on some characters of vegetative growth and yield of fenugreek**

character					Spraying fertilizer transactions Miller High Potassium
total yield kg .hectare <sup>-1</sup>	seeds numbers, seed.bod <sup>-1</sup>	bods numbers, bod.plant <sup>-1</sup>	branches numbers, br.plant <sup>-1</sup>	plant height cm.plant <sup>-1</sup>	
232.10b	8.00b	5.66b	3.66b	30.50b	Control
255.00b	8.33b	7.50b	4.33b	33.75b	250gm.100L <sup>-1</sup> water
305.50a	11.50a	12.16a	5.66a	35.58a	400gm.100L <sup>-1</sup> water

Table (3) shows the effect of spraying high-phosphorus Agroleaf on the characteristics of vegetative growth (plant height, branches number) and yield characters (bods number, seeds number and total yield) of fenugreek, the results appear from the table that the spraying fertilizer High phosphorus

Agroleaf (400gm.100 liters<sup>-1</sup> of water) has given the best results for characters(plant height, branches number ,bods number, seeds number and total yield) (36.05, 5.77, 11.33, 11.11, 297.3) compared with the comparison treatment that gave (30.5, 3.33, 5, 55, 7.44, 211.55).

**Table (3) the effect of spraying fertilizer High phosphorus Agroleaf on some characters of vegetative growth and yield of fenugreek**

character					High-phosphorus fertilizer spraying Agroleaf transactions
total yield kg.hectare <sup>-1</sup>	seeds numbers, seed.bod <sup>-1</sup>	bods numbers, bod.plant <sup>-1</sup>	branches numbers, br.plant <sup>-1</sup>	plant height cm.plant <sup>-1</sup>	
211.55b	7.44b	5.55b	3.33b	30.50b	Control
297.30a	11.11a	11.33a	5.77a	36.05a	400gm.100L <sup>-1</sup> Water

Table (4) shows the effect of interference between the spraying fertilizer Miller High potassium and Agroleaf High phosphorus on some of the characters of vegetative growth and yield of fenugreek (plant height, branches number, bods number, seeds number and total yield) the table shows that the effect of interference (400 g Miller 100 liter<sup>-1</sup> water + 400 g

Agroleaf.100 liters<sup>-1</sup> of water) has given the best results in all characters (plant height, branches number, bods number, seeds number and total yield) (39, 7.33, 18.33 0.14, 310.7) compared with the comparison treatment that gave (27.33, 2.33, 3.66, 5.66, 197.5).

**Table (4) the effect of interference between the spraying fertilizer Miller High potassium and Agroleaf High phosphorus fertilizer in some of characters vegetative growth and yield of fenugreek**

Character					The interference between the spraying fertilizer Miller and Agroleaf
total yield kg .hectare <sup>-1</sup>	seeds numbers, seed.bod <sup>-1</sup>	bods numbers, bod.plant <sup>-1</sup>	branches numbers, br.plant <sup>-1</sup>	plant height m. plant <sup>-1</sup>	
b197.50	c5.66	b3.66	c2.33	c27.33	<b>Control</b>
b210.33	ab10.33	b7.66	5.00 b	ab33.66	<b>250gm Miller.100L<sup>-1</sup>water</b>
b215.40	cb7.66	7.00 b	cb3.66	32.00bc	<b>400 gm Miller.100L<sup>-1</sup>water</b>
b235.00	9.00 cb	8.00 b	b5.00	ab 035.5	<b>400 gm Agroleaf.100L<sup>-1</sup>water</b>
b266.00	9.00 cb	6.00 b	cb4.00	cb32.16	<b>250gm Miller.100L<sup>-1</sup>water+400 gm Agroleaf.100L<sup>-1</sup>water</b>
a310.70	a14.00	a18.33	a7.33	a39.00	<b>400gm Miller.100L<sup>-1</sup>water+400 gm Agroleaf.100L<sup>-1</sup>water</b>

The increase is due to the spraying of plant nutrient of leaves fertilizer Miller and Agroleaf, because these fertilizers contain macro elements NPK and entering in the composition of organic compounds important in biological processes in the plant, Nitrogen is one of the protein components and enzymes, chlorophyll as it enters the Special Operations in protoplasm and enzymatic reactions and process of photosynthesis, and contributes to phosphorus in the formation and cell division and the formation of a strong and efficient roots high in the water, salt and nutrient absorption in addition to that it power vehicles elements and contributes to the transfer of manufacturing materials such as sugars process, potassium enters in increasing the effectiveness of photosynthesis and activation of enzymes and the process of the transfer process manufactured products to storage places [14]. And in turn led to increased activity of biological processes and regulate the level of plant hormones which control the division and growth of stem cells and increase the surface area of the leaves and thus increase food manufacturers of carbohydrates, proteins and transported to places

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need to build the plant tissue, which in turn is reflected in the growth and yield including (plant height, branches number, bods number, seeds number and total yield) [15]. These results are consistent with the mentioned [12] In a study of fenugreek, which found that the addition of fertilizer Agroleaf led to a significant increase in the (plant height, branches number, bods number, seeds number and total yield) amounting values (44.73, 6.46, 56.94, 15.33) as these fertilizers contain many small ones elements manganese, zinc, iron, boron, molbydiom and copper available for plant and increase its content in the vegetative part [16], as iron activates enzymes, redox for the electron transport chain in the process of respiration and help in the construction of chlorophyll, which affects positively the qualities of vegetative growth. these results are consistent with [9], and boron, zinc, which is working on the transfer of sugars into high-efficiency areas affecting the increase growth vegetative in general, [5] in addition, they provide micronutrients readily absorbed through the spraying of nutrients solution, which improves the vegetative growth [17,18].

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دراسة استجابة نبات الحلبة *Trigonella foenum – graecum* للرش بسماد عالي البوتاسيوم  
(ميلر) وسماد عالي الفوسفور (الاكروليف)

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الملخص

نفذت التجربة الحقلية في احد المنشآت التابعة لقسم البستنة وهندسة الحدائق خلال الموسم الزراعي 2013 – 2014 ، لدراسة استجابة نبات الحلبة *Trigonella foenum – graecum* للرش بسماد عالي البوتاسيوم (ميلر) وسماد عالي الفوسفور (الاكروليف)، تضمنت التجربة ست معاملات توليفية نتجت من التداخل بين العاملين، العامل الأول الرش بسماد عالي البوتاسيوم (ميلر) بثلاث مستويات (صفر، 250، 400)غم. 100 لتر<sup>-1</sup> ماء، والعامل الثاني الرش بسماد عالي الفوسفور (الاكروليف) بمستويين (صفر، 400)غم. 100 لتر<sup>-1</sup> ماء ، كررت ثلاث مرات انتجت ثمانية عشر وحدة تجريبية، اختير تصميم القطاعات العشوائية الكاملة بتجربة عاملية وقورنت النتائج باستخدام اختبار Duncan متعدد الحدود على مستوى احتمال 5%. تلخصت النتائج بأن اعطت معاملة الرش بسماد ميلر عالي البوتاسيوم مستوى 400 غم . 100 لتر<sup>-1</sup> ماء، ومعاملة الرش بسماد الاكروليف عالي الفوسفور المستوى الثاني 400 غم. 100 لتر<sup>-1</sup> ماء، اعلى النتائج (35.58 ، 5.66 ، 12.16 ، 11.5 ، 305.5) و(36.05، 5.77، 11.33، 11.11، 297.3) مقارنة مع معاملة المقارنة في صفات النمو الخضري والحاصل (ارتفاع النبات، عدد الافرع، عدد القرنات، عدد البذور بالقرنة، الحاصل الكلي) وعلى التوالي، اما تأثير التداخل فقد اعطت معاملة الرش بسماد (ميلر) 400 غم. 100 لتر<sup>-1</sup> ماء + اكروليف 400 غم. 100 لتر<sup>-1</sup> ماء، اعلى المتوسطات ولجميع الصفات (39 ، 7.33 ، 18.33 ، 14 ، 310.7).

الكلمات المفتاحية: الحلبة، ميلر، اكروليف.