

THE EFFECT OF SPRAYING WITH LICORICE EXTRACT AND ORGANIC FERTILIZATION OF POULTRY IN THE GROWTH OF FENUGREEK PLANT (*TRIGONELLA FOENUM-GRAECUM L.*)

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Abstract

The Research was conducted in the vegetable's house of Biology Department - College of Education for Pure Sciences-University of Diyala during the season 2014-2013 on fenugreek (*Trigonella foenum - graecum L.*) in order to study the effect of spraying with licorice extract by three levels 0, 2,3 g /l and spraying by four levels with poultry is 0,10, 15, 20 ml /l and their overlap in the growth of fenugreek In some recipes of vegetative growth and the product by using the global experience according to a complete randomized design C.R.D with four observations and the averages were compared by using Duncan test which is polynomial test at probability level of 0.05. The results indicated lack of a significant effect for the all used concentrations of licorice extract in all traits while the spray with the organic fertilization extract of the poultry at concentration of 15 ml / liter led to register the highest moral values in the recipe of pods number 62.22 pod / plant and the number of branches which reached to 5.55 Branch / plant compared with control treatment which recorded 46.11 and 4.33 respectively and there were no significant differences in each of the recipe of length and concentration of chlorophyll and weight of the registered pod in plants that are sprayed with the extract at concentration of 20 ml / liter which reaching to 117.77, 52.87, 93.05, respectively than in the treatment of spraying at concentration of 15 ml / liter which recorded 117.11, 51.93, 93.07 respectively. General, the interaction data indicate that the highest values for all traits in plants that were not sprayed with the extract of licorice and sprayed with the extract of organic fertilization of poultry.

KEYWORDS: LICORICE. ORGANIC. FERTILIZATION. POULTRY. FENUGREEK.

1. INTRODUCTION

The fenugreek (*Trigonella foenum - graecum L.*) is a plant belongs to the legume family (Fabaceae) and its English name (Fenugreek) is derived from the ancient Greek name (Greek hay) animal feed (straw or hay) and has many Arabic names such as Hallab – Halab (Al Batanouny 1999, Aldbai and Khulaidi 1997), commonly used in medicine since ancient times and is used today in the form of food and medicine in most countries of the world and because of being a rich source of a range of food ingredients such as proteins, fats, minerals and vitamins (Barnes, 2002) as well as its medical use such as increasing the milk secretion after birth by stimulating the mammary glands and regulating the cases of unstable menstruation among adolescent girls and used to increase appetite and in the treatment of anemia cases and weakness of the body and in the treatment of whooping cough and chest diseases and ease the pain of hemorrhoids and severe cases of constipation and some animal experiments showed that the Fenugreek works to inhibit liver cancer (Chevalier, 2003).

The recent studies pointed to the possibility of using some plant extracts such as licorice extract (*glycyrrhiza glabra L.*) which belongs to the legume family (Fabaceae) which is one of the perennial weeds as rises to 120 cm and the main root branched

into the sub veins grow horizontally below the soil surface and at depth of about 30 cm (Aldrouh 1976). This plant contains many of chemical compounds with a sweet taste as it contains a substance of gleserezin and glycyrrhejel and licorice acid compounds of vlavonideh including glabridin and glaring and et al., (alajaili 2005) which have a similar effect of growth regulators to improve the vegetative and flowering characteristics of various plants , moreover they contain a wide range of elements and nutrients (Moses et. al, 2002).

Recently attention tend to use the organic fertilization as alternative to the chemical fertilization that being a friend of environment as it explained the results of the study carried out by Al-Obeidi and et al., (2013) on the growth and product of cowpea by using several types of fertilizations as the fertilization treatment with remnants of poultry gave better result and with significant increase than the chemical fertilization and several studies showed a positive effect of organic fertilization for plants as Zidane and et al., (2010) showed that the addition of organic fertilization and interaction agriculture of cowpea and maize that the organic fertilization treatment gave the highest product of cowpea and maize.

2. MATERIALS AND METHODS OF THE WORK

The experiment was conducted in the Department of Biology – college of education for Pure Science / Diyala University from September 2013 until the April 2014 on fenugreek, the study included on two factors: spraying the plants with licorice extract at three concentrations 0, 2,3 g / L , as sprayed by two phases after a month of cultivation, the second one a month after the first spray, the licorice extract was prepared by grinding plant roots which are well dried and dissolved in warm water for 24 hours then nominated by foil type 12 whatman. And spraying with organic fertilization extract of poultry waste at concentrations are 0,10, 15,20 ml / liter and by four phases during the growing season as the first spray was after 15 days of agriculture and then the process repeated for the same duration and the organic fertilization extract of poultry was prepared by taking a certain weight of the organic fertilization which is dissolved well and added to distilled water by (4: 1) weight / size and left in plastic containers for 24 hours and then concussed well and was nominated through the filter paper type 12 whatman (Al-Fartusy 2003).

Seeds are sown at 09/27/2013 in a plastic pot which is 25 in diameter which contains 12 kg of anaerobically dried space of garden soil and petmos by proportion of (1: 3) and the irrigation made manually when the soil dried and Hoeing to dismantle the soil and dispose of the growing bushes.

The following characteristics are studied : plant height (cm), number of branches (branch / plant), measuring the content of leaves of chlorophyll using a SPAD -502 Chlorophyll meter which produced from Minolta company which is a Japanese company and by SPAD units, number of pods (pod / plant), the weight of pods.

By this, the experiment ensured two factors which are spraying with licorice extract (Petkizin) and the organic fertilization of poultry at three concentrations as well as the comparison, the experiment carried out by the complete random design (Daoud and Abdul Elias 1990). And the analysis of variance was conducted by using the SAS program and then a comparison of the differences between the treatments was made according to polynomial Duncan test at probability level of 5%.

3. RESULTS AND DISCUSSION

• Plant height(cm): -

The data of (Table 1) of the plant height recipe show the existence of significant differences between treatments when adding licorice to the treatments since the highest average in the treatment of comparison reached to 120.83 cm while the lowest rate of plant height in the treatment of 3 g / l licorice reached to 89.00 cm while reached to 106.83 cm in the treatment of 2 g / L.

Spraying with organic fertilization of poultry waste led to existence of significant differences between the treatments as the highest average of plant height in the treatment of 20 ml reached 117.77 cm while the lowest average of plant height amounted to 87.44 cm in the comparison treatment.

The interaction data between licorice and poultry indicate that the highest average of plant height amounted to 134.00 in the treatment of 15 ml of poultry with the comparison treatment that not sprayed with the licorice while the lowest average of plant height when treated with 3 g licorice with comparison treatment which amounted to 82.00 cm .

• **Number of branches / plant: -**

The Table (1) shows the existence of significant differences between treatments for the number of branches recipe during spraying with licorice extract as the highest average in plants of comparison treatment amounted to 6.25 branch / plant while the lowest rate in the number of branches amounted to 4 branch / plant in the treatment of spraying at concentration of 3 g / l of Licorice while amounted to 4.83 branch / plant in the treatment which sprayed at concentration of 2 g / l.

The results of spraying with organic fertilization of poultry showed the existence of significant differences between treatments, as the highest average of the number of branches in the treatment of 15 ml / liter reached to 5.55 branch / plant while the lowest average of the number of branches in the treatment of comparison that not sprayed with organic fertilization extract of poultry waste amounted to 4.33 branch / plant.

The results of the interaction between licorice and poultry showed that the highest average for the number of branches in the treatment of 10 and 15 ml / l remnants of poultry with the treatment that not sprayed with the licorice extract reached to 6.33 and 7.00 respectively while the lowest average in the number of branches during interaction 15 ml / liter of poultry with 3 g / l Licorice and 10 ml / liter poultry with 3 g / l Licorice which amounted to 4 branch / plant.

Table (1) the effect of spraying with licorice extract and the organic fertilization of poultry and interaction between the two Recipes; plant height and (cm) number of branches of *T. foenum-graecum* L.

Concentration of licorice extract (g/l)	Effect of organic fertilization of the poultry (ml/l)				Effect of licorice extract
	0	10	15	20	
plant length (cm)					
0	95.33 c	123.33 b	134 a	130.66 a-b	120.83 a
2	85.00 d-e	90.00 c-d-e	126.33 a-b	126.00 a-b	106.83 b
3	82 e	86.33 d-e	91.00 c-d	96.66 c	89.00 c
Effect of extract of the organic fertilization of the poultry	87.44 c	99.88 b	117.11 a	117.77 a	
branches number branch/plant					
0	5.66 b	6.33 a-b	7.00 a	6.00 b	6.25 a
2	3.66 c	4.33 c	5.66 b	5.66 b	4.83 b
3	3.66 c	4.00 c	4.00 c	4.33 c	4.00 c
Effect of the organic fertilization extract of the poultry	3.33 c	4.88 b	5.55 a	5.55 a	5.33 a-b

* the numbers that carry similar letters do not differ significantly among themselves according to the polynomial Duncan test at probability level of 5%.

• **The number of pods: -**

The results in Table (2) for the number of pods showed the existence of significant differences between treatments during adding licorice to the treatments since the highest average in the treatment of comparison reached to 69.66 pod / plant while the lowest rate of the number of pods in the treatment of 2 g / l licorice amounted to 44.00 pod / plant while amounted to 47.75 in the treatment of 3 g / l licorice.

Spraying with the organic fertilization for poultry led to the emergence of significant differences between the treatments as the highest average number of pods in the treatment of 10 ml / liter reached to 62.22 pod / plant while the lowest average of the number of pods in the treatment of comparison reached to 46.11 pod/ plant. The results of overlap between the spraying with licorice extract and poultry showed that the highest average of the number of pods in the treatment of 15 ml with poultry with the treatment that did not spray with licorice extract reached to 83.33 pod / plant while the lowest average number of pods 33.33 pod / plant.

• **Concentration of chlorophyll (SPAD units) : -**

Table (2) shows the existence of significant differences for the recipe of chlorophyll concentration between treatments during spraying with the licorice extract as the highest average in the plants of comparison treatment reached to 52.18 SPAD units while the lowest rate in the treatment of 2 and 3g/l licorice reached to 48.75 and 49.33 SPAD units respectively.

The results of spraying with organic fertilization for poultry waste showed the existence of significant differences between treatments as the highest average for the content of chlorophyll in the treatment of 15 and 20 ml / liter reached to 51.93 and 52.87 SPAD units respectively while the lower content of chlorophyll in the comparison treatment and 10 ml / l amounted to 47.27 and 48.27 SPAD units respectively.

During the interaction between licorice and poultry was founded that the highest average concentration of chlorophyll in the treatment of 15 and 20 ml / liter remnants of poultry with treatment that not sprayed with licorice which amounted to 54.76 and 54.50 SPAD units while the lowest average concentration of chlorophyll amounted to 46.00 SPAD units with interaction of 3 g / l licorice with treatment that not sprayed with the poultry extract .

Table (2) the effect of spraying with licorice extract and organic fertilization of poultry and the interaction between them for the two recipes ; the number of pods and chlorophyll concentration of *T. foenum-graecum* L.

Effect of the licorice extract	Effect of the organic fertilization of the poultry (ml/l)				Concentration of the licorice extract g/l
	0	10	15	20	
number of pods pod/plant					
0	68.66 c	69.66 b	83.33 a	61.00 c	69.16 a
2	33.33 g	38.66 f	53.00 d	51.00 d	44.00 c
3	42.33 d	45.66 d	50.33 d	52.66 d	47.75 b
Effect of the organic fertilization extract of poultry	46.11 d	51.33 c	62.22 a	54.88 b	
chlorophyll concentration SPAD units					
0	49.13 b-c-d	46.33 b-c-d	54.76 a	54.50 a	52.18 a
2	49.70 e-f	46.83 e-f	50.36 b-c-d	51.13 b-c	48.75 b
3	46.00 f	47.66 c-e-f	50.66 b-c-d	53.00 a-b	
Effect of the organic fertilization extract of poultry	47.27 b	48.27 b	51.93 a	52.87 a	

* the numbers that carry similar letters dose not different significantly among themselves according to polynomial Duncan test at probability level of 5%.

• **Weight of pods: -**

Table (3) shows the existence of significant differences for the recipe of pods weight between treatments when adding licorice to the treatments as the highest average in the comparison treatment reached to 97.92 g / plant while the lowest rate in the pods weight in the treatment of 2 g / l licorice reached to 66.13 g / plant while reached to 70.77 g / plant in the treatment of g / l licorice.

spraying with the organic fertilization of poultry led to the emergence of significant differences between the treatments as the highest average weight of pods in the treatment of 10 and 15 ml / l reached to 93.07 and 93.05 g / plant while the lowest rate for this trait in the comparison treatment that not sprayed with the extract amounted to 61.77 g / plant.

The interaction data between licorice and poultry indicate that the highest average weight of pods reached to 112.53 g / plant in the treatment of 15 ml / liter of poultry with treatment that not sprayed with licorice while the lowest average in pods weight during overlap 2 g / l with the treatment that not sprayed with licorice and treatment of 10 ml / l of poultry with 2 g / l licorice which amounted to 36.16 and 37.16 g / l respectively.

Table (3) the impact of spraying with licorice extract and organic fertilization of poultry and the interaction between them in the pods weight of *T. foenum-graecum* L.

Concentration of licorice extract g/l	Effect of the organic fertilization of poultry (ml/l)				Effect of the licorice extract
	0	10	15	20	
0	82.76 e	88.58 d	112.53 a	107.80 b	97.92 a
2	36.16 i	37.16 i	94.66 c	96.53 c	66.13 c
3	66.40 h	69.83 g-h	72.03 f-g	74.83 f	70.77 b
Effect of organic fertilization of the poultry	61.77 c	65.83 b	93.07 a	93.05 a	

* the numbers that carry similar letters dose not different significantly among themselves according to the polynomial Duncan test at probability level of 5% .

Did not appear in the results any effect of licorice on the characteristics of the vegetative growth and the result agrees with what said by Alwan and et al., (2010) as there was not any effect of extract of licorice on the characteristics of the cucumber plant under the circumstances of greenhouses and that cause may be attributed to the lack of the presence of light inside the plastic house which did not stimulates the hormonal path which is located in licorice or the reason for this may be due to the lack of concentrations used in this research. The outweigh of spraying with organic fertilization in some recipes of vegetative growth may be due to the fact that this fertilization is an important source of nutrients, particularly nitrogen, phosphorus, potassium and calcium (Krishnamurthy and et al.,, 2009) and that the presence of such elements have an important role in the conduct of physiological processes of the plant especially the process of photosynthesis and the process of amino acids and proteins building that have a role in the plant growth (Ahmed and et al., , 2009).

As well as the poultry provides nitrogen which leads to increase the number of leaves and the leafy area and in turn increases the effectiveness of carbon representation and manufacturing carbohydrates , the increase in chlorophyll content may be attributed to the increase in the readiness of the nitrogen element by spraying the fertilization extract which has an important effect in the formation of chlorophyll particle (Addiscott, 1974). What has been obtained from the results in the recipe of number of pods as a result of spraying with organic fertilization extract of poultry may be due to the influence of the components of the organic fertilization extract as nutrients which are important and necessary and play an important role in accelerating the growth of the plant as a result of increasing manufacture of carbohydrates in the plant (Abu Dahi and Al-Younis 0.1988) and this is what ensured by the increase in the vegetative growth in the (plant height - number of branches - the concentration of chlorophyll) when spraying with the organic fertilization extract of poultry which led to the increase the nutrients in the leaves and their travel to the consumed parts (pods), and the poultry contain most of the

mineral elements which leads to a good supply of nutrients that is reflected in the recipe of growth and production and these results are agreed with what said by El-Desuki and et al., (2010).

4. CONCLUSIONS

The spraying with poultry extract had a positive effect in recipes of vegetative growth and chlorophyll content and weight of the pods, and founded increase the readiness of nutrients in the plant when sprayed extract of poultry and that the spraying with extract of licorice did not give the positive effects and there were no significant differences when spraying with it and when used the overlap between the treatments the negative impact of licorice reduced.

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