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EFFECTS OF DROUGHT STRESS AND STIMULUS GROWTH BACTERIA ON SOME PHYSIOLOGICAL TRAITS OF MEDICINAL PLANTS OF FENUGREEK (*TRIGONELLA FOENUM-GRACEUM* L)

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ABSTRACT
To study the effect of drought stress and Plant Growth Promoting Rhizobacteria (PGPR) on some physiological and argronomic characteristics of fenugreek (*Trigonella foenum* L.), an experiment was done as split plot design in the basis of randomized complete blocks design with 3 replication in crop year 2012–2013 at the research station of Islamic azad university Yadegar-E-emam (RAH) khomeni branch. In this experiment, three irrigation, intervals 40, 70 and 100 mm evaporation from class A evaporation pan as main factor and plant growth promoting rhizobacteria (PGPR) consumption methods in four levels (Non consumption, seed soaking, irrigation water, seed soaking + irrigation water) was considered as a sub factor. The results indicate that the simple effect of drought stress on all traits was significant. The simple effect of PGPR was significant on some physiological and agronomical traits. Test results showed that the highest leaf Relative Water Content (74/20%) observed in 40 mm evaporation from class A evaporation pan. The highest seed yield (1382/62 kg.ha^{-1}), biological yield (3555/32 kg.ha^{-1}) and the highest harvest index (28 %) observed in PGPR uses (Seed soaking + irrigation water). The maximum of fresh weight (29/04 gr.m^2) and dry weight (7/39 gr.m^2) observed in 40 mm evaporation from class A evaporation pan and PGPR uses (seed soaking + irrigation water). The highest level of SOD activity (125/30 mg.pro.min^{-1}) was observed in 100 mm evaporation from class A evaporation pan and Non consumption of PGPR. Eventually the maximum saponin amounts (2/70 percent of dry weight) was observed in 100 mm evaporation from class A evaporation pan and PGPR uses (seed soaking + irrigation water).

KEY WORDS: Drought stress, Fenugreek, PGPR, Yield, Antioxidant enzymes

INTRODUCTION

Among inhibiting environmental factors on the growth and yield of crops, horticultural and medicinal drought is the most important factor of production decline, especially in arid and semi-arid area (Reddy et al., 2004) drought stress is a major factor in reducing crop yield. drought not only does cause this change in dry land areas but also affect on the temperate regions (Kramer, 1963) about 26 percent of the land under cultivation worldwide is faced with drought (Behdad *et al*., 2010). In order to optimize power plant based on the principles of sustainable agriculture and also to reduce the impact of environmental stresses are considered attention some of biological fertilizers including bacteria named growth stimulus or PGPR (Zahir *et al*., 2004) this group of bacteria through biological nitrogen fixation, soluble phosphorus and potassium, increased bioavailability of mineral elements, inhibit pathogens, and also produce hormones, plant growth regulator under influence crop yield And also it is cause increases the resistance of plants to environmental stresses (Sifola and Barbieri, 2006)These bacteria use called growth other way bacteria that have adding impact on the growth of their crops (Vessey, 2003) including stimulus growth , Bacteria of the genus Azotobacter, m Azospirillum and Pseudomonas (Zahir *et al*., 2004). The fenugreek plant with scientific name of Trigonella foenum-graceum L. is latent seeds isolated from a dicotyledonous plant petals is a owned family leguminous that has been reported anti-inflammatory effects, carminative, antispasmodic, anti-cancer, hypoglycemic, increased libido, astringent, tonic heart, binding bile, laxative, mucus, lowering cholesterol, lowering blood lipids, lowering blood pressure, lowering blood triglycerides, adding milk, laxative, tonic uterine oxytocic and reinforcing the uterus effects (Max, 1992 and Gruenwald and Fleming, 1998). The main ingredients of the grain are contains saponins, alkaloids and fiber mucilage (50%) (Sayed *et al*., 2000) study showed that the herb fenugreek, protein value , total fat, crude fiber and ash are 25.5, 10, 15 and 5/7 percent respectively (Gruenwald and Fleming, 1998) about 40 to 65 percent of the grains is formed of sugar, mainly related to seed mucilage, at least seven saponins have been reported under the names of grakounen in aggregate (Sayed *et al*., 2000). Studies on the effect of basil indicate where water stress have significantly to the growth, yield and chlorophyll content of the basil. by reducing the water content of the soil

indicators such as, leaf area index (LAI), specific leaf area (SLA), chlorophyll a and b and the ratio of root to shoot dry weight increase (Omid Begay, 2005) Evaluation of effect of drought stress on physiological characteristics of different populations on lemon balm herb showed that the effect of water stress on the chlorophyll a, b and total in two years were significant. In order to investigate the effect draught on the plant (*Parthenium argentatum*), this plant was stressed that the results showed with increasing stress, increased levels of soluble sugars and praline in plant evaluation effect of drought stress on physiological characteristics of populations balm plant showed that the effects of drought the amount of soluble sugars was observed in two years (Safykhany *et al*., 2008).Increase of concentration of soluble sugars have been reported under conditions of dehydration in sorghum and sunflower barley and alfalfa (Irigoyen *et al*, 1992). The use of bacteria in bean under drought stress increase the amount of chlorophyll a, b and total (Sharma *et al*., 2003) Pseudomonas plants bacteria inoculated showed in terms of inoculation these bacteria to stress conditions without inoculation, chlorophyll a, chlorophyll b and total chlorophyll, 34, 48 and 39 percent respectively. the proportional increase in the synthesis of chlorophyll, chlorosis also fell the leaves rate (Sharma *et al*., 2003) increase 38/6-38/3 percent in chlorophyll a and 36/82-50 percent chlorophyll b percentage relative to control were reported the use of acidhumic + PGPR during two growing seasons in wheat plants . Increase draught tension of condition under fungus mcorrhiza and Azospirillum my with corn inoculated in Proline content condition tension rate inoculated fungus mcorrhiza and Azospirillum increased under drought stress. as a result of interactions with azospirillum increase inoculation of maize seed mycorrhiza fungi on drought conditions and proline proline accumulation in soya roots due to increased water stress in soybean plants inoculated mycorrhiza stress on proline accumulation by 14% compared to increased non-inoculated .

MATERIALS AND METHODS

Plan experimental characteristic

to investigate the effects of drought and bacteria growth on some physiological characteristics of fenugreek test split plot randomized complete block design with three replications in islamic azad university unit of imam Khomeini yadegar (peace be upon him) was conducted in the spring of 13 92. where irrigation as a major factor in the 3 level (irrigation on 40, 70 and 100 mm pan evaporation from class A) and the use of growth promoting bacteria in the 4-level (non-use, seeding , irrigation, irrigation + seeding on instructions on use) were considered as subplot .Each iteration has 3 main plots, each consisting of 4 sub-plots ,each block has 12 sub-plots, respectively. in each sub-plots were planted 5 lines ,4meter length of each line. Spacing of 30 cm, bushes distance of the 5 / 0-1 cm.there are between the occurrences of a creek bottom was repeated for irrigation there wasboth plots between two stacks of the main plots and sub-plots between a stack of the main plots .The amount of fertilizer and seed used in the experiment after hitting the ground hard, chemical fertilizer as recommended was added to the amount of urea, 80 kg of pure nitrogen fertilizer phosphorus and 50 kg of superphosphate were applied, the road to 4-leaf stage seed rate is 5.1 kg.

The planting and seed treatment operation

After the assignment of treatments to plots of land preparation randomly taken into consideration and then was installed each plot. The seeds of the plastic on the screen in the shade with bacteria growth has dipped individually named and after drying ready to be planted in the shade. Seeds on the ridges and grooves to a depth of 1 to 2 cm were created and they were covered with soft soil. The first irrigation to provide after planting favorable conditions for the growth of seedlings from the soil and enhance was performed after the desired output germination.

Irrigation

The first irrigation after planting done, watering until the later stages of thinning on till environmental conditions and plant out after irrigation treatments after 40 mm evaporation from pan, 70 mm evaporation from pan and irrigation was applied after 100 mm evaporation from pan Fight against weeds, pests and diseases To combat weeds, weeding on growth The plant was completed. Also, due to the prevalence of pests and diseases Mankuzb fungicide were used according to instructions to about 2 per thousand of fungicide, insecticide and phosphorus acaricide, Prvfnufus and chlorpyrifos insecticide Traits measuring the amount of chlorophyll a, b and total to measure the concentration of 0.2 g samples of leaf chlorophyll was extracted with 80% acetone). (Arnon, 1949). The extract was passed through a filter paper and to reach a volume of 25 ml of acetone were added and extracted total chlorophyll. Absorbance of chlorophyll a and b, respectively, was read at 645 and 663 nm wavelength and using the formula of chlorophyll a and b and chlorophyll was obtained in milligrams per gram of fresh leaf.

Measuring the amount of soluble sugars

Frozen samples at a rate of 2.0 grams per 3 ml the resulting homogeneous solution was then extracted with distilled water was filtered through filter paper. Samples for glucose measurement, 50 ml from homogenization smooth 5.0 ml to of phenol, 5%, and 2.5 ml was added 98% sulfuric acid. Immediately after the addition of sulfuric acid, an exothermic reaction occurs with the production of orangethe production of high heat-up. Therefore it is necessary after the addition of acid; the reaction mixture was cooled at room temperature for 10 minutes. Standard curve were drawn using different concentrations glucose from 0 to 20 micrograms per milliliter. Standards and sample absorption spectrophotometer at a wavelength of 480 nm was measured and the was determined amount of soluble sugars, on a mg per mg wet weight of the sample) (DuBois *et al*., 1956).

Measurement of proline

To measure the proline content of leaf tissue were used from (Bates *et al*., 1973) way that for the size-of proline, first were weighed the seedlings and the amount of 2.0 g Chinese mortar solfosaleyselek acid in 3 ml of 3% was well worn and the resulting homogenates at 18,000 rpm for 15 minutes centrifuges turning. then 2 ml of the filtered extract gated transferred to tubes and pipes to the amount of 2 ml nine hydrants was add of analytical grade reagent and 2 ml of acetic acid. After closing the tubes were placed c° 100 for an hour in the water. After cooling pipes to each of the 4 ml of toluene were added and using the vertex was shaken for 15 to 20 seconds tubing. Finally, the outer phase that contains red and proline was dissolved in toluene that taken in conjunction with the standard sample was placed in a spectrophotometer was read numbers in the 520 nm wavelength. proline concentration in milligrams per gram of fresh leaf tissue using was determined the standard curve. Expressed as milligrams per gram of fresh weight evenly.

Measure saponin

one gram of fenugreek seed nitrogen was extracted Chinese liquid powder in a mortar and saponins with 80% ethanol in Mayer flask and then the resulting solution with a glass filter vacuum was smooth. Alcohol by means of a rotary evaporator was evaporated in vacuum at 45 ° c. the remaining solids were washed in distilled water and the solution was rotary bottom flask. The resulting viscous solution was transferred to use a tube Apendrof be kept in the fridge until. The solid material was dissolved in methanol extracted from leaf tissue. 15 micro liters of sample is incubated on the plate. Samples distance from each other is 1 cm. Prepared platesinside a tank containing the solvent for TLC analysis was saponin to practice different combination done on the plate. the solvent mixture of ethyl acetate: water:acetic acid, respectively, the ratio of 7: 2: 2.after the solvent moves up and spread the liquid on the plate, the plate of the tank under the hood off and driedand then with reagent methanol: acetic anhydride and sulfuric acid ratio of 10: 1: 1 was sprayed into the oven at 104 ° c, was placed for 15 min. Band spot sprayed on the plate under UV light wavelength of 300 nm was observed from the trans Loumynaturand calculation of the Rf value, the band was created by calculating of saponins percentage was calculated on the dry weight).

Measuring the amount of flauonoids

the method for measuring flauonoids (Krizek *et al*., 1993) 0/5 grams of fenugreek seeds with 7 ml of acid ethanol (including ethanol and acetic acid in a ratio of 99 to 1) pulverized and then centrifuged. then the supernatant for 10 min c80 was placed in a hot water bath temperature and then cooled down by spectrophotometer was read at a wavelength of 330 nm was used for concentration calculation , the extinction coefficient (mol-cm 33000 = ε) was calculated flauonoids rate on unit mg dry weight.

Statistical Analysis

The data were analyzed were performed using SAS software and custom charts
excel software and comparisons of means by Duncan test at 5% level.

RESULTS AND DISCUSSION

Chlorophyll a

The effect of water stress on chlorophyll a

The results showed that the level of stress in terms of there is a significant difference in the levels of chlorophyll a. the comparison results show the effect of water stress on the chlorophyll a fenugreek significant differences between treatments. according to the results, with increased drought fenugreek significantly reduced the amount of chlorophyll a. the highest chlorophyll a fenugreek in the treatment of 40 mm evaporation from class a pan evaporation yielded a

statistically showed no significant difference with other dry surfaces. Chlorophyll fenugreek in the treatment of 1/41 was milligrams per liter. Chlorophyll content of TF in the treatment of 100 mm evaporation from class A pan evaporation, 0/83 mg (figure 1). Review on basil plant indicates that stress has a significant effect on growth, basil is a function of chlorophyll. by reducing the water content of the soil, such as indices, leaf area index (LAI), specific leaf area (SLA),chlorophyll a and b and increases the ratio of root dry weight the stem (Omid Begay, 2005).

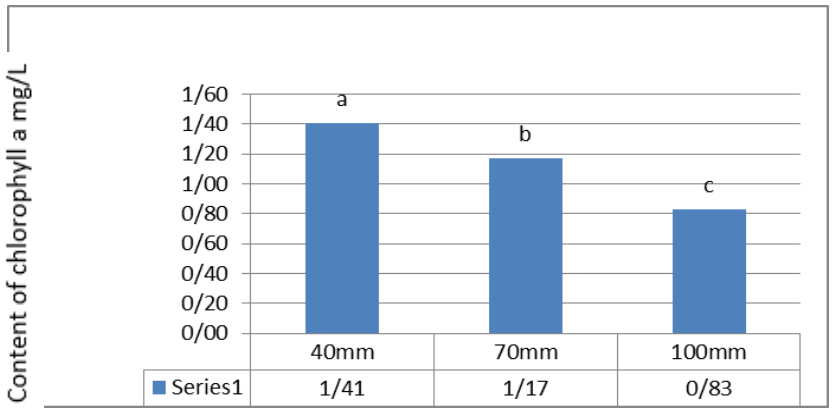

Figure 1. The effect of water stress on chlorophyll a

Effect of PGPR on chlorophyll a

The results of the application of PGPR in five percent had a significant effect on the level of chlorophyll a. results showed that mean comparison of the amount of chlorophyll a fenugreek in between treatments, the highest chlorophyll a fenugreek with 1.20 mm grams per liter of treated bacteria use as irrigation water was seeding which showed no significant difference with other treatments. Lowest chlorophyll a fenugreek with 1/06 mm grams per liter of bacteria were observed in terms of use a statistically significant difference with other treatments (Figure 2). Increased .38/6 - 38/3 percent chlorophyll a and 82/36 - 50% compared to control chlorophyll b the application of humic acid + bacteria growth during the growing season it was reported in wheat (abou-aly and mady,). Also stated that the use of microorganismssuch as trichoderma soil increased the chlorophyll in leaves of soybean inoculated with the control screw. Research studies on the effect of azotobacter shahpsnd families and species found in coastal areas did azotobacter inoculation increased plant growth and increase in leaf chlorophyll content (Amooaghaie and mostajeran, 2008).

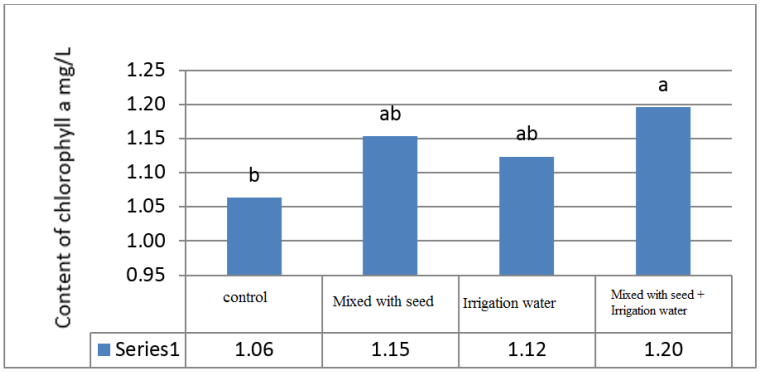

Figure 2. The effect of bacterial growth on chlorophyll a

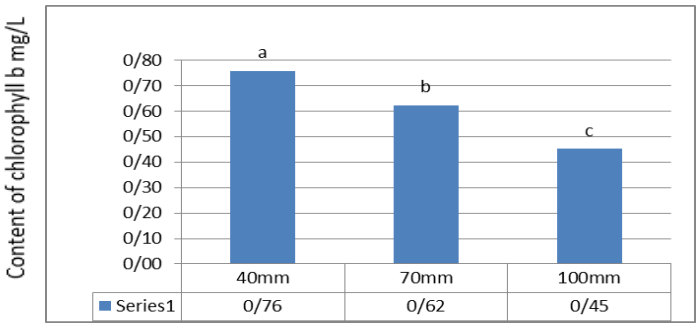

Figure 3. The effect of water stress on chlorophyll b

Effect of PGPR on chlorophyll b

based on the results of bacterial growth at a percent had no effect on chlorophyll b.results showed that mean comparison of the amount of chlorophyll b fenugreek among the treatments with the highest chlorophyll b fenugreek 68/0 mgl use in the treatment of bacteria in water obtained seeding + with other treatments showed no statistical difference. Lowest chlorophyll b fenugreek with 0/56 mg in the absence of bacteria was observed that the use of statistics with other treatments showed significant differences (figure 4). Increased 38/6 - 383/3 and 36/82 - 50%percent chlorophyll a chlorophyll b to control the application of humic acid + bacteria growth during the growing season was reported in wheat (abou-aly and mady,).also stated the use of soil microorganisms-such as trichoderma chlorophyll in leaves of soybean increased compared to the control without inoculation. Research studies on the effect of azotobacter species shahpsnd family carried out in coastal areas and observed azotobacter inoculation increased plant growth and increased chlorophyll in the leaves (Amooaghaie and mostajeran, 2008).

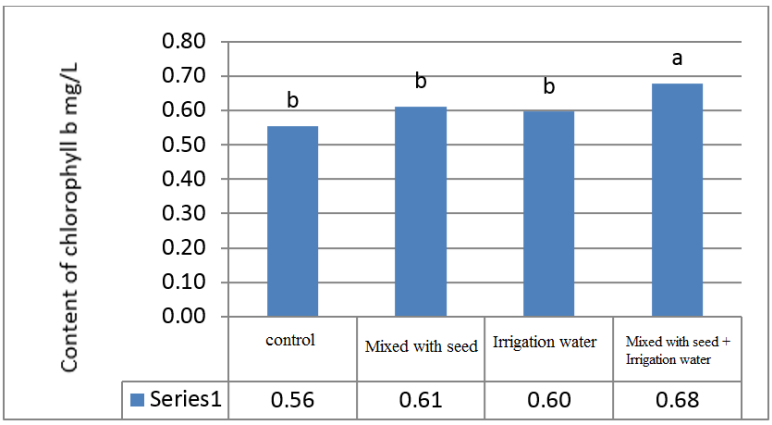

Figure 4. The effect of bacterial growth on chlorophyll b

Chlorophyll a + b

The effect of water stress on chlorophyll a + b

the results showed that the level of stress in terms of chlorophyll a + b there were no significant differences in the level of one percent .results comparison of the effects of drought stress, chlorophyll a + b fenugreek indicates significant differences between treatments. Based on the results of stress by increasing the amount of chlorophyll fenugreek significantly reduced. The mostthe amount of chlorophyll a + b fenugreek 40 mm evaporation from the surface treatment class pan evaporation yielded indicated a statistically significant difference with irrigation levels. The amount of chlorophyll a + b fenugreek in this group was 2.24 milligrams per liter. Chlorophyll content of fenugreek in the treatment of 100 mm evaporation 30/1 milligrams per liter (figure 5). effect of drought stress the physiological characteristics of medicinal plant populations mo showed that the effect of drought stress, chlorophyll a, b and total in

two years was significant (Safykhany *et al*., 2008) by looking at the flowering plant family Mexican mint family found that stress has a significant effect on the rate of photosynthesis the transpiration rate and stomatal conductance. so where severe drought stress (55% of field capacity) photosynthetic rate decreased and the rate of photosynthesis was in control.

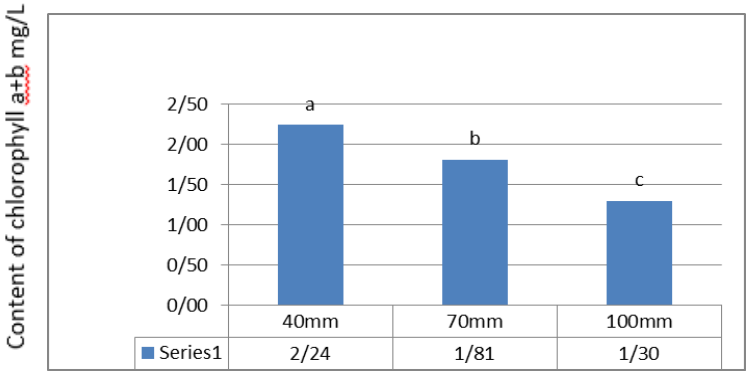

Figure 5. The effect of water stress on chlorophyll a + b

Effect of PGPR application on chlorophyll a + b

based on the results of bacterial growth at percent had a significant effect on chlorophyll a + b. fenugreek results of mean comparison showed that the amount of chlorophyll a + b fenugreek in between treatments, the highest chlorophyll b + a fenugreek with 1/88 mg l the use of bacteria as seeding + irrigation treatments were showed a statistically significant difference with other treatments. Lowest chlorophyll a + b fenugreek 1/68 milligrams per liter in terms of use bacteria were observed statistically significant differences with the other treatments (fig. 6).

The use of pseudomonas bacteria in bean in terms of drought chlorophyll a, b and total increase (Sharma *et al*., 2003).inoculated with azospirillum bacteria pseudomonas putida, is increased the amount of chlorophyll a, b and a + b, however, this increase was not statistically significant (Moslemi, 2011) bean plants inoculated with bacteria showed that in terms of inoculation these bacteria to stress conditions without inoculation, the concentration of chlorophyll a, chlorophyll b and total chlorophyll, respectively 34, 48 and 39 percent. The proportional increase in the synthesis of chlorophyll, Decreased chlorophyll of the leaves (Sharma *et al*., 2003).

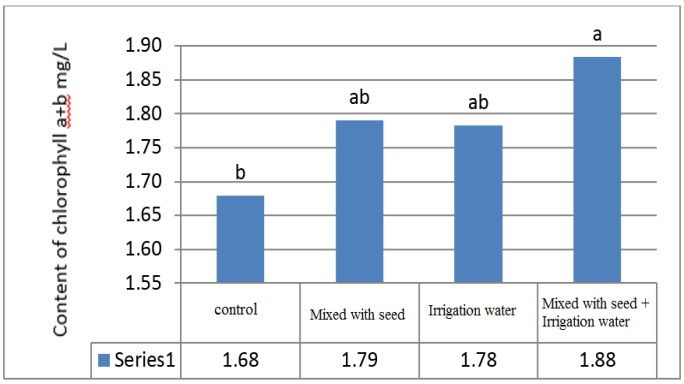

Figure 6. The effect of bacterial growth on chlorophyll a + b

Soluble sugars

Effect of drought stress on soluble sugars

the results showed that the stress levels of sugars there were no significant differences in the level of one percent solution. according to Duncan's test compared the effects of drought fenugreek showed that the soluble sugars in

between treatments, irrigation of 40 mm evaporation from class a evaporation pan lowest soluble sugars to themselves. fenugreek soluble sugars the treatment was 28/73mg per g wet weight based on the comparison most soluble sugars fenugreek with 78/45 mg per g wet weight of the treated irrigation was 100 mm compared to the other treatments was found no significant difference (fig. 7). Accumulation of sugars is of great importance because of the accumulation of these substances cause pressureosmotic dehydration and reduction of inflammatory cells and their maintenance (Hekmat Shear, 1994). To investigate the effect of water stress on plant *Parthenium argentatum*, the plant was under stress the results showed that with the increasing tension, increased levels of soluble sugars and proline in plant. effect of drought stress on physiological characteristics of different populations showed that lemon balm herb the effect of water stress on soluble sugar content was significant in two years [13] under the terms of the concentration of soluble is reported sugars dehydration in sorghum and sunflower),1(turner et al alfalfa and alfalfa (Irigoyen *et al*., 1994).

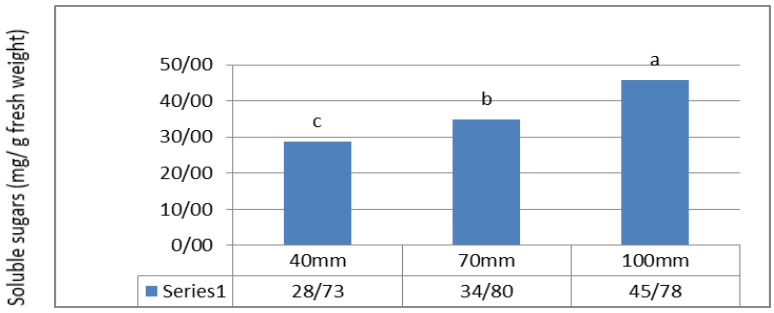

Figure 7. The effect of water stress on soluble sugars

Effect of PGPR on the amount of soluble sugars

Based on the results of bacterial growth at percent had a significant effect on soluble sugars. based on the results comparison of different treatments, bacteria use as irrigation water with 38/23 mg seeding l g wet weight allocated to the maximum amount of soluble sugars fenugreek there are significant differences between the other treatments according to the results of the comparison lowest soluble sugars fenugreek for the treatment of bacterial consumption by an average of 95/33 mg g wet weight, respectively (figure 8).

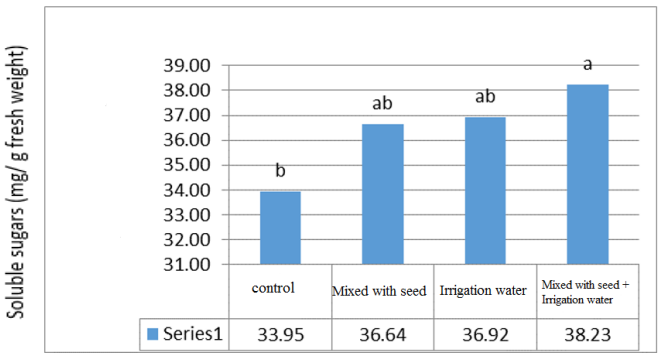

Figure 8. The effect of bacteria growth on soluble sugars

Proline

Effect of drought stress on proline

The results showed that the stress levels of proline there were no significant differences in the level of one percent. According to Duncan's test compared the effects of drought stress on proline fenugreek showed that among the different treatments, 100 mm irrigation accounted for the greatest amount of proline. fenugreek proline in the leaves were treated with 10/50 mg g fresh tissue. Based on the comparison of the lowest proline fenugreek with 32/5 mg g fresh leaf tissue of treated irrigation was found of 40 mm compared to the other treatments no significant difference (fig. 9). In some plants in the early stages of several amino acids, increased water stress by continuing drought only increased proline accumulation and stored. thymus dipped in water soil, plant height, number of lateral branches, fresh and dry weight of vegetative body volume and root length, root dry weight and reduce the amountthymol and proline

increased to investigate the effect of water stress on the plant (*Parthenium argentatum* gray), it was stressed that the results showed with increasing tension, the amount of soluble sugars and proline the rose plant.

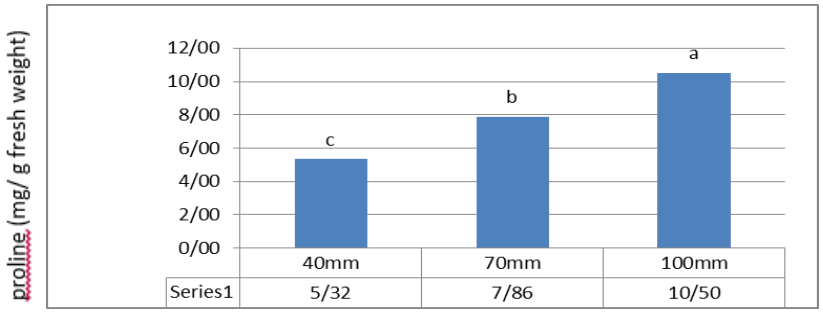

Figure 9. The effect of drought stress on proline

Effect of bacterial growth application on proline

Based on the results of bacterial growth at percent had a significant effect on proline. based on the comparison of different treatments, bacteria use as irrigation water seeding 9.13 mg per gram of tissue fresh fenugreek leaves accounted for the greatest amount of proline that there was no significant difference with other treatments based on the comparison of the lowest proline fenugreekthe treatment of bacterial consumption by an average of 75/6 mg g fresh leaf tissue respectively (figure 10). Bacteria caused by drought reduce other defense mechanism; the sod is prevented from rising.Because the activity of antioxidant enzymes in the plant defense mechanism to reduce oxidative damage might not be synthesized by bacteria proline also reduce the damage caused by free radicals and contribute to oxidative stress (Moslemi, 2011) proline content in maize plants inoculated with azospirillum and mushrooms mycorrhiza increased under drought stress. as a result, maize seed inoculation with azospirillum interactions and mycorrhiza fungi proline content increased under drought stress the effect of water stress increased proline accumulation in soybean roots and stress on proline accumulation compared in plants inoculated with mycorrhiza 14% there was an increase than in non-inoculated

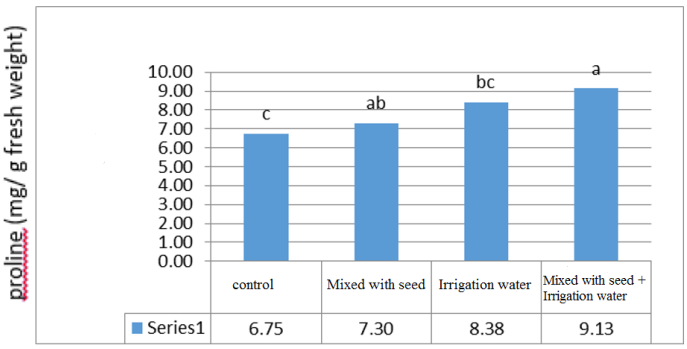

Figure 10. The effect of bacteria growth on proline

Flavonoid

Effect of drought stress on the flavonoid

The results showed that the stress levels of flavonoids there were no significant differences in the level of one percent. According to Duncan's test compared the effects of drought effect on flavonoid fenugreek showed that among treatments, irrigation, 100 mm maximum amount flavonoids in them. Flavonoid content of fenugreek the treatment was 81/8 mg dry weight. based on the comparison of the lowest flavonoid fenugreek is also 4/77 mg dry weight of the treated irrigation of 40 mm, which was significantly higher than other treatments (figure 11).

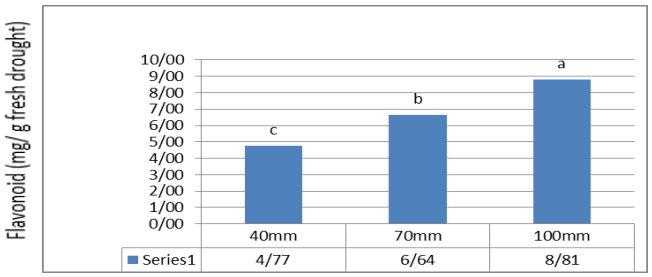

Figure 11. The effect of drought stress on the flavonoid

Effect of PGPR application on the flavonoid rate

based on the results of bacterial growth at percent had a significant effect on the flavonoid based on the comparison of different treatments, bacteria use as irrigation water seeding 50/7 mg on dry weight allocated to the highest flavonoid fenugreek there are significant differences between the other treatments according to the comparison results, the lowest flavonoid fenugreek for the treatment of bacterial consumption by an average of 6.28 mg dry weight (figure 12).

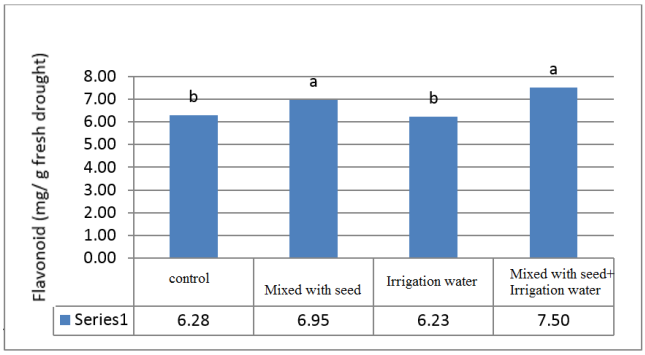

Figure 12. The effect of bacterial growth on the flavonoid

Saponins

Effects of drought stress, saponins

The results showed that the level of stress in terms of there were no significant differences in the level of one percent saponins according to Duncan's test compared the effects of drought stress, fenugreek saponins showed that among treatments, irrigation of 100 mm the saponins have won. the amount of fenugreek saponins the treatment was 2/52% of dry weight. The results of the comparison lowest fenugreek saponins with 1/39 percent dry weight for the irrigation of 40 mm compared to the other irrigation treatments were significantly different (figure 13).

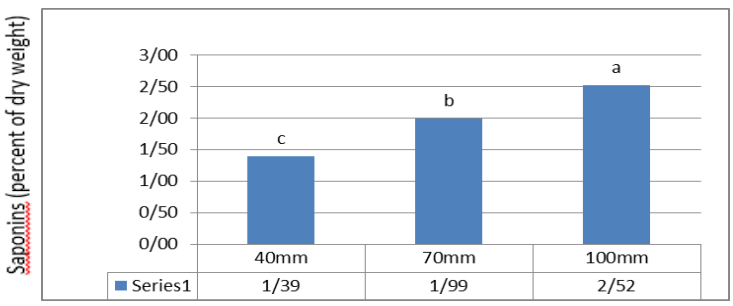

Figure 13. The effect of drought stress, saponins

Effect of PGPR application on the amount of saponins rate

Based on the results of bacterial growth at a percent had a significant effect on the amount of saponins. based on the comparison of different treatments, 2.11% of bacteria in irrigation water use seeding the amount allocated to the dry weight of fenugreek saponins there are significant differences between the other treatments the results are also compared the lowest fenugreek saponins the treatment of bacterial consumption by an average of 79/1 per cent of the dry weight (figure 14).

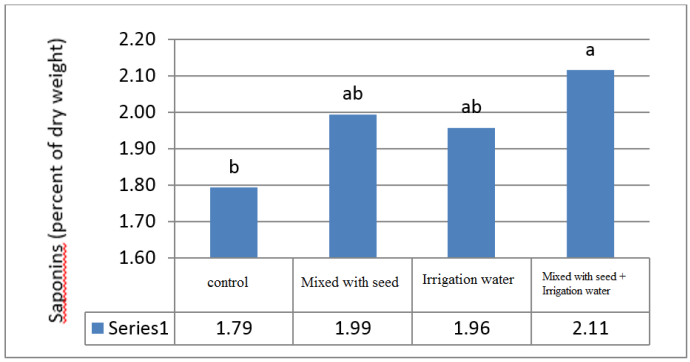

Figure 14. The effect of bacterial growth on the saponins

The interaction between stress and the use of growth promoting bacteria on the amount of saponins results showed that the interaction between stress and bacterial stimuli saponins significantly different growth rates of five percent. according to Duncan's test compared the interaction of drought and bacteria fenugreek saponins showed the growth rate in between treatments, irrigation of 100 mm and the use of bacteria seeding irrigation water to make the most of saponins. fenugreek saponins in this group was 70/2% of dry weight. Based on the comparison of the lowest fenugreek saponins also with 28.1% of the dry weight of the irrigation of 40 mm and lack of growth promoting bacteria in comparison to other irrigation treatments were significantly different (fig. 15).

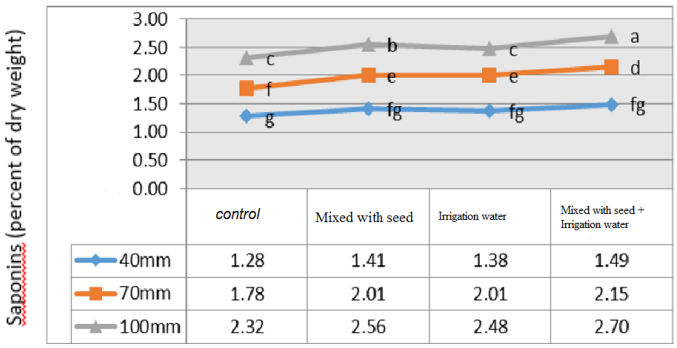

Figure 15. Interaction of drought and bacteria growth on the amount of saponins

CONCLUSION

The results showed that drought stress reduced the amount of chlorophyll a, b and total, there was an increased rate of drought was a cause soluble sugars, proline. The survey also revealed that bacteria use the growth in the levels of either seeding, irrigation water and seeding and irrigation water to produce more in the absence of stress and tension were blue. the increase the amount of chlorophyll a, b and total soluble sugars and proline were plants and increase the amount. Application of bacterial growth in the water and conditions the positive effect was noted on the traits under drought stress. The maximum amount of saponins (70/2% of dry weight) of irrigation after 100 mm evaporation and consumption growth promoting bacteria seeding + water for irrigation.

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