Effect of Irrigation timing and Potassium fertilizing on the some growth characteristics and production for Mungbean *(Vigna radiata L.)*

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Abstract- A field experiment was held in summer season 2011 in the fields of one of the farmers on the banks of the Euphrates River in Ramadi City on the Mungbean harvest, to study the effect of two Irrigation period (7-14) days, and three intensities of potassium (0, 50, 100) Kg/h on some of the characteristics of this harvest and the class of the used harvest is the local kind. Results showed superiority the plants were irrigated every 7 days in the highest rate of all the characteristics of study. The results also showed surpass the plants were fertilized by a higher concentration of potassium (100) kg \ ha of all the characteristics of study. The search results showed the superiority of irrigated every 7 days and fertilized by the high level of potassium (100) kg \ e in the highest rate for all characteristics of study in a significant difference from other interventions.

Index Terms- Water Stress, Potassium fertilizing, Mung bean harvest, Irrigation timing.

I. INTRODUCTION

The water resources are considered to be one of the most important natural resources the life depends on, and to preserve these resources is considered to be granted, aggregation sector is considered to be the main consumer of these resources and there is an increasing worries concerning these resources future, considering its limitation many calls focused on keening on the optimum use of these Irrigation resources.

Recently, some of the agricultural applications were followed, aiming to overcome the physiological syndromes that could happen to the plants growing in the hard environment; thirst, Drought, groundwater shortage, that all contribute to supply the plants with the water need (Islam et al., 2015). It is noticed that that the plants that are exposed to severe drought gradually in its growing season would be more resistant when exposing to another drought era if we compare it with other plants that have never experienced drought ever before (Nur, 2014).

The mung bean *(Vigna radiata L.)* is a summer legume that is widely planted in Iraq field, because it has a short growing season (90-120) days, and it can bear the drought in all growing phases except for blossoming phase (Alzarqaa et al., 2014). The mung bean is planted to get its seeds that have an high nourishment values for humans and animals, because it is rich with the alimentary elements, protein percentage in its seeds (20%), Carbohydrate (65%) whereas oil percentage (1.5%), as well as the usage of mung bean as a green grass, and for feeding the animals, and using it as a green fertilizer to enhance the quality of the soil, and considering the importance of this harvest, it become important to thoroughly study the requirement of its growth and production (Das and Kar, 2013).

The potassium element is considered one of the important and effective elements on the productivity of the harvest, because it activate more the 75 enzymes that contribute to completing multiple important biological activities in the plant, and it contributes in the photosynthesis process and in the process of transferring the glucose from the source to the outlet, and it plays a very important role in forming the protein and deepening the root (Shahzad et al., 2014).

Considering all above importance, a field study has been carried out to study the effect of the Irrigation periods and the potassium fertilizing on the Mash harvest and its component, and study the connection relation between the characteristics.

II. MATERIALS AND WORKING METHODS

A field experiment was held in summer season 2011 in the fields of one of the farmers on the banks of the Euphrates river in Iraq. Soil with physical and chemical characteristics illustrated in Table.1, to know the effect of the two times of Irrigation 7, 14 days and the potassium fertilizer, which is going to be added to 3 levels (0, 50, 100) Kg/h in the form of potassium sulfate (43% K) and studying its effect on the mung bean local kind. The phosphate fertilizer was added at one time before planting in a form of triple superphosphate (45% P) with the reality of 75 Kg /h (Alfahdawi 2004).Whereas the Nitrogen fertilizer was added as urea (46% N) Kg /h in 4 equal doses, the first dose was added directly after the germination, the second dose after 21 days from the first dose, the third with the start of flowering, and the fourth dose when starting forming the pods /plant (Alaani 2001).
The irrigation deadlines every six days and every 12 days.

The R.C.B.D design was used in three duplications. The experimental soil was plowed, then softened and straightened and after that it was divided into trial units with dimension of 3*3m every single trial unit has 6 lines with internal space of 0.50m, and the distance between one hole and another in the same row is 0.25 with leaving a safe distance of 2 meters

between a duplicate and the other, and 1.5m between a treatment unit and the other to control the movement of the water.
The failure hole were replaced after appearing of 75% of the seedling by plants already planted in glass sand in the same time of the planting of the original to insure similarity in plants growth, the bushes were fought all the growth season to insure that the bushes do not complete the harvest in the field of experiment.

III. Measured the Soil Moisture Directly in the Field.

Using method (CPN 503 DR hydro probe), the moisture of soil was determined and follow-up attrition moisture with layers of soil. The irrigation scheduling process as it has been installed measurement pipes in the field and measurement process has been at depths of 10, 20, 30 and 40 cm from the soil surface. The weight method was used to compare the moisture measurements of soil with device data aforementioned**.** The plants were reduced to 1 plant in one hole after three weeks from germination. And the following characteristics where studied:

Plant Height: it was measured from the point of connecting The stem with the soil to the top of the plant.

Leaf area: It was calculated Leaf area was measured by using a laser leaf area meter (Laser Area Meter CI-203 and Serial Number 203-2.13-08059).

number of days to flowering.: the number of days from the date of planting until first flowering (Ali, et. al. 1990).

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Table.1: Some of the physical and chemical characteristics of the experience field soil before the planting.

The Characteristic	Value
Electrical conductivity ds.m^{-1}	2.35
The degree of soil interaction	7.35
Nutrients	
Instant nitrogen PPm	64.2
WP-ready PPm	13.7
Organic matter g/kg	1.09
Apparent density mg.g/m3	1.22
Volumetric distribution of separate soil)G. kg 1-soil)	
Sand	144
Clay	320
Silt	536
Conception	Clay,alluvial Fusion
Percentage soil moisture when pulling 33 KPa	31.4
Percentage soil moisture when you lift 1500 kPa	16.6

IV. Results and Discussion

1.Plant height: The results illustrated in Figure.1

indicates significant effects of the Irrigation and potassium factors in increasing plant height of Mung bean harvest. The results showed that there is a significance effected of the Irrigation timing in this character, where the first timing 7 days had the highest rates of plants height (cm) (**65.73cm**), with a significance difference from the second Irrigation timing which given a rate of plant height (cm) (**38.00cm**) and this can be explained by sufficient humidity available which caused an increase the ratio of the absorbance elements, that reflected positively on increasing the division of the cells and its elongation, consequently a total increase in growth and plant heights (Ihsan et al., 2013) .This result goes along with (Benlloch-González et al., 2015), who indicates to the role of the water in conserving the shape of the vegetarian cell throughout filling it with water and increasing its elongation, that leads to increase in the height of the plant in addition to the fact that the water is a solvent and a transporter to other solvents, that increase the ability of the plant to elongate.

The potassium concentrations had a clear effect on the plant heights rates, the 100 Kg/h concentration gave the highest rate of the plant height (**101.22cm**) and with a significant difference from the other concentrations (50, 0) Kg/h which given of (**65.73cm**) **(81.76cm**), arranged. Shows figure. 1 the significance Interactions between the Irrigation timing and the potassium fertilizer concentrations, the plants which was Irrigation with 7 days and fertilized with high concentration (100) Kg /h with potassium fertilizer gave the highest rates of the plant height (**101.22cm**) with a significance difference from the rest of the Interactions, and that can be explained by the availability of the humidity and the element of potassium in the soils from the beginning of the plant growth that led to an increase the speed of photosynthesis and that reflected positively on the plant height (Shahzad et al., 2014).

Figure.1 effect of Irrigation timing and potassium fertilizer and the interaction between them in the plant height (cm).

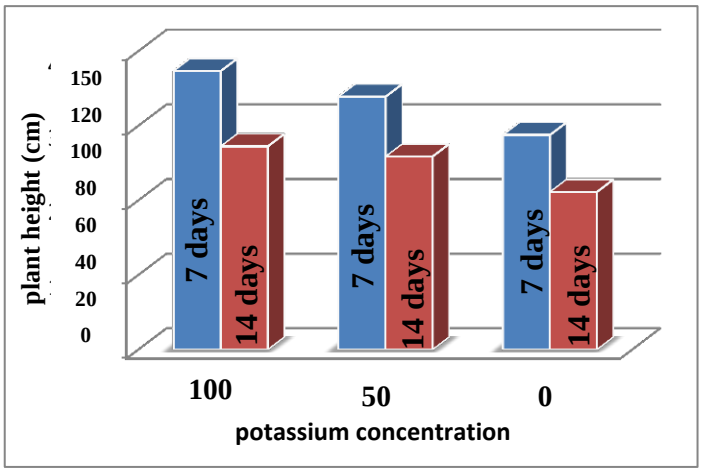
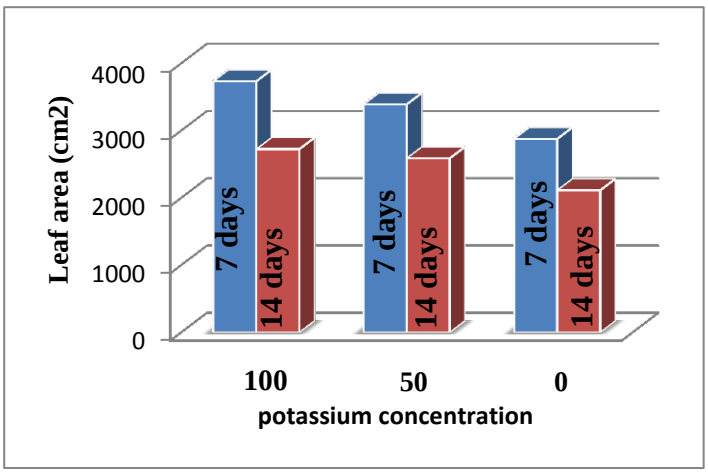


Figure.2 Irrigation timing and potassium fertilizer effect and the interaction between them in the plant Leaf area (cm^2).



2. Leaf area (cm^2).

The results illustrated in Figure.2 indicates significance effects of the Irrigation factor in the leaf area for the harvest, 7 days factor gave the value of the highest rate of the leaf area (**2876.67cm^2**), and with a significant difference from the second factor 14 days which gave (**2112.56cm^2**). That can be explained that the water stress has a negative effect on the leaf elongation, and that' is reflected in the plant leaf area and these results go along with (Rao et al., 2015).

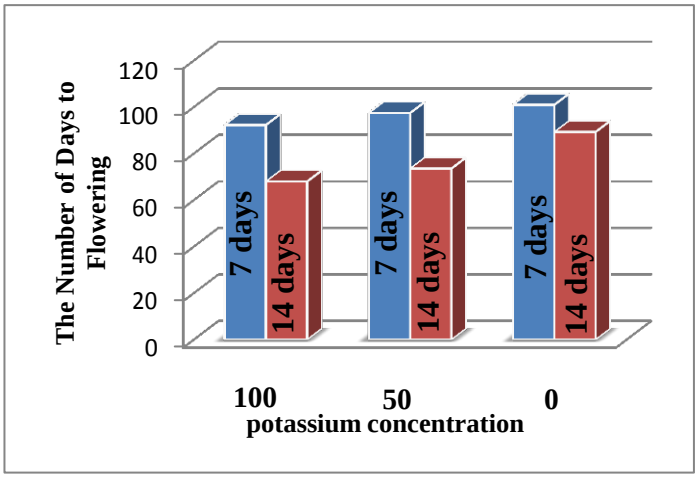
The results illustrated in Figure.2 indicates significant effects of the potassium in plant leaf area of Mash harvest. The plants fertilized with a high concentration (100) Kg /h with potassium fertilizer gave the highest rates of the plant leaf area (**3733.34cm^2**), and with a significance difference from the rest factors (50, 0) which gave a rate of leaf area reached (**3389.54cm^2**), (**2876.67cm^2**) respectively. This is an attributable to the important role of potassium in the process of division and elongation of the cells and that reflects positively on the leaf area and plant height, these results go along with (Ranawake et al., 2012). Figure.2 showed the significance Interactions between the Irrigation timing and the potassium fertilizer concentrations, the plants which was Irrigation with 7 days and fertilized with high concentration (100) Kg /h with potassium fertilizer gave the highest rates of the leaf area reached (**3733.34cm^2**) and with a significant difference from the rest of the interactions. This is due to that the water and potassium union that affected in the leaf area and all plant activity, consequently an increase in plant elongation and then the leaf area.These results go along with (Alzarqaa et al., 2014) who got the same results.

4- The Number of Days to Flowering:

The results illustrated in Figure.3 indicates significant effects of the weathering factor in the leaf area for the mung bean harvest.The results indicate significance effects of the weathering factor in the planting day number until ripeness for the mung bean harvest, 14 days was superior to less value for the number of days to flowering (**101.00**) days and with a significance difference from the first timing 7 days that gave a higher the number of days to flowering reached (**89.32**) days.This result shows the clear effect of the humidity on the flowering and ripeness of the plant, and this result goes along with (Abyar et al., 2014).The results illustrated in Figure.3 Indicates significant effects of the potassium in plant growth, flowering, and ripeness of mung bean harvest. The plants fertilized with high concentration (100) Kg /h with potassium fertilizer led to decrease the number of days to flowering, and it given (**92.30**) days, and with a significance difference from the rest factors (50, 0) which given the number of days to flowering (**97.45**), (**101.00**) days respectively. It has been attributed to the effect of the potassium on the flowering and Fertilization in mung bean and provoking the process of flowering and horns creation, these results consistent (Bushra et al., 2013).

Figure.3 shows the significance interference between the Irrigation timing and the potassium fertilizer concentrations, the plants which were Irrigation with 14 days and fertilized with a high concentration (100) Kg/h with potassium fertilizer gave the number of days to flowering (**68.00**) days with a significant difference from the rest of the interactions. This is supported by (Mondal et al., 2015) said that if the humidity was available in the phases of mung bean growth will encourage the green growth and that will lead to ripeness delay.

Figure. 2 Irrigation timing and potassium fertilizer effect and the interaction between them in the character of a number of days to flowering.



V. CONCLUSIONS

Mung bean plants positively responded to the potassium fertilizer and showed high drought tolerance. The Mungbean plants were most tolerant of drought when fertilizer with 100 Kg/h potassium.The use of potassium fertilizer is an innovative and promising way to reduce the impact of drought on plant growth and crop production.

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