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Effect of Chemical, Organic, Bio-Fertilizers and Water Stress in Growth, Flowering and Seed Production of Onion (Allium cepa L.) White Local cv.

Abdel-monnem Sadalaha Kahlel
Plant Production Department, Technical Agricultural College /Mosul
North Technical University / Iraq
E-mail : monnem_sadalaha@yahoo. com

***Abstract* – In order to study the effect of chemical, organic, bio-fertilizer and water stress in growth and seed production of onion a field experiment was implemented during the season of 2013-2014. The study conclude three factors : four types of fertilizers (chemical, local poultry manure, local sheep manure, and manufacture poultry manure), bio-fertilizer (dry bread yeast), and two treatments of water stress (without water stress and with water stress). The experiment included 16 different treatment (4 X 2 X 2) carried out in factorial experiment in split plot system in randomized complete block design with three replications. The results showed that adding local poultry manure gain the highest seed stalk number and dry weight, umbel diameter, number of flowers per umbel, plant seed yield and total seed yield, applying dry yeast increased all the mentioned parameters except umbel diameter, whereas water stress caused a decline in all studied parameters. Application of local poultry manure and dry yeast help in decreasing water stress damage in growth and seed production of onion.**

***Keywords* – Organic, Bio-fertilizer, Water stress, Onion Seed.**

I. INTRODUCTION

Onion (*Allium cepa* L.) is an important bulb crop grown worldwide. It is important crop in all condiment and used of flavoring the food, both at mature and immature bulb stages besides being used as salad and pickles. To lesser extent, it used by processing industry for dehydration in the form of onion flakes and powder, which are in great demand in the world market. Seeds production of onion crop is a complex processes that require skill and extensive knowledge of the plant characteristics and the suitable conditions for production (Hassan, 2000). Iraqi production of onion seeds is very few where depends on the import of seeds from outside the country. Among the factors affecting the production of onion seeds are fertilizers. Farmers have adopted the strategy of increasing crop yield by applying large amounts of chemical fertilizers, the negative effects of heavy applications of chemical inputs, in term of production, environment, and quality deterioration are becoming apparent. The ultimate goal of sustainable agriculture is to develop farming systems that are productive, profitable, energy-conserving, environmentally-sound, conserving of natural resources such as soil and water, and that ensure food safety and quality (Fawziy, *et. al*., 2012) Organic fertilizers has been used in recent times as a substitute for chemical fertilizers because of their importance in achieving clean production free from residual effects of chemical fertilizers and numerous studies indicated that. Ali *et. al*. (2008) found that the applying of cow dung manure 10 tons. ha^{-1} has increased the number of flowers per umbel, plant seed yield and total seed yield (kg. ha^{-1}). Also Bendegumbal *et. al*. (2008) noticed that the use of farm manure at 25 tons. ha^{-1} rate gave a significant increase in the number of umbel per plant, umbel diameter, seed weight per umbel and weight of 1000 seeds as compared with the treatment of chemical NPK fertilization (125-50-125 kg. ha^{-1}). Al-Khafajy and Al-Guboury (2010) noticed that the use of sheep manure at a rate of 20 tons. ha^{-1} for onion seeds production led to a significant increase in plant height, seed stalk dry weight, number of flowers per umbel, umbel diameter, fruit set percentage, number of seeds per umbel and seeds yield per plant and per unit area. Kahlel, (2013) found a responsibility of onion plant for organic fertilizer (poultry and sheep) with superiority over chemical fertilizer in average bulb weight, bulb diameter, bulbs total yield (ton. $h^{-1)}$.

Dry yeast is a natural bio- substances suggested to be of useful stimulatory, nutritional and protective functions when it is applied on vegetable plants during stressful condition due to its hormones, sugars, amino and nucleic acids, vitamins and minerals. The dry bread yeast (*Saccharomyces cerevisiae*) is a kind of the used bio-fertilizers in soil fertilization or in foliar application on the shoots of vegetable crops (El-Ghamring, *et. al*., 1999). Fawziy *et. al*. (2012) reported that dry yeast contain many nutrient elements produce a compounds of semi growth regulator like auxins, gibberellins and cytokinins. Also dry yeast have the ability to produce some enzymes that help in converting process of monosaccharide to alcohol and CO_2 which is essential for photosynthesis in plants (Dinha and Khazrajy 1990). So dry bread yeast has been used in improving growth and productivity in some vegetable crops. It was found by Sarhan, *et. al*. (2011) that spraying eggplant by dry bread yeast 5 $g.l^{-1}$ led to a significant increase in plant height, P, K content in leaves, fruits plant yield and total fruits yield. Kahlel, (2015) noticed that the applying of dry bread yeast near the roots of potato plants (4 and 8 $g.l^{-1}$ conc.) resulted in a significant increase in the number of stems per plant, plant height, fresh and dry weight of plant, number of tubers, tubers plant yield, and tubers total yield.

The growth of onion plants and seed production also affected by the availability of irrigation water in the different stages of plant growth. Roy, *et. al*., (2014) reported that onion require frequent irrigations, and soil moisture is an important factor that influences seed yield of onion, because plant roots absorbed very little water

from depths beyond 24 inches; most of the water is from the top 12 inches of soil, thus upper soil areas must be kept moist to stimulate root growth and provide adequate water for the plant. Kumar, *et. al*. (2007) irrigate onion plants with four levels (25, 50, 75 and 100%) from the rate of evapo- transpiration they found that irrigation rate of 25, 50 and 75% reduced the total yield bulbs by 50%, 23% and 10%, respectively, as compared with the 100% irrigation treatment. El- Balla *et. al*. (2013) exposing onion plants to water stress for two weeks in four different stages of reproductive growth, namely, bolting, flowering, seed formation and seed maturation stage, they mentioned a significant decrease in the seed yield when exposing plants to water stress at any stage of growth. Yousuf *et. al*., (2013) mentioned that least seed yield of onion was when stress was imposed on the seed formation stage, irrespective of the amount of water applied so they concluded that seed formation stage is the critical stage of onion seed production. Roy *et. al*., (2014) found that decrease water irrigation amount in the season from 28. 77 cm. to 20.65 cm. caused a decrease in onion seeds yield from 1110.81 to 933.63 kg. ha^{-1}.

The aim of this experiment is to study the ability of applying organic fertilizer instead of chemical fertilizer, dry bread yeast as bio-fertilizer under water stress condition to improve plant growth and seed production of onion (White Local cv.) and decrease water stress negative effect in growth and seed yield.

II. Materials and Methods

In order to study the effect of chemical, organic, bio-fertilizer and water stress in growth and seed production of onion a field experiment was implemented at Department of Plant Production in Technical Agricultural College / Mosul / Iraq during the season of 2013-2014, the studied factors were as follows:

A-Chemical and organic fertilizers:

1-Chemical fertilizers at a rate of 260 kg. ha^{-1} urea, 260 kg. ha^{-1} triple superphosphate and 200 kg. ha^{-1} potassium sulfate.

2-Local poultry manure at a rate of 15 tons. ha^{-1} with half amount of chemical fertilizers mentioned above.

3-Local sheep manure at a rate of 20 tons. ha^{-1} with half amount of chemical fertilizers mentioned above.

4-Manufactured poultry manure (Italpollina) at a rate of 30 kg. 100 $m^{2\ -1}$ with half amount of chemical fertilizers mentioned above.

The addition of organic and phosphate fertilizers was before planting by scattering on the soil, whereas nitrogen and potassium fertilizers were added at two times, the first after month of germination and the second after a month of the first.

B-Bio-fertilizer (dry bread yeast) it applied as solution (0 and 4 $g.L^{-1}$ conc.) by watering near the plant roots in two times, the first at flowering stage and the second at seed formation stage.

C-Water stress

1-Without water stress (normal irrigation).

2-With water stress, by exposing plants to drought twice time, the first at flowering stage (for 12 days) and the second at seeds formation stage (for 10 days). Onion bulbs (White Local cv.) were sowing in 8th October 2013 in a Loamy soil in plots at a lines 60 cm. width and 20 cm. between plants.

The experiment include 16 different treatments (4X 2 X 2) Carried out in factorial experiment in Randomized Complete Block Design within split plot system with three replications.

The following measurements were recorded:

1-Number of seed stalks per plant.

2-Dry weight of seed stalks (g.).

3-Umbel diameter (cm.).

4-Number of flowers per umbel.

5-Seed yield per plant (g.).

6-Seed yield per unite area (kg. ha^{-1}).

Results were analyzed statistically according to SAS system (SAS 1998) and compared to the means by Duncan multiple rang test at 0.05 level (Al-Rawy and Kalaf, 2000).

III. Results and Discussion

Tables 1 and 2 illustrates the effect of fertilizers types, dry bread yeast, water stress and their interaction in seed stalk numbers and dry weight. It was found that the highest number 6.81 and dry weight 15.91 g. of seed stalk resulted from applying local poultry manure which is significantly superior over other fertilizers types. The application of dry bread yeast has led to a significant increase in the number 6.43 and dry weight 14.94 g of seed stalk compared with control treatment. The water stress decline the number 5.80 and dry weight 12.70 g of seed stalk compared with the normal irrigation. The interaction between the three studied factors show a significant effect, the highest number 6.91 and dry weight 16.19 g. of seed stalk produced from interaction between local poultry manure and yeast addition. Also the interaction between local poultry manure and normal irrigation gains the highest number 7.24 and dry weight 18.12 g of seed stalk. It was appear that the impact of interaction between yeast and water stress in number and dry weight of seed stalk is attributed to water stress only, where the two normal irrigation treatments superior over the water stress treatments regardless of yeast addition. The triple interaction between fertilizer, yeast and water stress shows a significant effects in number and dry weight of seed stalk, the interaction between local poultry, yeast addition and normal irrigation gains the highest number 7.38 and dry weight 18.24 g. of seed stalk which superior over most other interaction treatments.

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Table 1 Effect of fertilizers, yeast and water stress and there interaction in number of seed stalk per plant

Fertilizers Type				**Dry Bread Yeast**		**Water Stress**	
Chemical	Poultry	Sheep	Manufact.	Without Y	With Y.	Without WS	With W.S.
5.81 d	6.81 a	6.20 c	6.54 b	6.26 b	6.43 a	6.87 a	5.80 b
Fertilizer X Yeast							
		Chemical	Poultry	Sheep	Manufact.		
Without Yeast		5.74 e	6.72 ab	6.08 de	6.48 bc		
With Yeast		5.88 e	6.91 a	6.33 cd	6.61 abc		
Fertilizer X Water Stress							
		Chemical	Poultry	Sheep	Manufact.		
Without Water Stress		6.51 cd	7.24 a	6.77 bc	6.98 ab		
With Water Stress		5.11 g	6.37 de	5.63 f	6.11 e		
Yeast X Water Stress							
		Without Yeast		With Yeast			
Without Water Stress		6.81 a		6.94 a			
With Water Stress		5.69 b		5.92 b			
Fertilizer X Yeast X Water Stress							
Yeast	Water Stress	Chemical	Poultry	Sheep	Manufacture		
Without Yeast	Without W.S.	6.48 d-g	7.11 ab	6.73 b-f	6.94 a-d		
	With W.S.	5.01 j	6.33 e-h	5.43 ij	6.02 gh		
With Yeast	Without W.S.	6.55 c-g	7.38 a	6.82 b-e	7.02 abc		
	With W.S.	5.21 j	6.42 d-g	5.84 hi	6.21 fgh		

Means followed with the same latter are not significantly different according to Duncan multiple range test at the probability of 0.05 levels.

Table 2 Effect of fertilizers, yeast and water stress and there interaction in seed stalk dry weight (g.).

Fertilizers Type				**Dry Bread Yeast**		**Water Stress**	
Chemical	Poultry	Sheep	Manufact.	Without Y	With Y.	Without WS	With W.S.
13.57 d	15.91 a	14.15 c	15.40 b	14.57 b	14.94 a	16.81 a	12.70 b
Fertilizer X Yeast							
		Chemical	Poultry	Sheep	Manufact.		
Without Yeast		13.42 d	15.63 b	13.92 cd	15.32 b		
With Yeast		13.73 d	16.19 a	14.32 c	15.49 b		
Fertilizer X Water Stress							
		Chemical	Poultry	Sheep	Manufact.		
Without Water Stress		15.42 c	18.12 a	16.03 b	17.68 a		
With Water Stress		11.72 g	13.69 d	12.27 f	13.13 e		
Yeast X Water Stress							
		Without Yeast		With Yeast			
Without Water Stress		16.64 a		16.98 a			
With Water Stress		12.50 c		12.91 b			
Fertilizer X Yeast X Water Stress							
Yeast	Water Stress	Chemical	Poultry	Sheep	Manufacture		
Without Yeast	Without W.S.	15.21 c	18.01 a	15.82 bc	17.54 a		
	With W.S.	11.63 g	13.25 e	12.02 fg	13.10 e		
With Yeast	Without W.S.	15.64 bc	18.24 a	16.24 b	17.82 a		
	With W.S.	11.82 fg	14.14 d	12.53 ef	13.16 e		

Means followed with the same latter are not significantly different according to Duncan multiple range test at the probability of 0.05 levels.

Tables 3 and 4 reveals that there were a significant variation between fertilizers types, dry yeast, water stress and their interaction in umbel diameter and number of flowers per umbel. The applying of local poultry manure produced the highest umbel diameter 8.62 cm. and number of flowers per umbel 753.7, whereas the lowest result were from chemical fertilizer (6.85 cm., 665.5), also adding dry yeast gains the highest umbel diameter 7.86 cm., and number of flowers per umbel 716.1 compared with control treatment. Water stress caused a significant decline in the umbel diameter and number of flowers per umbel as compared with normal irrigation. Regarding to the

interaction between fertilizers and dry yeast it was observed that the interaction between local poultry manure and dry yeast gains the highest umbel diameter 8. 72 cm. and number of flowers per umbel 764.2, also the interaction between fertilizers and water stress showed a significant variation whereas the interaction between local poultry manure and normal irrigation (without stress) produced the highest umbel diameter and number of flowers per umbel. The interaction between dry yeast and normal irrigation produce the highest umbel diameter and number of flowers per umbel. The triple interaction between fertilizer, yeast and water stress shows a significant effects and the best treatment was the interaction between local poultry manure and dry yeast and normal irrigation which gains the highest umbel diameter 10.23 cm. and number of flowers per umbel 840.2 which superior over all other interaction treatments except one treatment (local poultry manure and without dry yeast and normal irrigation).

Table 3 Effect of fertilizers, yeast and water stress and there interaction in umbel diameter (cm.).

Fertilizers Type				**Dry Bread Yeast**		**Water Stress**	
Chemical	Poultry	Sheep	Manufact.	Without Y	With Y.	Without WS	With W. S.
6.85 d	8.62 a	7.56 c	8.04 b	7.67 a	7.86 a	8.77 a	6.77 b
Fertilizer X Yeast							
		Chemical	Poultry	Sheep	Manufact.		
Without Yeast		6.78 e	8.52 ab	7.42 d	7.95 c		
With Yeast		6.92 e	8.72 a	7.70 cd	8.13 bc		
Fertilizer X Water Stress							
		Chemical	Poultry	Sheep	Manufact.		
Without Water Stress		7.59 d	10.13 a	8.32 c	9.03 b		
With Water Stress		6.11 f	7.12 e	6.79 e	7.04 e		
Yeast X Water Stress							
		Without Yeast		With Yeast			
Without Water Stress		8.63 a		8.91 a			
With Water Stress		6.71 b		6.82 b			
Fertilizer X Yeast X Water Stress							
Yeast	Water Stress	Chemical		Poultry	Sheep	Manufacture	
Without Yeast	Without W. S.	7.55 cd		10.03 a	8.02 c	8.92 b	
	With W. S.	6.02 g		7.02 de	6.82 ef	6.98 de	
With Yeast	Without W. S.	7.63 cd		10.23 a	8.63 b	9.15 b	
	With W. S.	6.21 fg		7.22 de	6.77 ef	7.11 de	

Means followed with the same latter are not significantly different according to Duncan multiple range test at the probability of 0.05 levels.

Table 4 Effect of fertilizers, yeast and water stress and there interaction in flowers number per umbel.

Fertilizers Type				**Dry Bread Yeast**		**Water Stress**	
Chemical	Poultry	Sheep	Manufact.	Without Y	With Y.	Without WS	With W. S.
665.5 d	753.7 a	689.7 c	717.8 b	697.2 b	716.1 a	769.2 a	644.2 b
Fertilizer X Yeast							
		Chemical	Poultry	Sheep	Manufact.		
Without Yeast		659.9 f	743.2 b	678.8 e	706.9 d		
With Yeast		671.1 ef	764.2 a	700.7 d	728.7 c		
Fertilizer X Water Stress							
		Chemical	Poultry	Sheep	Manufact.		
Without Water Stress		711.5 d	830.6 a	748.3 c	786.3 b		
With Water Stress		619.5 g	676.9 e	631.2 g	649.3 f		
Yeast X Water Stress							
		Without Yeast		With Yeast			
Without Water Stress		757.1 b		781.3 a			
With Water Stress		637.3 d		651.0 c			
Fertilizer X Yeast X Water Stress							
Yeast	Water Stress	Chemical		Poultry	Sheep	Manufacture	
Without Yeast	Without W. S.	701.5 ef		821.1 ab	715.4 d	7 70.5 c	
	With W. S.	618.4 j		665.4 g	622.3 ij	643.4 hi	
With Yeast	Without W. S.	721.6 de		840.2 a	761.2 c	802.2 b	
	With W. S.	620.6 j		688.2 f	640.2 hij	655.2 gh	

Means followed with the same latter are not significantly different according to Duncan multiple range test at the probability of 0.05 levels.

Tables 5 and 6 showed that there were a significant variation between fertilizers types, dry yeast, water stress and their interaction in plant and total seed yield. Adding local poultry manure produced the highest plant seed yield 22. 65 g. and total seed yield 1509. 9 Kg. ha. $^{-1}$ which significantly superior over the other three fertilizers, also applying dry yeast gains the highest plant seed yield 19. 48 g. and total seed yield 1298.6 Kg. ha. $^{-1}$ compared with control treatment. Water stress caused a significant decline in the plant seed yield and total seed yield as compared with normal irrigation. Regarding to the interaction between fertilizers and dry yeast it was observed that the interaction between local poultry and dry yeast gains the highest plant seed yield 22.89 g., and total seed production 1525.9 Kg. ha. $^{-1}$, also the interaction between fertilizers and water stress showed a significant variation whereas the interaction between local poultry manure and normal irrigation (without stress) produced the highest plant seed yield 27.97 g., and total seed production 1864.6 Kg.ha.$^{-1}$ which is superior over all other treatments. The interaction between dry yeast and normal irrigation produce the highest plant seed yield 24.34 g. and total seed production 1622.6 Kg.ha.$^{-1}$. The triple interaction between fertilizer, yeast and water stress shows a significant effects and the best treatment was the interaction between local poultry manure and dry yeast and normal irrigation which gains the highest plant seed yield 28.12 g. and total seed production 1877.3 Kg.ha.$^{-1}$.

Regarding to the interaction between fertilizers and water stress in the data tables it was clear that applying local poultry manure for the plant that exposed to water stress contribute in decreasing the damage of water stress in growth, flowering and seed production, which indicate the effect of poultry manure on soil physical properties especially soil moisture content. Where we note in table (6) from the interaction between fertilizer kinds and water stress that adding local poultry manure has reduced water stress damage and that is appear from the seed yield of the treatment of local poultry manure(1155.3kg.ha^{-1}) under tensile conditions, which is increased far more than the seed yield of chemical fertilizer (769.9 kg.ha^{-1}) under tensile conditions, and slightly less than the seed yield of chemical fertilizer under normal irrigation conditions (1301.9 kg.ha^{-1}). This indicate the possibility of using local organic manure to reduce the water stress damage or the irrigation water deficit in some regions of the country.

The increase in vegetative, flowering and seed yield parameters as a result of adding organic fertilizer compared with chemical fertilizer may be due to the role of organic fertilizer in improving the physical, chemical, and biological characters of the soil and increase its ability to maintain water and nutrient elements content, especially nitrogen, phosphorus and potassium (Al-Zouby *et al*., 2007). Atti and Al-Sahaf, (2007) mentioned that the addition of organic fertilizer (Organo Fert.) led to increase variability of phosphorus element by 50% than the control treatment, as well organic fertilizer encourages microorganism and increase microbial activity which stimulate microbial enzymes activity such as Nitrogenase, Urease and Dehydragenase (Fathy *et al*., 2000). Atti and Al-Sahaf (2007) reported that using organic fertilizer (poultry fertilizer) led to increase the percentage of mycorrhiza colonies in potato roots and attributed that to the contain of the manure to numbers of unspecified types of mycorrhiza spores, which contributed to increase the proportion of roots injury, also organic fertilizer contains some fungi such as *Trichoderma* spp. that share with mycorrhiza fungi in positive interactions to stimulate growth, they also reported that the decomposition of organic fertilizers, resulting in some amino and organic acid, all these functions of organic fertilizer play an important role in biological processes of plants especially photosynthesis and led to increase vegetative growth and flowering (tables 1, 2, 3 and 4) which contributed in increasing umbel diameter, plant seeds yield and total seeds yield. The function of organic fertilizer in maintain water in the soil and keep soil moisture contribute in decreasing water stress negative effect in the plants exposing to drought. This results were in harmony with that finding of (Ali *et. al*. 2008, Bendegumbal *et. al* 2008, Al-Khafajy and Al-Guboury, 2010, Khalel, 2015). The increment in vegetative, flowering and seed yield parameters resulted from applying dry bread yeast near the onion plant roots might be attributed to the effects of yeast in increasing levels of endogenous hormones in treated plants which could be interpreted to cell elongation and cell division, also may be due to the physiological roles of vitamins and amino acids in the yeast which increased the metabolic processes rate and levels of endogenous hormones i. e. IAA and GA_3

Table 5 Effect of fertilizers, yeast and water stress and there interaction in plant seed yield (g.).

Fertilizers Type				**Dry Bread Yeast**		**Water Stress**	
Chemical	Poultry	Sheep	Manufact.	Without Y	With Y.	Without WS	With W. S.
15.54 d	22.56 a	17.97 c	19.75 b	18.47 b	19.48 a	23.67 a	14.28 b
Fertilizer X Yeast							
		Chemical	Poultry	Sheep	Manufact.		
Without Yeast		14.96 f	22.41 ab	17.65 d	18.89 cd		
With Yeast		16.16 ef	22.89 a	18.29 d	20.61 bc		
Fertilizer X Water Stress							
		Chemical	Poultry	Sheep	Manufact.		
Without Water Stress		19.53 d	27.97 a	22.62 c	24.56 b		
With Water Stress		11.55 g	17.33 e	13.33 fg	14.94 f		

Yeast X Water Stress					
	Without Yeast	With Yeast			
Without Water Stress	22.99 a	24.34 a			
With Water Stress	13.94 b	14.63 b			
Fertilizer X Yeast X Water Stress					
Yeast	Water Stress	Chemical	Poultry	Sheep	Manufacture
Without Yeast	Without W. S.	18.42 ef	27.82 a	21.76 cd	23.66 bc
	With W. S.	11.43 h	17.01 f	23.22 gh	14.12 gh
With Yeast	Without W. S.	20.65 de	28.12 a	23.15 bcd	25 46 ab
	With W. S.	11.67 h	17.66 f	14.44 gh	15.76 fg

Means followed with the same latter are not significantly different according to Duncan multiple range test at the probability of 0.05 levels.

Table 6 Effect of fertilizers, yeast and water stress and there interaction on total seed yield (Kg. h^{-1}).

Fertilizers Type				**Dry Bread Yeast**		**Water Stress**	
Chemical	Poultry	Sheep	Manufact.	Without Y	With Y.	Without WS	With W.S.
1035.9 d	1509.9 a	1197.9 c	1316.6 b	1231.3 b	1298.6 a	1577.9 a	951.9 b
Fertilizer X Yeast							
	Chemical	Poultry	Sheep	Manufact.			
Without Yeast	994.6 f	1493.9 ab	1176.6 d	1259.3 cd			
With Yeast	1077.3 ef	1525.9 a	1219.3 d	1373.9 bc			
Fertilizer X Water Stress							
	Chemical	Poultry	Sheep	Manufact.			
Without Water Stress	1301.9 d	1864.6 a	1507.9 c	1637.3 b			
With Water Stress	769.9 g	1155.3 e	888.6 fg	995.9 f			
Yeast X Water Stress							
	Without Yeast		With Yeast				
Without Water Stress	1532.6 a		1622.6 a				
With Water Stress	929.3 b		975.3 b				
Fertilizer X Yeast X Water Stress							
Yeast	Water Stress	Chemical	Poultry	Sheep	Manufacture		
Without Yeast	Without W.S.	1227.9 ef	1854.6 a	1450.6 cd	1577.3 bc		
	With W.S.	761.9 h	1133.9 f	1547.9 gh	941.3 gh		
With Yeast	Without W.S.	1376.6 de	1877.3 a	1543.3 bcd	1697.3 ab		
	With W.S.	777.9 h	1177.3 f	895.9 gh	1050.6 fg		

Means followed with the same latter are not significantly different according to Duncan multiple range test at the probability of 0.05 levels.

Fawzy *et. al*., (2010) reported that dry yeast is a natural bio-substance suggested to be of useful stimulatory, nutritional and protective functions when it is applied on to vegetable plants during stress conditions due to its content of hormones, sugars, amino and nucleic acids, vitamins and minerals. Thereby, it can be induce thermo tolerance due to its role in the synthesis of protein and nucleic acids and in minimizing their degradation. These results were in agreement with that finding (Fawzy *et. al*., 2010, Sarhan *et al*., 2011, Fawzy *et. al*., 2012, Khalel, 2015))

The decline in vegetative, flowering and seed yield parameters as a result of exposing onion plants to water stress at flowering and seeds formation may be due to the deficit of soil moisture which is an important factor that influences seed yield of onion, because plant roots absorbed very little water from depths beyond 24 inches, most of the water is from the top 12 inches of soil, thus upper soil areas must be kept moist to stimulate root growth and provide adequate water for the plant (Roy *et. al*. (2014). Bazza, (1999) reported that adequate watering condition in the early of the season led to the development of an abundant leaf cover and a shallow root depth which cannot withstand water stress at later stage. Marschner, 1995 mentioned that soil water deficits inhibit leaf expansion, which reduces the amount of solar radiation intercepted as well as uptake of nutrients, because of reduced transpiration rates, in onion plants, rates of transpiration, photosynthesis and growth are lowered by mild water stresses. The flowering and seeds formation stage considered as critical stage for seed production, Borgo *et. al*., (1993) reported that water stress during bulb sprouting and beginning of the anthesis (period when onion flowers are fully open and functional) reduce the number of umbels and flowers per plant. Also Yousuf *et. al*. (2013) showed that flowering stage of onion seed production may be considered critical. These results were in harmony with (Borgo, *et. al*., 1993, Bazza, *et. al*. 1999, Kumar *et. al*., 2007. El-Balla *et. al*., 2013, Roy, *et. al*., 2014).

IV. CONCLUSION

It can be concluded from this study that we can used organic fertilizer (local and manufactured poultry manure) as an alternative to half of the chemical fertilizer and increased growth, flowering and seed yield of onion better than using chemical fertilizers alone, in addition to avoid the problems of using chemical fertilizer like pollution of the environment and crops produced. Also the addition of dry bread yeast as a bio-fertilizer by irrigation near the plant roots result a significant increase in the seed yield of onion. Exposing onion plants to water stress by stop irrigation at flowering and seed formation stages caused a significant decrease in the growth, flowering and seed yield and these two stages are considered as critical for plant irrigation and seed production. The use of organic fertilizers has led to reduced water stress damage, where we got a good increase percent in seed production (33. 35 %) in the treatment of local poultry manure compared with the treatment of chemical fertilizer under water stress conditions as a result of the function of organic fertilizer in maintain water in the soil and keep soil moisture.

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