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Response of wheat varieties (*Triticum aestivum* L.) to seeding rates and organic extract in Suluq- Libya

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ABSTRACT

This investigation was performed to study the effect of organic extract and NPK as foliar application 4.8 l/ha at the seedling and tillering stage on wheat (*Triticum aestivum* L.) at the northeast Al-Kadra/Suluq in Libya. Four varieties of bread wheat, Amricana Xpress, Aroona, Vee,sWafi and Kasyon/Glennson.81 with two seeding rates 100 and 120 kg/ha were used. This study was conducted in the growth seasons 2015/2016 and 2016/2017. The experiment was conducted as a split- split plot in randomized complete blocks design arrangement with three replications and three factors. Production of grain yield increased of varieties Kasyon/Glennson.81, Vee,s Wafi and Amricana Xpress by 35.4 %, 18.8 % and 16.4 % respectively when adding 4.8 l/ha of organic extract compared to the control of season 2016/2017. Showed all data obtained significant differences at a significant level of 1% and 5% except in some cases. The highest grain yield was highly significantly by varieties Kasyon/Glennson.81 and Vee,sWafi were 3.68 and 3.66 tons/ha, respectively in 2015/2016 season, while in 2016/2017 the highest grain yield was for Amricana Xpress and Vee,sWafi of 5.35 and 4.83 tons/ha, respectively. The lowest grain yield of Aroona was 3.36 tons/ha in 2015/2016 season. When the agriculture rate of 120 kg/ha production was significantly decreased by 3.9 % in the first season and insignificantly increased by 0.6% in the second season compared to seeding rates 100 kg /ha. The protein content of grain was 14.45% by using Amricana Xpress variety and adding organic extract at the rate 4.8 l/ha in 2015/2016 season.

Key words: Organic extract, varieties, wheat, *Triticum aestivum* L., grain yield, seeding rates, protein content of grain.

Introduction

Bread wheat (*Triticum aestivum* L.) the world's most widely cultivated crop, used by more than a third of the world's population as a Basic food (Curtis, 2002). The total global wheat output exceeded 749.3 million ton in 2016, according to FAOSTAT data (FAOSTAT, 2017).Wheat is further classified as winter or spring, hard or soft, red or white, and by protein content (Briggle and Curtis, 1987).Wheat is one of the most important cereals grown in Libya. Wheat contains vitamins, minerals and essential amino acids, throughout with useful metabolites and dietary fibers. The high cost of inorganic fertilizer, use of natural fertilizer resources for increasing crop production on sustainable basis has become imperative. Addition humic acid (HA) the treatments consisted of HA alone (3 kg/ha or 1.5 kg/ha) as a low-cost natural fertilizer and to determine its effect on the yield of rainfed wheat crop (*Triticum aestivum* L.) Results suggested that HA applied alone at 3 kg/ha increased the yield by 24% over the control and saved 100% cost of the chemical fertilizer (Khan *et al.*, 2010). HA and folic acids has great potential as a low cost natural fertilizer to improve soil fertility on sustainable basis. HA can be used as a cheap organic fertilizer source to improve plant growth and yield, and enhance stress tolerance, as well as to improve soil physical properties and complex metal ions (Zandonadi *et al*., 2007). Humic substances in soil increase nutrient absorption by augmenting the availability of nutrients in addition to improvement of the physical structure of soil (Cimrin and Yilmaz, 2005). On the other hand, organic matter in soil has been reported to provide the compounds which affect root growth and the distribution of nutrients absorbed by plants (Lobartini *et al*., 1997). Bohme and ThiLua (1997) reported that HA had beneficial effects on the nutrient uptake by plants, and was particularly important in the transportation and availability of micro-nutrients in plants. This

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may not only help in recycling of organic waste causing environmental pollution but also conserve a rich pool of nutrient resources, which can reduce the sole dependence on chemical fertilizers (Ghosh and Sharma, 1999). In addition, the presence of humic molecules raises the effect of NPK fertilization on plants (Chen *et al*., 2001). The integrated use of organic nutrient sources with inorganic fertilizer has been shown to increase the potential of organic fertilizer (Heluf, 2002; Ahmad *et al*., 2006) and to improve soil fertility and productivity of agricultural systems (Van-Lauwe *et al*., 2002).

Seed rate is one of the most important agricultural factors that need a more focus to obtain the maximum crop yield. High seed rate increases competition between plants for shared resources, especially water, nutrients and sunlight, which has led to low quality and low yield. If a low seed rate is used, the yield will decrease and the number of plants will be reduced to the unit area (Hameed *et al*., 2002).Wheat sown by drilling method at the seed rate of 150 kg/ha significantly increased the plant vigor and yield (Curtis, 2002).Wheat grown at a seed rate of 150 kg/ha gave a significant increase in the strength of plant growth and yield. This increase in yield was associated with a gradual increase in all components of growth. A seed rate at 125 kg/ha was optimized for yield and quality of wheat grains (Soomro *et al*., 2009).When cultivating the local cultivar Marjawee at a rate of 120 kg/ha, an increase in grain yield and the largest harvest index, while 160 kg/ha gave the maximum number of total tillers and total biological yield while not affected the quality characteristics by seed rate (Soqer, 2006).In the Salouq area, variety Vee,sWafi yield was given 6.2 - 7 tons/ha with a thousand-grain weight 44.9 g while the Aroona was yield 5.6 tons/ha, variety Kasyon/Genaro.81 was yield 5.58 tons/ha with thousand-grain weight 42.3 gram in Salouq under irrigation (IMAO, 1998). With regard to differences between varieties, previous studies have clearly shown that selected varieties that are associated with a particular density and used by farmers may be a practical option for improving wheat production. Depends on the genotype and the environment and is strongly influenced by the seed rate (Fischer *et al*., 1976).

The objectives of this research were: i.)Productivity and quality soft wheat varieties imported from ICARDA. ii) The best suitable seed rate for each variety. iii) Effect of foliar fertilization of organic extract (amino acids and humic acids) for each variety under irrigation conditions.

Material and Methods

The present study was undertaken during the two successive growing seasons 2015-2016 and 2016-2017. Crop growth was under irrigation conditions at Suluq in Libya Southwest of Benghazi located about 50 km of the city of Benghazi, along the longitude 31°40′ 07″ north latitude 20°15'01″ east longitude and at an altitude of 65 m (Wikipedia, 2017). Four varieties of soft wheat and two seeding rates were used to study the effect of foliar application of organic extract on wheat productivity.

A split-split plot arranged as randomized complete blocks design with three replications was used. Main plots were arranged to organic extract at a rate of 4.8 l/ha and control, sub-plots to four wheat varieties, sub-sub plots to two seeding rates. Organic extract contains humic 15%, folic 10%, amino 10% acids, potassium 6%, phosphorus 4% and nitrogen 1 %

Treatment details were: i) foliar spray with water (control), ii) organic extract spray was added 4.8 l/ha at seedling and tillering stage. The experiment was conducted under conditions spray irrigation. The experimental unit was (4 m x 4 m). Planting was done at a rate of 100 and 120 kg/ha and the distance between rows were 20 cm and 5 cm between plants on the rows as indicated by (ARC, 1989). Ten plants were taken from each experimental unit to measure productivity.

Plant Materials

Four wheat varieties named Amricana Xpress, Aroona, Vee,sWafi and Kasyon/Glennson.81. These varieties were obtained from investment management and agricultural operations, as shown in Table 1.

Soil study

Both experiments were sown by hand on 8 December 2015 and 2016. No herbicide treatments were used. All plots were kept free of weeds by hand-weeding.
Soil samples were collected from Suluq. Three soil samples were collected from each stand at depth (0-50 cm) before planting for two seasons 2015/2016 and 2016/2017 to study some physical and chemical properties of the experimental soil. Soil analysis results indicate that the soil area Suluq are fertile and not stressful (Tables 2 and 3).

Table 1: Shows four wheat (*Triticum aestivum* L.) varieties pedigree, name and the source, 1994 - 1995.

Variety name	The source and pedigree
Amricana Xpress	(Commercial Variety) U. S. A.
Aroona	ICARDA
Vee"sWafi	ICW86 -1034 - 300L – 300 AP – OL - SAP- OL- OAP
Kasyon/Glennson.81	ICW85 - 0025 - 05AP-300 AP-300L-SAP-OL-OAP

Table 2: Mechanical analysis of soil at Suluq for 2015/2016 and 2016/2017 seasons.

Soil parameters	Season of examination	
	2015/2016	2016/2017
Mechanical analysis of soil		
Sand %	36.0	34.0
Silt %	25.12	26.3
Clay %	38.88	39.7
Soil texture	Clay loam	

Table 3: Chemical analysis of soil at Suluq for 2015/2016 and 2016/2017seasons.

Soil parameters							
Chemical analysis of soil		Available macronutrients ppm		Physical analysis of soil		Percentage of moisture content	
pH (1:2.5)	9.04	N	760	Soil bulk density g/cm^3	1.27	Field capacity	22.18
EC dSm-1	0.3	P	5.0	Soil Porosity %	52	Wilt Point	20.65
OM %	0.8			Soil enforcement cm/h	3	Water available	11.53

Climatic study

Mean of some meteorological data for Suluq area in Libya during two growing seasons of wheat crop 2015/2016 and 2016/2017 as described in Fig.1 and 2. Source: meteorological station Benghazi, 2017. The average air temperature from November to June in Suluq is 18.96 °C and the average cumulative rainfall is 86.6 mm. Rain conditions were more varied than thermal conditions. In season 2016/2017 the highest rainfall rate was 132.2 mm and in 2015 / 2016 was the lowest 41 mm than at a similar time for many seasons. The instability of the weather, which in turn affected the development of spring wheat due to the lack of rainfall in March, April, May and June 2015/2016, was observed in conjunction with the elongation of the stem and the flowering period. On the other hand, mean relative humidity were 58.51 % in 2015/2016 and 63.31 % in 2016/2017.

Studied traits

The following traits were measured at both studies in two seasons 2015/2016 and 2016/2017. Yield and yield components: number of plants / m^2,plant height (cm), leaf area cm^2/plant, number of tillers / plant, spike weight (g), number of grains per spike, thousand-grain weight (g), biological yield (tons/ha),grain yield (tons/ ha), straw yield (tons /ha), harvest index % = (grain yield / biological yield) x 100.Quality characters: protein content and moisture content of grain by using a device Perten from the Research Laboratory of Grain Marketing, USA (Manhattan, Kansas).

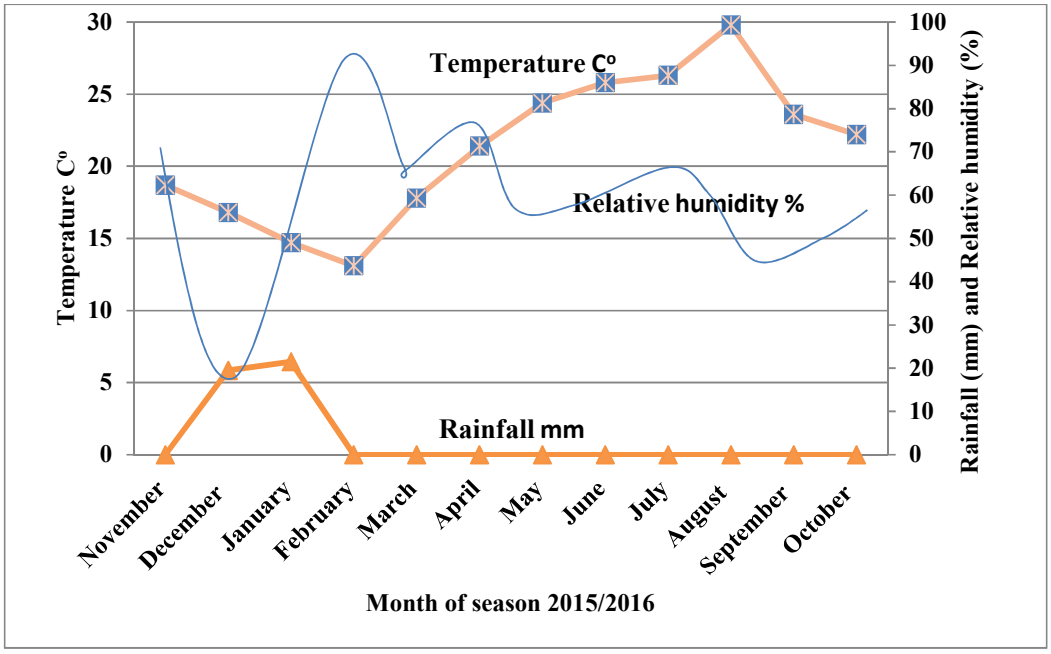

Fig. 1: Mean temperature and rainfall data at Suluq area in Libya during 2015/2016.
Source: meteorological station Benghazi 2017.

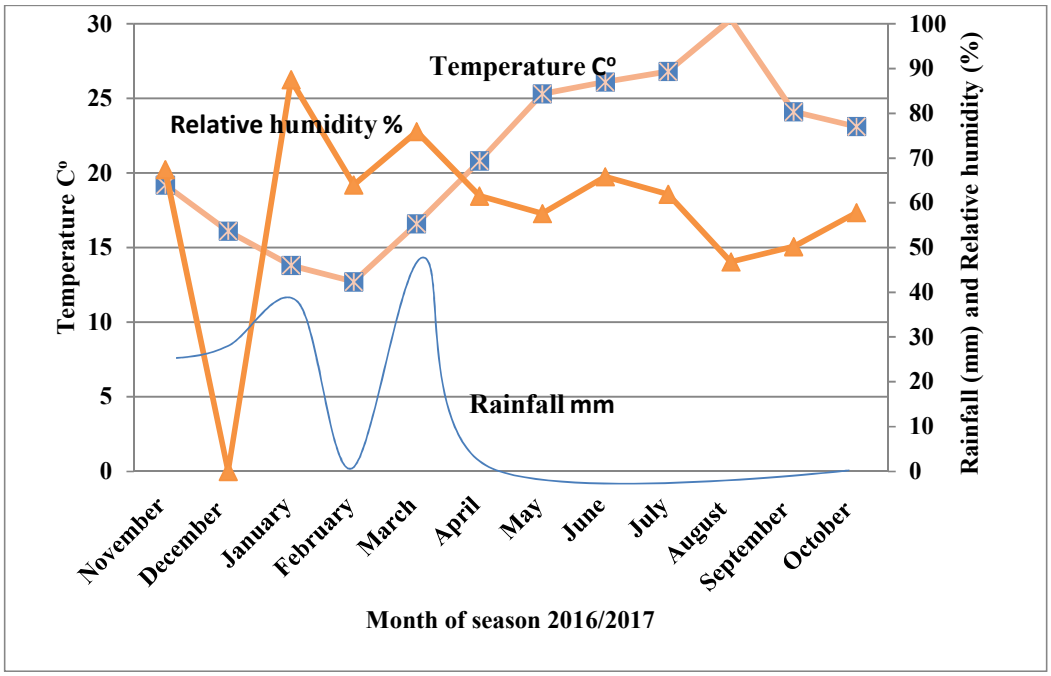

Fig. 2: Mean temperature and rainfall data at Suluq area in Libya during 2016/2017.
Source: meteorological station Benghazi 2017.

Statistical analysis

Use the normal distribution test by Shapiro-Wilk test with using the SPSS program before analyzing the data and all data were statistically analyzed according to the technique of analysis of variance (ANOVA) as published by Gomez and Gomez, 1984, all data is analyzed using SAS System to significantly evaluate the differences between treatments and interaction and means of the

treatment were compared by the least significant difference (LSD) and at a significant level ≤ 0.01 and ≤ 0.05.

Results and Discussion

1-Effect of organic extract

No significant differences were observed for number of plants/m^2, plant height, leaf area/plant and number of tillers/plant in both seasons when adding organic extract or water control in Table 4.

Data presented in Table 5 a significant difference in spike weight for the first season 2015/2016 and the number of grains per spike of two season when adding organic extract and thousand-grain weight was significantly in the season 2016/2017 when adding 4.8 l/ha organic extract reached 50.18 g. This result was agreed with Kandil *et al*., 2016 whom found that the increase in the rate of dry matter supply from the source leaves and stems to sink the plant grains during the time unit when adding amino acid increasing the degree of grain filling and increasing thousand-grain weight, weight of grains per spike and number of grains per spike.

No significant differences were observed in the protein content in both seasons when adding organic extract and control (Table 5). These results are disagreed with (Dromantiene *et al*., 2013) that adding the amino acids to the wheat crop improves the technological characteristics of grains where protein content increased by 20.6 - 10.8%.

The biological yield of crop differed significantly in the first season when adding the organic extract reaching 24.11 tons /ha while the second season did not significant differences reaching 27.5 tons/ha compared to control this is consistent with Vernieri *et al*., 2005, amino acids reduce the use of chemical fertilizers and improve plants growth. Nikiforova *et al*., 2006 found that amino acids promote the development of root system and activate shoot growth of plant.

Grain yield was significantly different in both seasons and production reached 5.2 tons/ha in season 2016/2017. Production of grain yield was increased by 5.2 % and 17.9 % for the first and second seasons, respectively, when adding 4.8 l/ha of organic extract compared with control. This result was found by Alaru *et al*., 2003; Meijer, 2003; Kandil *et al*., 2016 that amino acids promote grain formation in the crop. Straw production reached 20.5 tons/ha in the 2016/2017 season when adding organic extract. The harvest index did not differ significantly in both seasons of the study.

Response of varieties

Variety Vee-sWafi gave significantly the highest number of plants in the 2015/2016 season, however, Kasyon/Glennson.81 gave in 2016/2017 season (Table 4). Variety Aroona gave significantly the highest plant height for both seasons (Table 4). The largest leaf area was significantly obtained by varieties Kasyon/Glennson.81 and Aroona in the first and second season respectively (Table 4). The highest number of till

ers per plant was significantly observed by variety Aroona in both seasons (Table 4).

The highest number of grains per spike was significantly obtained by variety Vee-sWafi in both seasons (Table 5). This result was agreed with IMAO 1998 in the Salouq area. Variety Kasyon/Glennson.81 gave significantly the highest spike weight in the first season and the highest thousand-grain weight in both seasons (Table 5).

The highest protein content was significantly obtained by variety Aroona in both seasons (Table 5).

Varieties Kasyon/Glennson.81 and Amricana Express gave significantly the highest biological yield, grain yield and straw yield in the first and second seasons respectively (Table 5).This result was agreed with Al-Shakmak, 2003-2013 that the varieties Kasyon/Glennson.81 and Aroona excellence gave high grain production. Varieties Amricana Express and Aroona gave significantly the highest harvest index in the first and second seasons respectively (Table 5).There are significant differences in biological yield, grain yield, straw yield and harvest index between varieties in two seasons, indicating the different conditions of each season due to the exposure in the two seasons to drought.

Table 4: Effect of organic extract and seeding rates of wheat varieties on number of plants/m^2, plant height, leaf area/plant and number of tillers / plant in 2015/2016 and 2016/2017 seasons at Suluq in Libya.

Property / Treatments	Number of plants / m^2		Plant height (cm)		Leaf area cm^2/plant		Number of tillers / plant	
	2015/ 2016	2016/ 2017	2015/ 2016	2016/ 2017	2015/ 2016	2016/ 2017	2015/ 2016	2016/ 2017
A- Organic extract								
Control	128.6	127.38	85.48	86.54	28.84	34.89	5.90	5.91
4.8 L/ha	130.0	128.95	86.36	86.72	29.25	29.96	6.09	6.15
F. test	N.S.	N.S.	N.S	N.S.	N.S.	N.S.	N.S.	N.S.
B- Varieties								
Amricana Express	128.71 b	126.48 b	81.85c	81.85d	29.6ab	28.89b	5.57c	5.63c
Aroona	128.15b	127.92ab	91.27a	91.24a	27.86c	40.80a	6.45a	6.54a
Vee-sWafi	130.88 a	129.08 a	87.16b	88.73b	28.24bc	28.83b	5.92bc	5.87bc
Kasyon/Glennson.81	129.46 b	129.17a	83.40c	84.68c	30.47a	31.19b	6.05ab	6.09b
C- Seeding rates								
100 kg/ha	123.86	123.1	85.38	84.86	29.14	34.68	6.08	6.14
120 kg/ha	134.74	133.23	86.45	88.40	28.95	30.18	5.91	5.92
F. test	**	**	N.S	**	N.S.	N.S.	N.S.	N.S.
D-Interactions								
F. test A × B	N.S.	**	N.S.	**	N.S.	*	N.S.	N.S.
F. test A × C	N.S.	**	N.S.	**	N.S.	N.S.	**	**
F. test B × C	**	N.S.	N.S.	N.S.	N.S.	*	N.S.	N.S.
F. test A × B × C	**	*	N.S.	N.S.	*	*	*	N.S.

*N.S. Non-Significant ** Significant at a level of 1% of probability (P < 0.01) * Significant at a level of 5% of probability (0.01 =< P < 0.05)*

Table 5: Effect of organic extract and seeding rates of wheat varieties on spike weight, number of grains per spike, thousand-grain weight and protein content of grain in 2015/2016 and 2016/2017 seasons at Suluq in Libya.

Property / Treatments	Spike weight (g)		Number of grains per spike		Thousand-grain weight (g)		Protein content	
	2015/ 2016	2016/ 2017	2015/ 2016	2016/ 2017	2015/ 2016	2016/ 2017	2015/ 2016	2016/ 2017
A- Organic extract								
Control	2.65	4.20	42.79	50.92	40.95	46.92	13.908	14.20
4.8 L/ha	2.81	4.42	43.46	54.92	41.08	50.18	14.167	13.92
F. test	*	N.S.	*	**	N.S.	*	N.S.	N.S.
B- Varieties								
Amricana Express	2.70b	3.64c	48.7b	58.08b	42.0b	47.47b	14.10ab	13.906b
Aroona	2.40c	4.27b	32.0d	43.50d	40.3c	47.78b	14.25a	14.350a
Vee-sWafi	2.75b	4.87a	51.5a	61.50a	39.6d	47.32b	13.96b	14.092b
Kasyon/Glennson.81	3.08a	4.46ab	40.3c	48.58c	42.3a	51.63a	13.85b	13.889b
C- Seeding rates								
100 kg/ha	2.73	4.46	43.25	52.29	41.28	48.50	13.92	13.89
120 kg/ha	2.73	4.16	43.00	53.54	40.75	48.60	14.16	14.228
F. test	N.S.	N.S.	N.S.	**	**	N.S.	**	**
D- Interactions								
F. test A × B	*	N.S.	**	*	N.S.	N.S.	**	**
F. test A × C	*	N.S.	**	N.S.	N.S.	N.S.	*	**
F. test B × C	N.S.	N.S.	N.S.	N.S.	*	N.S.	*	*
F. test A × B × C	N.S.	N.S.	N.S.	*	N.S.	N.S.	N.S.	*

*N.S. Non-Significant ** Significant at a level of 1% of probability (P < 0.01) * Significant at a level of 5% of probability (0.01 =< P < 0.05).*

Increased grain yield of variety Kasyon/Glennson.81 in the drought season 2015/2016 indicates resistance of variety Kasyon/Glennson.81 to drought, this is compatible with (Al-Shakmak, 2003-2013) decrease in grain production by increasing the drought and heat stress of all varieties with difference between them in the percentage of decrease and the superiority of the varieties Amricana express, Wamid, Vee's Wafi, Jarka and Sarmbo in the production of grain on the varieties Kasyon/Glennson.81, Behoth 208 and Aroona in late agriculture and exposure to drought and heat. Al Shakmak, 2003-2013 found that variety Kasyon/Glennson.81 among the four varieties was resistant to drought at different levels of drought intensity, the production of grain to 10 tons / ha, confirming the variability and difference in the ability of varieties and strains of soft wheat to resist drought.

3-Effect of seeding rates

The number of plants/m^2 and plant height were increased significantly at the seeding rate 120 compared with 100 kg/ha for both seasons except plant height was insignificantly for season 2016/2017. The leaf area and the number of tillers per plant were not significantly differences between two seeding rates in both seasons (Table 4).This result differs with Soqer, 2006 that seeding rate 160 kg/ha was the best in leaf area and the number of tillers. Seeding rate 120 kg/ha was significantly showed the highest protein content in grains compared with 100 kg/ha in both seasons (Table 5).

No significant differences were observed between two seeding rates in both season for spike weight, number of grains per spike and thousand-grain weight, expect for number of grains per spike in second season and for thousand-grain weight in the first season (Table 5).

Seeding rate 100 kg/ha gave significantly the highest biological, grain and straw yields than seeding rate 120 kg/ha in the first season, however, in the second season no significantly differences were observed between seeding rates for biological, grain and straw yields (Table 5).

The harvest index was significantly different in season 2016/2017 and no significant differences in season 2015/2016 (Table 5). This result was found by Hameed *et al*., 2002 that increase seeding rate increases competition between plants for shared resources, especially water, nutrients and sunlight, which has led to low yields. If used a low seeding rate, the yield will decrease and decrease the number of plants for area unit.

Effect of interaction

Three way interactions among organic extract, varieties and seeding rates were significantly showed effect in number of plant /m^2, leaf area in both seasons and number of tillers in the first season (Table 4).This was agree with Farooq *et al*. (2016) whom found that number of tillers increased at seeding rate 120 kg/ha compared to 100 kg/ha.

Three way interactions among organic extract, varieties and seeding rates were not significantly showed effect on spike weight, number of grains per spike, thousand-grain weight and protein content of grain in both seasons except, number of grains per spike and protein content of grain in the second season (Table 5). However, variety Amricana Express and Kasyon/Glennson.81 were significantly showed differences at control and seeding rate 100 kg/ha in season 2016/2017. This result was disagrees with Farooq *et al*., 2016 whom found that yield wheat increased at seeding rate 120 kg/ha compared to 100 kg/ha.

No significantly difference were observed among three way interactions on biological yield, grain yield, straw yield and harvest index in both seasons, expect, harvest index in the second season (Table 6).

Two way interactions between varieties and organic extract was highly significantly observed on number of grains per spike in both seasons except, varieties Vee's Wafi and Aroona with organic extract was not significantly in the first and second season respectively. The highest number of grains per spike was 63 and 60.67 grain for varieties Vee's Wafi and Amricana express with the rate 4.8 l/ha of organic extract in the second season.

Two way interactions between varieties and organic extract was highly significantly showed on content protein in grain in both seasons, except, varieties Vee'sWafi, Amricana Express and Kasyon/Glennson.81 with adding organic extract and control were not significantly differences in the

second season. Moreover, amino acids stimulate the activity of some enzymes responsible protein and carbohydrates synthesis and therefore the biomass and this action is directly correlated with the yields. Similar results were found by El-Naggar and El-Ghamry, (2007).

Table 6: Effect of organic extract and seeding rates of wheat varieties on biological yield, grain yield, straw yield and harvest index in 2015/2016 and 2016/2017 seasons at Suluq in Libya.

Property / Treatments	Biological yield (tons/ha)		Grain yield (tons/ha)		Straw yield (tons/ha)		Harvest index	
	2015/ 2016	2016/ 2017	2015/ 2016	2016/ 2017	2015/ 2016	2016/ 2017	2015/ 2016	2016/ 2017
A- Organic extract								
Control	22.90	24.6	3.431	4.41	19.47	20.2	15.184	14.200
4.8 L/ha	24.11	27.5	3.609	5.20	20.50	22.37	14.977	13.918
F. test	*	N.S.	*	*	*	N.S	N.S.	N.S.
B- Varieties								
Amricana Express	21.8b	28.91a	3.38b	5.35a	18.5b	23.6a	15.58a	13.906b
Aroona	21.7b	27.38ab	3.36b	4.63bc	18.4b	22.8ab	15.54a	14.35a
Vee-sWafi	24.7a	23.88b	3.66a	4.83b	21.0a	19.1b	14.89ab	14.092b
Kasyon/Glennson.81	25.8a	24.10b	3.68a	4.42c	22.1a	19.77ab	14.32b	13.889b
C- Seeding rates								
100 kg /ha	24.4	25.14	3.59	4.79	20.8	20.35	14.88	13.89
120 kg/ha	22.7	27.00	3.45	4.82	19.2	22.22	15.28	14.23
F. test	**	N.S.	*	N.S.	**	N.S.	N.S.	**
D- Interactions								
F. test A × B	*	N.S.	N.S.	*	**	N.S.	**	**
F. test A × C	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	**
F. test B × C	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	**
F. test A × B × C	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	*

*N.S. Non-Significant ** Significant at a level of 1% of probability (P < 0.01) * Significant at a level of 5% of probability (0.01 =< P < 0.05)*

Two way interactions between varieties and organic extract were highly significantly presented on straw yield. No significant differences were observed between the organic extract and varieties Vee-sWafi and Kasyon/Glennson. 81 in the first season (Table 7). Previous studies indicated that external amino acids could regulate nitrate uptake thus helping to form dry matter (Xing-Quan and Kyu-Seung, (2012).

Table 7: Effect of the interaction between of organic extract and wheat varieties on straw yield (tons/ha) of season 2015/2016 at Suluq in Libya.

Varieties / Organic extract	Amricana Express	Aroona	Vee-sWafi	Kasyon/ Glennson. 81
Control	17.5 g	16.6 h	20.9 d	23.0 a
4.8 L/ha	19.4 f	20.2 e	21.1 c	21.3 b

Two way interactions between organic extract and varieties were significantly differences on biological yield. No significantly differences were observed between varieties Vee-sWafi and Kasyon/Glennson.81 and adding the organic extract and the control. The highest biological yield (24.87tons/ha) was obtained by variety Vee-sWafi and organic extract 4.8 l/ha in the first season (Table 8).The amino acids effect on plant growth and yield may be due to improving photosynthetic efficiency leading to production of more assimilates needed for formation of new cell reflected to increase Xing-Quan and Kyu-Seung, (2012).

Two way interactions between organic extract and varieties were significantly differences on grain yield (Table 9).The highest grain yield of varieties Amricana Express and Vee-sWafi was 5.758 and 5.237 tons/ha, respectively when adding organic extract of rate 4.8 l/ha. The increase in

productivity of Amricana Express was 16.4% when adding 4.8 l/ha compared with control. Variety Vee-sWafi was increased in productivity by 18.8 **%**while the increase in the Kasyon/Glennson.81 reached 35.4% of season 2016/2017.Humic acid stimulate the biochemical processes in plants such as photosynthesis and total chlorophyll content which consequently increased yield and quality (Khan *et al*. 2010 ;Bakry *et al*. 2013) confirmed our results, whom concluded that humic acid had promoting effects on plant growth, grain yield and quality of wheat.

Table 8: Effect of the interaction between of organic extract and wheat varieties on biological yield (tons / ha) of season 2015/2016 at Suluq in Libya.

Varieties / Organic extract	Amricana Express	Aroona	Vee-sWafi	Kasyon/ Glennson.81
Control	20.72 g	19.85 h	24.50 d	26.55 a
4.8 l/ha	22.88 f	23.62 e	24.87 c	25.08 b

Table 9: Effect of the interaction between of organic extract and wheat varieties on grain yield (tons/ha) of season 2016/2017 at Suluq in Libya.

Varieties / Organic extract	Amricana Express	Aroona	Vee-sWafi	Kasyon/ Glennson.81
Control	4.948 bcd	4.518 de	4.407 e	3.753 f
4.8 L/ha	5.758 a	4.742 cde	5.237 b	5.082 bc

Conclusion

The average values of the data obtained data organic extract follows: 4.8 liters/ha > Control and varieties Kasyon/Glennson.81 >Vee-s Wafi>Amricana Express >Aroona in season 2015/2016 for grain yield, while, in the second season was Amricana Express >Vee-sWafi >Aroona > Kasyon/Glennson.81. Seeding rate 100> 120 kg /ha for biological, grain and straw yields in the first season .The productivity of grain yield in second season was higher than the productivity in the first season. It was noted the instability of the weather, which in turn impact ton development of wheat despite of application of irrigation due to decrease in quantity and distribution of precipitation during the growth season of 2015/2016 was 41 mm and 2017/2016 was 132.2 mm. Fertilizing organic extract improves grain quality and productivity.

Recommendations

Due to the richness of organic extract in their nutritional value and using it as environmentally friendly organic fertilizer so we recommend adding the extract of humic, folic and amino acids at a concentration of 4.8 liters per hectare in the case of regular distribution of rainfall during the growing season to give grain yield increase of 17.9 % compared with control. It is preferable to cultivate the Kasyon/Glennson.81, Amricana Express and Vee-sWafi of *Triticum aestivum* L., while avoiding cultivating Aroona because is unsuitable for the conditions of the Suluq-Libya region. Seeding rate 100 kg/ha considered appropriate at drought and heat stress.

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