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Effect of different packaging treatments of Urea fertilizer and agricultural distances between lines and plants on the yield of sunflower

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Abstract

This experiment was applied according to the arrangement of split plots design by using a randomized complete block design (R.C.B.D) with three replications, the planting distances were filled with (40 ×40), (50×50), (60×60), and (70×70) for the main plots, while the packaging parameters (Zeolite + cement) were set. And (white cement only), (zeolite only) and regular (comparative) urea in the secondary plates (subplot). The result showed the significant effect of planting distances between lines and plants, as the distance (70×70) was superior to the traits of the weight of 1000 grains and the yield, the individual plant gm plant^{-1} 78.00 gm and 78.48 gm plant^{-1} respectively The distance (40×40) was superior by giving the highest rate for the trait of total grain was 79.92 g, while the distance (70×70) and the packaging treatment (zeolite only) superior by giving the highest mean for the trait of the yield of the individual plant gm plant which reached which reached 80.30 gm.

Keywords: planting distances, packaging treatments. Weight of 1000 grains.

Introduction

The sunflower crop (*Helianthus annus* L.) is one of the crops belonging aster family, as its oil is considered one of the best types of oils because it contains the omega-3 fatty acid, as well as unsaturated fatty acids such as linoleic, oleic and palmitic, in addition to containing vitamins such as A E is consideredvalue animal fodder. Most of the studies in the world indicate that fertilization, especially with nitrogen, is one of the field operations that has a direct relationship with the amount of yield (Al-Sahoki, 1996), in addition to the fact that increasing the level of nitrogen fertilizer has a positive effect on representation and ultimately enhancing the harvest index and grain yield (*et al.*,2001), and that the fertilizers are rapidly transforming into less ready-made forms due to the problems of washing, volatilization, adsorption and sedimentation (Noureddine *et al.*,, 2004).or various industrial ones, including white cement and zeolite, because of their important traits

in slowing down the release and limiting washing processesthus ensuring a continuous supply of nutrients to crops (Rehakov *et al.*,2004), and that the plants distribution

in the agricultural distances between plants and lines (plant density) is one of the most important production factors that are related to the plants number and

reduce yield losses caused by high plant densities that affect sunflower yield and seed oil ratio (Allam *et al.*,2003).

2 -. Materials and methods

The field experiment was carried out during the spring season 2021 in Al-Majd Um Al-Aqaf sub-district (9 km from the center of Al-Muthana Governorate). The included the The experiment included the study of two factors: agricultural distances (40 x 40), (50 x 50), (60 x 60) and (70 x 70), respectively, and the second factor included the packaging treatments (Zeolite + cement), (white cement only), (zeolite only) and regular urea (comparative), as the experiment was applied according to the split trials method using the randomized complete block design (R.C.B.D) and with three replications. The distance treatments (D) were placed in the main plots,

while the urea fertilizer packaging treatments (F) were placed in the subplots. Thus, the experiment included 16 consensual treatments and 48 experimental units, leaving a distance of 1.5m between one sector and another or between one plank and another was added in three batches, the first at planting, the second at the eight-leaf stage, and the third at the beginning of the formation of the flower bud, while triple superphosphate (P_2O_5 46%) was used as a source of phosphorous added at once when planting

. Potassium sulfate (K_2O 50%) as a source of potassium was added in two batches, the first after the completion of emergence and the second in the flowering phase, using the of 160 kg N ha and 100 kg P_2O_5 ha and 160 kg K2O ha^{-1} (Al-Abadi, 2011).

2.2 The studied traits

2.2.1 Number of grains **per disc:** The average of number per.

2.2.2 Weight of 1000 grains **(gm):** the average of weight of 1000 grains based at 8% moisture (Al- Sahokie, 1994).

2.2.3 grains **yield per plant (gm):** Weight of grains yield per plant as average for harvested plants after weight was adjusted based at 8% moisture.

2.2.4 The total yield (t ha^{-1}): It was calculated harvested then the yield was converted into (t ha^{-1}) 8% humidity.

Table (1) Some physical and chemical properties of field soil before planting.

The ready amount is mg kg^{-1} of soil			PH	EC $Ds.m^{-1}$	CEC Cmol $+Kg^{-1}$	Soil tissue	Organic matter	Soil separators mg kg^{-1} of soil		
N	P	K						sand	clay	Silt
30.4	3.95	175.6	7.8	6.3	5.98	Alluvial mixture	6.8	64	18	18

After collecting the samples, they were arranged and analyzed statistically by the program Genstat. Means were compared using the least significant difference test at a probability level of (0.05) (Al-Rawi and Khalaf Allah, 1980).

3. Results and discussion

3.1 Effect of planting distances on yield and its components:

The Results of table (2) indicate that there is no significant effect of the planting distances on the trait of grains by

disc.While significant of weight of 1000 grains (g), as the distance D4 (70 ×70) gave the highest grains rate for this trait of 78.00 gm without a significant difference from the distance D3 (60 × 60), which recorded an rate of 77.00 gm, followed by the distance D1 (40 × 40) which significantly outperformed the treatment of D2 (50 ×50), which recorded the lowest mean for this trait of 66.29 gm, the result agreed with (Thabet, 2006)which showed a linear increase in the treatment of with the increase in the distance between plants.

Table 2: Effect of planting distances on yield trait.

Traits **Planting distances**	**Number of grains per disc**	**Weight 1000 grain seed (g)**	**Seed yield per plant (g)**	**Total yield (t h^{-1})**
D1	**618**	**70.12**	**61.04**	**3.81**
D2	**1003**	**66.29**	**60.38**	**2.41**
D3	**808**	**77.00**	**73.71**	**2.04**
D4	**841**	**78.00**	**78.48**	**1.60**
L.S.D 0.05	**N.S**	**2.27**	**1.509**	**150.2**

3.2 Effect of packaging treatments on yield and its components:

which did not differ significantly from treatment F1the comparison treatment F4 (without) gave the lowest average for this trai of t68.38 g, to increase the weight of grains in the wheat crop.

Table 3: Effect of urea fertilizer packaging parameters on yield traits**.**

Traits **Packaging** treatments	**Number of** grains **per disc** grains	**Weight of a** grains **(g)**	grains **yield per plant (g)**	**Total yield (t h^{-1})**
F1	**731**	**70.38**	**67.43**	**2.43**
F2	**1068**	**72.75**	**69.96**	**2.53**
F3	**778**	**79.92**	**67.34**	**2.39**
F4	**792**	**68.38**	**68.88**	**2.51**
L.S.D 0.05	**N.S**	**2.56**	**N.S**	**N.S**

3.3 Effect of binary interaction between planting distances and packaging on yield and its components:

Thes in table (4) indicated that there was no significant effect of the binary interaction between equal planting distances and urea fertilizer packaging treatments on the number of seeds per disc.

The results of table (4) indicate the superiority of the combination (F3 × D3) by giving the highest average weight of 1000 grains amounted to 87.50 gm and without significant difference (F3 ×D4), which averaged 86.50 gmthe combination

(F4× D1) gave the lowest Rate of weight of, 65.00 g.

The results of table (4) showed the superiority of the combination (F3 ×D4) over the rest of the combinations Which reached 56.80 gm per plants, and the reason for the superiority of the mentioned combinations it may be attributed to its superiority to some extent in the weight of 1000 grains.

It was noted, from the results of table (4) that the highest averages of the total seed yield were recorded with the narrow distance, and the packaging treatments differed, but the highest averages were recorded with the combination (F2 × D1), which gave the highest average of 4.13 t ha^{-1}.

The combination (F1× D4) is the lowest average for this trait, which amounted to 1.53 t ha^{-1}.

The reason for the superiority of the mentioned combination in the total grains yield is due to the increase in the number of plants per unit area (Plant density), which means an increase in one of the components of the yield, which is the number of discs in a quantity that made the increase outweigh the decrease due to the relative decrease in the other two components of the yield, namely (namely the grains with the highest level of fertilizer quantity. It results from more plants per unit area of abundant plant nutrients that promote full growth.

Table 4: The effect of the binary interaction between planting distances and packaging treatments on the yield and its components.

Planting distances	Packaging treatments	Adjectives			
		Number of Grains per disc	Weight of a 1000 grains (g)	Grains yield per plant (g)	Total yield (t h^{-1})
D1	F1	590	68.00	61.00	3.81
	F2	585	67.00	60.00	4.13
	F3	648	80.50	56.95	3.55
	F4	648	65.00	66.22	3.75
D2	F1	649	65.01	56.80	2.27
	F2	1985	66.50	63.50	2.55
	F3	782	65.17	57.40	2.29
	F4	596	68.50	63.80	2.54
D3	F1	823	76.50	76.45	2.12
	F2	821	77.00	76.50	1.86
	F3	854	87.50	74.70	2.07
	F4	732	67.00	67.20	2.12
D4	F1	864	72.00	75.45	1.53
	F2	882	80.50	79.85	1.59
	F3	826	86.50	80.30	1.63
	F4	792	73.00	78.30	1.62
L.S.D 0.05		N.S	4.44	3.298	357.7

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