Nat. Volatiles & Essent. Oils, 2021; 8(6): 2299-2304

NVEO
Natural Volatiles &
Essential Oils

Effect Of Different Packaging Treatments Of Urea Fertilizer And Equal Agricultural Distances Between Lines And Plants On The Yield Of Sunflower

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Abstract

A field experiment was conducted in Al-Majd Umm Al-Akf sub- district ((9 km away from the center of Al-Muthanna Governorate), during the spring season 2021 to study the effect of four different packaging treatments for urea fertilizer and four distances for planting between lines and plants on yield characteristics. The experiment was applied according to the arrangement of split plots design. 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 (sub plot). The results of the analysis showed the significant effect of planting distances between lines and plants, as the distance (70×70) was superior to the characteristics of the weight of a thousand seeds and the yield, the individual plant gm plant^{-1} 78.00 gm and 78.48 gm plant^{-1} respectively. While the distance (40×40) was superior by giving the highest mean for the characteristic of total seed yield of 3.81 t ha^{-1}. The weight of a thousand seeds was 79.92 g, while the distance (70×70) and the packaging treatment (zeolite only) outperformed by giving the highest mean for the trait of the yield of the individual plant gm plant^{-1} it reached 80.30 gm.

Key words: planting distances, packaging coefficients, weight of a thousand seeds.

1. Introduction

The sunflower crop Helianthus annus L. is one of the crops belonging to the compositae 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, Band E (Nasrallah et al., 2014), and the yield of the crop is considered high value animal fodder (Connor and Hall, 1997). Most of the studies in the world indicate that fertilization, especially nitrogen, is one of the most 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 (Cheema etl., 2001), and that the sdded fertilizers are rapidly transforming into less ready-made forms due to the problems of washing, volatilization, adsorption and sedimentation, or various industrial ones, including

white cement and zeolite, because of their important characteristics in slowing down the release and limiting washing processes, and thus ensuring a continuous supply of nutrients to crops, and that th distribution of plants in the agricultural distances between plants and lines (plant density) is one of the most important production factors that are often dealt with for ensure optimum number of plants 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-Akf sub-district (9 km from the center of Muthanna Governorate). The experiment included the study of two factors agricultural distances (40 × 40), (50 × 50), (60 × 60) and (70 × 70) and code it with code D1 , D2, D3, D4 sequentially, and the second factor included the packaging treatments (Zeolite + cement), (white cement only), (zeolite only) and regular urea (comparative) tokens were given to her F1, F2, F3, F4, 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 coefficients of equal distances (D) were placed in the main plots, while the urea fertilizer packaging coefficients (F) were placed in the sub plots. 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, and the seeds of the Lilo hybrid were planted in 3/3/2021 in the spring season, as 3- 4 seeds were placed in the hole with a depth of 3 cm (Al-Sahoki, 1994), and urea fertilizer (48%) was used as a source of nitrogen and 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 and was added at once when planting either. 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 recommended quantities of 160 kg N ha and 100 kg P_2O_5 ha and 160 kg K_2O ha^{-1} (Al-Abidi, 2011).

2.2 The studied characteristics:

2.2.1 Number of seeds per disc : The average number of seeds per tablet after scattering by hand.

2.2.2 Weight of 1000 seeds (g): according to the average weight of 1000 seeds based on 8% moisture [5].

2.2.3 Seed yield per plant (g): Weight of seed yield per plant as average for harvested plants after harvesting weight was adjusted based on 8% moisture.

2.2.4 The total yield (t ha^{-1}): It was calculated through the yield of the seeds of the two middle lines harvested and on the basis of the area harvested for the two middle lines, and then the yield was converted into (t ha^{-1}) on the basis of 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	8.95	175.6	7.8	6.3	5.98	Alluvial mixture	6.8	64	18	18

After collecting the samples, they were arranged, tabulated and analyzed statistically by means of the statistical program Genstat. The averages were compared using the least significant difference (L.S.D) test at a probabilistic 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 the statistical analysis in table (2) indicate that there is no significant effect of the planting distances on the trait of seed by disc.

It was found from the results in table (2) that there were significant differences between equal distances in the trait of weight of a thousand seeds (g), as the distance D4 (70 ×70) gave the highest mean for this trait of 78.00 g without a significant difference from the distance D3 (60 × 60) , which recorded an average of 77.00 g, followed by the distance D1 (40 × 40) which in turn significantly outperformed the distance D2 (50 × 50), which recorded the lowest mean for this trait of 66.29 g.

Table 2 : Effect of planting distances on yield characteristics.

Adjectives / Planting distances	Number of seeds per disc	Weight of a thousand 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:

The results of the statistical analysis in table (3) indicate that there is no significant effect of urea fertilizer packaging treatments on the characteristics of the number of seeds per disc, the seed yield of the individual plant (g) and the total seed yield.

It was noticed from the results in table (3) that there were significant differences between the treatments of Urea fertilizer packaging in the trait of weight of one thousand seeds, as the F3 (zeolite only) packaging treatment recorded the highest average for the trait amounting to 79.92 g, significantly superior to the treatment F2 (white cement only), which did not differ significantly from treatment F1 (Zeolite + cement), while the comparison treatment F4 (without encapsulation) gave the lowest average for this trait, which was 68.38 g, to increase the weight of a thousand grains in the wheat crop.

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

Adjectives / Packaging Transactions	Number of seeds per disc	Weight of a thousand seed (g)	Seed 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 confficients on yield and its components:

The results of the statistical analysis in table (4) indicated that there was no significant effect of the binary interaction between equal planting distances and urea fertilizer packaging coefficients 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 one thousand seeds amounted to 87.50 gm and without significant difference (F3 × D4) which averaged 86.50 gm. While the combination (F4 × D1) gave the lowest average weight of one thousand seeds, which was 65.00 g. These results confirm to some extent in line with the results of the factors, which are singular.

The results of table (4) showed the superiority of the combination (F3 × D4) over the rest of the combinations, and it gave the highest mean for the trait of the yield of the individual plant gm $plant^{-1}$ it reached 80.30 gm and without significant difference from the number of combinations, while the combination (F1 × D2) gave the lowest mean of the yield of the plant it reached 56.80 gm of plants, and the reason for the superiority of the mentioned mixture may be attributed to its superiority to some extent in the weight of a thousand seed.

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 coefficients 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 seed 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 the number of seeds per disc and the weight of a thousand seeds. High with the highest level of fertilizer quantity. It results from receiving 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 coefficients on the yield and its components.

Planting distances	Packaging Transactions	Adjectives			
		Number of seeds per disc	Weight of a thousand seed (g)	Seed 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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