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A study on the effect of irrigation and the ratio of mixing nitrogen and pelleted cow manure on some quantitative and qualitative characteristics of sunflower and the variety of Gabor

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Abstract

Nitrogen is one of the most important nutrients and a key factor in achieving optimum yield in crops. For this purpose, a study was performed on the effect of irrigation and the ratio of mixing nitrogen and Pelleted cow manure on some quantitative and qualitative characteristics of sunflower (the variety of Gabor) as a split plot test in randomized complete block with three replications. In this experiment irrigation is as the main factor in three levels of 6-12-18 days and the ratio of mixing nitrogen and Pelleted cow manure as a sub factor in three levels (120 Nitrogen +120 cow) , and (180 Nitrogen + 180 cow) and 300 kg N ha + the lack of using cow manure (control). The results showed that there was a significant difference at the 1% level between the levels of the main factor (a) in terms of the studied traits except oleic acid. Also, in terms of the levels of the sub factor (b) there was a significant difference at 5 and 1% probability level among other traits except Linoleic acid. In terms of the interaction of a × b a significant difference was observed only in terms of traits, Linoleic acid, Erucic acid, Palmitic acid, Butyric acid and oil percent. Seed and oil yield allocated the highest seed and oil yield in 6 days of irrigation and the lowest seed and oil yield in 18 days and the seed yield and oil yield at 18 days have reduced to 51.05%and 53.37% compared of irrigation per 6 days. in unsaturated fatty acids, the combination of 12 days irrigation × 30 nitrogen manure + without using cow manure constituted the highest rank. The combination of irrigation per 18 days, × 180 nitrogen manure + 180 cow manure allocated the minimum unsaturated fatty acid. However, in terms of saturated fatty acids the combination of irrigation per 18 days × 180 nitrogen manure + 180 cows manure is the best combination and the combination of irrigation per 6 days × 180 nitrogen manure + 120 cows manure had the lowest mean.

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Introduction

Sunflower is the fourth annual oilseed in the world that is grown for its edible oil (Karimzadeh Asl *et al*, 2003). This plant is justified by performance as a crop in the wide range of environmental conditions and the country's need for edible vegetable oils is a basic requirement. Sunflower is in fourth place in terms of oil production among the annual plants producing oil after soybean, cottonseed and peanuts (Anonymous, 2001). It forms about 8.2 per cent of total world production of oilseeds (FAS, 2005) so that in the current conditions, 90% of the country's oil is imported and this issue makes the country's high dependence on imported oil. FAO's study of 40 years suggests that 33 to 60 percent of the increased agricultural products' performance in different countries is due to fertilizer consumption and this organization calls fertilizer as the key to food security (Hemdila, 2000). Over 60% of fertilizers in Iran are nitrogen fertilizers from 4 million tons in crop year 85-1384 (Malakuti, 2005). Due to the production of 88 million tons of crops in the same year, farm efficiency of fertilizers in the country is low for various reasons, including washing and it should be increased through the consumption method and time resources and nitrogenous fertilizers consumption. (Malakuti *et al*, 2008). Therefore sunflower is located at the top rank due to the increase of the production of oilseeds. Iran is considered among the arid and semi-arid areas by being in latitude 25 to 38 degrees As a result, crop yield drastically decreases due to the precipitation deficit. According to the requirements of the oil and water shortage, proper irrigation can be applied to determine the optimal use of resources while conserving water and moisture, it also achieved an acceptable performance. Therefore, we can evaluate the resistance of sunflower cultivars to water deficit in this area (Karimzadeh Asl *et al*, 2003). Sunflower water level is lower in the early vegetative stage is lower than the complete growth of the plant and the amount of water usage is high after the flower formation due to high temperature, plant height and plant cover.

Sunflower is one of the plants that highly need nutrients and often shows positive response to chemical fertilizers. Despite the good production potential of the country, its culture only relatively poor soils with low management is dedicated to Cody (consuming unbalanced) because of low yield of this product (Mazaheri *et al*, 2001). Enough food, especially nitrogen and the appropriate method according to the physiological characteristics of growth and development of management strategies to improve the performance of most plants are plants (Malakuti *et al*, 2008). According to the research pelleted urea fertilizer and manure, with the gradual liberalization has led to long-term effects include: decreased absorption and increased nitrogen leaching losses also have a positive impact on soil health and nutritional levels and decrease as well as increase the efficiency of urea fertilizer is Nitrogen (Alemi *et al*, 2010). Animal manures have different food, especially high levels of humus, which are very useful for soil improvement but there is high humidity and low density material costs will increase. With regard to the merits and mentioned urea fertilizer and manure in agriculture in order to make optimal use of them, we can recommend the right combination of urea fertilizer and manure. Ericsson and Parivar (1990) reported the use of some mechanical forces compress the material means to pressure to reduce the material into a solid form is which makes transportation and storage easier than the first type. Hernandez *et al* (2006) reported that at least four compression methods use machines that are, cube, pellet and briquette making. Roller press for press materials commonly used metals and minerals. Masayuki (2001) reported on a common platform in the world, there are two types of machines that will turn into compost manure into pellets. A disk-type pellet form and press materials for dry and wet materials are used for different types of extruders. Plate types based on a simple way of making the two types of plates (one screw) and the twin plates are divided. Single screw plate materials based on the friction between the material and the wall of the housing and screw are made (Alemi *et al*, 2010) of these plates were used in this study (Figure 1).

Given the positive effects of slow-release nitrogen

fertilizers release nitrogen fertilizer plates in this study the effects of animal and period of irrigation plate is studied. To its effects on some quantitative and qualitative characteristics of saturated and unsaturated fatty acids, sunflower order to achieve maximum yield and quality should be considered.

Materials and methods

The test of Agriculture and Natural Resources Research Station of Ardabil was implemented in the 2013 crop year. The experimental plot was in a randomized complete block design with 3 replications and on yield and some quantitative traits in sunflower plants (figure Gabor) were carried out. In this study, irrigation as main plots and three levels of nitrogen fertilizer and manure mixed plate ratio of 6-12-18 days as a subplot in three levels (120 N + 120 bovine) and (180 N + 180 cattle) and 300 kg N ha manure + lack of control. Each block has three main plots and each main plot of the three sub-plots in each plot (plot) 5 lines with 50 cm culture is formed. Planting sunflower seeds to a depth of 3 cm on each line a distance of 25 cm were planted on ridges and manually. Seed in each hole is before planting and then thinning the hill to reach the desired concentration. During the growth of weeds, pests and diseases were fighting potential. Different levels of fertilizers during seed bed preparation and seeding into the slots on the stack, and the soil and the emergence of two true leaves, sunflower, irrigation treatments were applied. In order to prevent the entry of water weeds per plot to the other plots or blocks, drainage design and output streams between the block and the main plot, excess water was removed. In this research, quantitative and qualitative characteristics of the pre-yield, oil yield, oil percentage of saturated and unsaturated fatty acids were studied.

Statistical calculations

To do the statistical calculations MSTATC and SPSS18 software were used and to draw the charts Excel and SnagIt-8 software were used.

Results and discussion

The results of variance analysis in Table 1 is presented and evaluated. So that is observed between the levels of the main factor (a) of the studied traits except oleic acid, there was a significant difference at the 1% level. Also, the subplot level (b) Except Linoleic acid yield significant differences in the levels of 5 and 1 percent respectively. The interaction of a × b only traits Linoleic acid, Erucic acid, Palmitic acid, Butyric acid and oil percentage was significantly different.

Table 1. Analysis of variance for studied traits.

S.O.V	df	Mean of Square							
		Linoleic acid	Oleic acid	Erucic acid	Palmitic acid	Butyric acid	oil percent	Oil Yield	Grain Yield
Rep		0.697	0.004	0.008	0.0001	0.0005	0.299	602702043	2443170.03
Factor (a)		12.354**	0.135	0.25**	0.026**	0.03**	4**	25411864616.1**	81024161.2**
Error1		0.664	0.081	0.004	0.00025	0.0003	0.152	1340585176	4284100.04
Factor (b)		1.779	0.401*	0.023*	0.005**	0.002**	11.377**	401827543039**	6154352.3*
a × b		3.409*	0.207	0.034**	0.021**	0.011**	1.794**	406390523.7	799667.3
Error 2		1.08	0.073	0.004	0.00008	0.00008	0.11	511223823.7	1912449.4
C.V%		1.35%	1.56%	25.55%	15.17%	12.09%	2%	15.16%	15.51%

* and **, respectively, significant at the 5% level and 1%.

Comparisons of mean

Seed yield, oil yield and oil percentage

6 days with an average yield of Irrigation 11623.33 kg/ha had the highest yield and irrigation with an average of 18 days of 78.5688 kg/ha allocated to the lowest yield and grain yield in irrigated than 18 days 6 days irrigation is reduced the rate of 51.05% (Table 2). Cox and Jolliff (1986) on a two-year trial found

that on sunflower seed yield in rainfed conditions than under irrigation, 51% and 20% reduced irrigation conditions are consistent with these results. Several Scholars came to a similar conclusion in their research (6, 2, 16, 19, 20, and 21). The mixing ratio of nitrogen fertilizer and livestock manure pellets with an average composition of 180 N + 180 9728.89 kg per hectare was found to be the best combination of fertilizer and a combination of 300 + lack of nitrogen in the manure were statistically superior (Table 3). Ferzi *et al* (1986) assessed three years in normal conditions and water shortage The mixing ratio of nitrogen fertilizers and livestock manure N + plates combined 300 Manure taking the average of 173535.1 was recognized as the best blend of fertilizer (Table 3). Oil content in the 6 days of irrigation with an average of 2.217 percent, the highest percentage of oil accounted for 18 days of irrigation with average 15.9 percent; the lowest percentage of oil had the lowest percentage of oil in 6 days irrigation than 18 days irrigation increased by 71.7% results (table 2). Feoli *et al* (1993) reported that the meaning effect on the yield of sunflower. In six days, with an average oil yield of irrigated 193970.7 accounted for the highest oil yield and irrigation with an average of 18 days 90443.3 had the lowest oil yield and oil yield at 18 days compared to 6 days of irrigation water reduced 53.37 (table 2). Other results indicate that the effect of water shortage on oil percentage did you mean (FAS, 2005) the results of this research has been inconsistent. These results indicate that a relatively low percentage of oil adjective has the effect of stress, this finding Mozaffari *et al* (1996) and Losavio *et al* (1981) corresponded. The mixing ratio of nitrogen fertilizer and manure nitrogen Plate combined 300 + without using manure with average 17.66% of the best known compound fertilizer (Table 3).

Table 2. Comparison of Average levels of the main factors based on Duncan's multiple range tests.

Traits														Irrigation level
Grain Yield		Oil Yield		oil percent		Butyric acid		Palmitic acid		Erucic acid		Linoleic acid		
11623.33	a	193970.7	a	16.69	b	0.057	b	0.075	b	0.1154	b	75.53	b	6 Days
9426.67	b	162996	b	17.22	a	0.015	a	0.129	a	0.166	b	77.38	a	12 days
5688.78	c	90443.3	c	15.90	c	0.129	c	0.017	c	0.4263	a	77.70	a	18 days

Dissimilar letters indicate significant differences at the 5% level.

Table 3. Comparison of Average levels of the sub factors based on Duncan's multiple range tests.

Traits														ratio of mixing nitrogen and Pelleted cow manure
Grain Yield		Oil Yield		oil percent		Butyric acid		Palmitic acid		Erucic acid		Oleic acid		
8934.44	ab	137043.8	b	15.42	b	0.068	b	0.061	b	0.193	b	17.18	b	(120 Nitrogen +120 cow)
8074.44	b	136831.1	b	16.74	c	0.052	c	0.053	b	0.292	a	17.58	a	(180 Nitrogen + 180 cow)
9728.89	a	173535.1	a	17.66	a	0.098	a	0.098	a	0.223	b	17.26	b	300 kg N ha + the lack of using cow manure (control)

Dissimilar letters indicate significant differences at the 5% level.

Saturated and unsaturated fatty acids

Linoleic acid irrigated once in 18 days with an average of 77.70 to 12 days was irrigated in the top statistical group (Table 2). The mean levels of interaction factor × subplot levels (Figure 1) that combines (6 days + without using manure nitrogen fertilizer, irrigation × 300) with an average of 79.21 was the Department of Premier and composition (6 days once irrigation × 120 + 120 manure nitrogen) with an average of 74.77 were in class d. The fatty acid oleic acid + 180 180 Nitrogen manure with average 58.17 accounted for the highest level and was a statistical group (Table 3). The mean levels of interaction factor × subplot fatty acid levels acid (Figure 2) compound (12 days +

without using manure and nitrogen fertilizer, irrigation × 300 × 300 N + no irrigation once a day use of manure) with mean 0.46 and 0.54 in the top statistical group were combined, (18 days irrigation × 120 + 120 manure nitrogen and 18 days irrigation × 180 N + 180 manure) with a mean of 0.06 were in class d. The mean levels of interaction between fatty acid palmitic acid subplot factor × levels (Figure 3) the combination of (18 days irrigation × 180 + 180 manure nitrogen) with a mean 24.0 in the top statistical group and composition (6 , 12 and 18 days irrigation × lack of manure) with a mean of 0.01 were in class d. Of fatty acid, butyric compound (18 days irrigation × 300 N + without using cow dung) with a mean 20.0 at the Department of Premier and mix (6, 12 and 18 days irrigation × 180 N + 180 manure) with a mean of 0.01 were in the class d (Fig. 4). The mean levels of interaction between fatty acid palmitic acid subplot factor × levels (Figure 5) compound (18 days irrigation × 180 + 180 manure nitrogen and 18 days irrigation + 120 × 120 Nitrogen Fertilizer), respectively, with an average of 24.18 and 30.18 were in the top statistical group composition and (6 days irrigation × 120 + 12 manure nitrogen) were in class e .

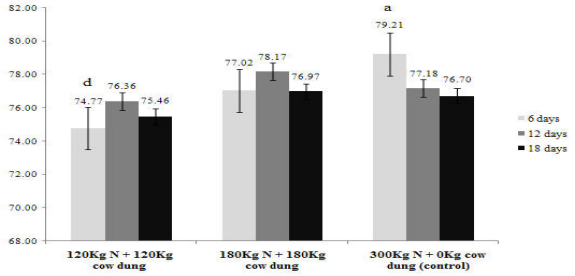

Fig. 1. Average of the interaction in main factor levels × sub factor levels for fatty acid of Linoleic acid based on Duncan test at 5% probability level.

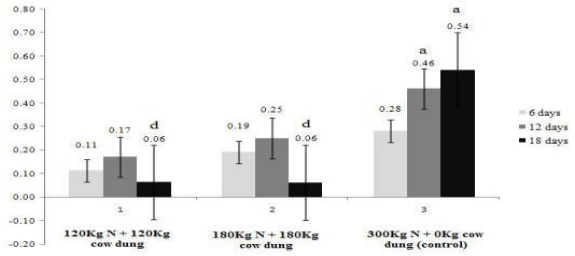

Fig. 2. Average of the interaction in main factor levels × sub factor levels for fatty acid of Erucic acid based on Duncan test at 5% probability level.

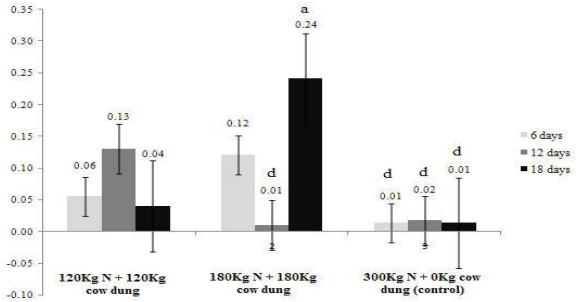

Fig. 3. Average of the interaction in main factor levels × sub factor levels for fatty acid of Palmitic acid based on Duncan test at 5% probability level.

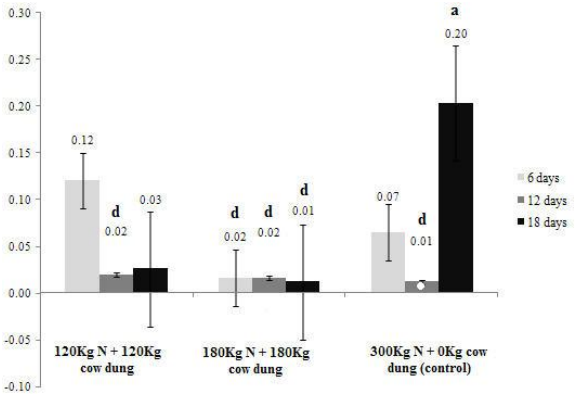

Fig. 4. Average of the interaction in main factor levels × sub factor levels for fatty acid Butyric acid based on Duncan test at 5% probability level.

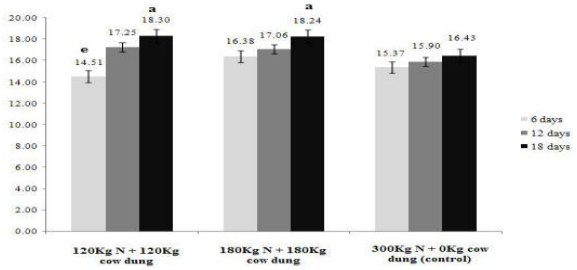

Fig. 5. Average of the interaction in main factor levels × sub factor levels for oil percent based on Duncan test at 5% probability level.

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