



EFFECT OF EARLY PLANTING DATES ON THE GROWTH AND YIELD OF TWO VARIETIES OF OAT (*AVENA SATIVA* L.)

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Abstract

A field experiment was conducted during autumn season 2018-2019 in the station of Al-Diwaniyah agricultural directorate (10 Km from the center of Al-Diwaniyah city) to study the response of two varieties of oat crop to an early planting dates, the experiment was including two factors, the first factor was four agricultural dates (15/9, 1/10, 15/10, 1/11) whereas the second factor two varieties from oat crop (Genzania, Al-Gouda). The experiment was applied according to plots design –Split by using randomized complete design block with three replicates, the planting dates treatments were put in the main plots and the varieties in the subplots. The results showed exceeding the yield of total green forage and the yield of total dry forage in the date 1/10 which gave the highest means attained (27.55 and 8.906) tan ha⁻¹ respectively, whereas the date 1/11 gave the highest protein percentage in the grains which attained 17.339% as for planting dates there was no significant effect on the grains yield, whilst the varieties, Genzania variety was significantly exceeded in the yield of total green forage and the yield of total dry forage and recorded a highest mean attained (24.66 and 7.818) tan ha⁻¹, while Al-Gouda variety was exceeded in the protein percentage attribute in the grains and recorded the highest percentage attained 17.725%.

Keywords: early planting dates, growth, yield, Oat.

Introduction

Oat crop (*Avena sativa* L.) is a winter annual grassy plant that belongs to the Poaceae family. It is planting in many countries around the world as a dual-purpose crop to produce grains and fodder where animals feed on it. It is characterized by the density of vegetative growth and it also attributed as a plant with many leaves which are characterized by being soft, which earns the palatability from animals, in addition to increase its nutritional value and the length of the growing season which makes it gave many cuts and high productivity and the Romans called it Avena which means the grass of sheep. The Mediterranean or Middle East region is the origin of oat crop and from there, migrants have transported it to all countries of Europe, Russia, and Turkey, and it is currently grown in many regions of the world (Murphy and Hoffman, 1992; Rines *et al.*, 2006). The cutting is an important factor that affecting on the growth, yield and quality of the forage crop and this effect of the crop was differ according to the number of cuts which consider from important factors that affecting on the production of the green and dry forage (Patel *et al.*, 2013) and as a resulting of deterioration of livestock in Iraq and the lack of planting fodder areas with this crop and the needing to provide the green fodder as an assistant factor that reducing the prices of animal products, despite of the importance of this crop, but the productivity of it fodder and seeds still suffer from a severe shortage as compared with world rates, therefore, it became necessary to search for other ways or technologies that lead to increasing the yield as a study of the best agricultural dates, especially with the presence of a number of varieties.

Materials and Method

The experiment involved the study two factors, the first (planting dates), which included four dates (15/9, 1/10, 15/10 and 1/11) which placed in the main plots, whereas the second factor was (varieties) and the experiment included two types from oat crop (Genzania, Al-Gouda) which placed in the subplots for their importance, the experiment was

applied according to plots design –Split by using randomized complete design block with three replicates, the treatments were randomly distributed within each block and the number of the experiment units became (3×4× 6=72 experimental units).

The Studied attributes

- 1- The total yield of the green forage (tan ha⁻¹) :** It was calculated as a total yield of the whole green forage of all cuts.
- 2- The total yield of the dry forage (tan ha⁻¹) :** It was calculated as a total yield of the whole dry forage of all cuts.
- 3- The plant height (cm) :** After the plants reached the physiological maturity and before harvesting, the height of the plants was measured by using the metric ruler from the soil surface to the top of the plant and for ten plants were taken randomly from each experiment unit and for all the replicates, after that the mean was calculated by divided sum of the total height of plants in each experimental unit on their numbers.
- 4- Grains yield (tan ha⁻¹) :** It was calculated from weighted the grains of the middle lines from each experimental units and it was converted into tan ha⁻¹.
- 5- The percentage of protein in the grains (%) :** Random samples of the grains were taken from each experimental units and the protein percentage was evaluated by CropScan 2000 Bnir analyses.

Results and Discussion

The total yield of the green forage (tan ha⁻¹):

From the results in the table 1. that the planting dates 15/9 and 1/10 were recorded the highest means of the total yield of the green forage attained 27.55 and 27.25 tan ha⁻¹ whereas the date 1/11 recorded the lowest mean attained 18.22 tan ha⁻¹, the reason of the exceeding the two dates and they gave five cuts due to their early planting dates as compared with the other dates as the total yield of green

forage is related with the yield of the cuts throughout the growing season and this result agreed with Ayub *et al.*, (2012).as for the varieties, Genzania variety was significantly exceeded and recorded the highest mean attained 24.66 tan ha⁻¹ whereas Al-Gouda variety recorded mean attained 24.49 tan ha⁻¹ and the reason may be due to their exceeded in all cuts.

Table 1 : Effect of planting date and varieties and their interaction between them on the total yield of the green forage (tan ha⁻¹)

Dates	varieties		Dates Mean
	Genzania	Al-Gouda	
9/15	27.80	27.84	27.25
10/1	27.23	28.00	27.55
10/15	24.78	23.72	24.06
11/1	18.83	18.41	18.22
varieties mean	24.66	24.49	
L.S.D _{0.05}	Dates	varieties	Interaction
	1.068	1.035	2.078

The total yield of the dry forage (tan ha⁻¹):

The results in the table 2. showed that the planting dates 15/9 and 10/1 recorded the highest mean attained 8.906 and 8.855 tan ha⁻¹ while the date 11/1 recorded the lowest mean attained 5.802 tan ha⁻¹ and the reason of two date exceeding maybe due to they gave five cuts as a result of planting them at an early dates as compared with other dates and the total yield of the dry forage is related with the yield of the cuts throughout the growing season and this result agreed with Ayub *et al.*, (2012).As for the varieties, Genzania variety was significantly exceeded and recorded the highest mean attained 7.818 tan ha⁻¹ whereas Al-Gouda variety recorded mean attained 7.625 tan ha⁻¹ and the reason may be due to their exceeded in all cuts.

Table 2 : Effect of planting date and varieties and their interaction between them on the total yield of the dry forage (tan ha⁻¹).

Dates	varieties		Dates Mean
	Genzania	Al-Gouda	
9/15	9.236	9.341	8.855
10/1	9.100	8.868	8.906
10/15	6.983	6.534	6.906
11/1	5.952	5.760	5.802
varieties mean	7.818	7.625	
L.S.D _{0.05}	Dates	varieties	Interaction
	0.4469	0.3528	0.7417

The plant height (cm):

The results in the table 3. showed there was an extreme increasing with dates advancing to the plant height attribute which recorded means attained (63.31, 65.81, 68.82, 69.95) cm of the four dates respectively and the reason may be due to the suitability of the temperature (25.2) C° which gave oat the perfect growth and accumulation of dry matter and that positively reflected on plant height also recurrence of cuts lead to reduce nutrients which support the growth and that reduce the height of down internodes and this result agreed with Alatabi (2011) and Ziara (2013) and Aasal and faiyth (2014) and Al- Dulaimi and Alkalifawi (2016) who mentioned that the cut process lead to reduce the plant

height, as for the varieties, Genzania variety was significantly exceeded and recorded the highest mean attained 71.17 cm whereas Al-Gouda variety recorded mean attained 62.90 cm and the reason of the variation between the two varieties may be due to difference of their genotype Matiello *et al.* (1999) and this result agreed with what found by Ma *et al.* (2006); Zaman *et al.* (2006) ; Buerstmayr *et al.* (2007) and Ahmed *et al.* (2008) who all mentioned to difference of varieties between them in the plant height attribute.

Table 3 : Effect of planting date and varieties and their interaction between them on the plant height attribute (cm).

Dates	varieties		Dates Mean
	Genzania	Al-Gouda	
9/15	69.50	56.17	63.31
10/1	68.20	66.73	65.81
10/15	70.10	71.90	68.82
11/1	76.87	56.80	69.95
varieties mean	71.17	62.90	
L.S.D _{0.05}	Dates	varieties	Interaction
	1.120	2.253	4.206

The grains yield (tan ha⁻¹):

From the results in the table 4. we observed there was no significant differences between planting dates, while the varieties, Al-Gouda variety gave the highest mean attained 2.455 tan ha⁻¹ whereas Genzania recorded the lowest mean attained 2.257 tan ha⁻¹, the reason of Al-Gouda variety exceeding return to it was basically exceeded in one of the yield components also it may be due to difference in it genotype and this result agreed with what found by Nawaz *et al.* (2004); Gautam *et al.* (2006); Ahmed *et al.* (2008) and Mohamed (2017) who explained that the varieties differ in the amount of grains yield.

Table 4 : Effect of planting date and varieties and their interaction between them on the grains yield attribute (tan ha⁻¹).

Dates	varieties		Dates Mean
	Genzania	Al-Gouda	
9/15	2.467	2.853	2.470
10/1	2.080	2.433	2.441
10/15	2.387	2.547	2.633
11/1	2.093	1.987	2.387
varieties mean	2.257	2.455	
L.S.D _{0.05}	Dates	varieties	Interaction
	N.S	0.1330	0.2859

The percentage of protein in the grains (%):

From the results in the table 5. we observed planting date 1/11 was significantly exceeded and recorded the highest percentage attained 17.244, whereas 1/10 recorded the lowest percentage attained 16.828% without any significant difference from 15/10 which recorded %17.150 this can be explained that the grain protein comes from two sources: the vegetative parts and the fruit parts. therefore, the temperatures of the last date (25 °C) lead to a tension on the fruit parts (parts of the flower cluster) and therefore reduced its contribution in the food manufacturing, which lead the plant to dependence mainly on materials transported from the vegetative part (the second source) during the retranslocation

process of materials which mostly protein substances and that lead to increased deposition of protein in grains this result was similar to what achieved by each researchers Eriscon *et al.* (1977); Chapko *et al.* (1991), Singh *et al.* (2010) and Ghazal (2012) and al-Hassani (2014) and Mostafa *et al.* (2010) who noticed there was an increase in the protein percentage when planting is delayed ,as for varieties, Al-Gouda variety gave the highest percentage attained 17.725%, whereas Genzania variety recorded percentage attained 16.975% and this agreed with (Doehlert, (2002); Pixley and Frey (1991); Yanming *et al.* (2006); Peterson *et al.* (2005) and Biel *et al.* (2009) who showed that the oat varieties differ in the protein percentage of grains.

Table 5 : effect of planting date and varieties and their interaction between them on the percentage of protein in the grains attribute (%)

Dates	varieties		Dates Mean
	Genzania	Al-Gouda	
9/15	17.533	17.633	17.244
10/1	15.533	17.567	16.828
10/15	17.367	17.400	17.150
11/1	17.467	18.300	17.339
varieties mean	16.975	17.725	
L.S.D _{0.05}	Dates	varieties	Interaction
	0.1317	0.1798	0.3445

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