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EFFECT OF CLIPPING NUMBER, PLANTING DATES AND VARIETIES ON GRAIN YIELD AND THE COMPONENTS OF SIX VARIETIES OF BARLEY

Mahmoud T. Al-Jayashi[1], Faisal M.M. Al-Tahir[1] and Husham S. Ali[2]

[1]Agriculture College, Al-Muthanna University, Iraq.
[2]General Board of Agriculture Research, Ministry of Agriculture, Iraq.

Abstract

The experiment was carried out during the winter season 2018-2019 at the research station, Agriculture College, Al-Muthanna University, to determine the effect of clipping number and planting dates in the crop and the components of six varieties of barley, for three dates were 15/10, 1/11 and 15/11. Split split-plot arrangement and RCBD design with three replicates were used. The results of the analysis showed the superiority of IBA 99 strain in grains number, 1000 grains weight and grain yield, which averaged (45.61 grains, 45.94 g, 4.18 and 38.77 t.ha^{-1}), the planting dates was exceed the first date 15/10 in all the studied traits, control (without clipping) was significant superior, gave the highest averages in grain yield, grains number and 1000 grains weight (4.23, 46.76 and 47.79) respectively, without significant difference with one time clipping treatment, the results showed a significant differences in the interaction between clipping and varieties in grains number, outperformed (comparative treatment without clipping- IBA 99), no significant difference with (one time clipping- IBA 99), while the interaction between varieties and planting dates, (IBA99-First Date 15/10) gave the highest average in grain yield, grains number and spikes number and 1000 grains weight, the average (4.12 t.ha^{-1}, 46.53 grains, 244.4 spike) respectively. The interaction study between clipping treatments and planting dates, it was observed that the combination (control-the second date) showed significant differences in grain yield and 1000 grains weight with mean averages of 4.65 t.ha^{-1} and 48.71 g, (control-the first date) recorded the highest average in the grains number with an average of 48.83 grains, while (twice clipping treatment-the first date) was a significantly increased in the spikes number/ m^{2}, which gave an average of 267.7 spike superior to other treatment.

Key words: clipping number, planting dates, varieties, grain yield, components, barley.

Introduction

The barley crop *Hordeum vulgare* L. is an important grain crop in the world, grains contain 9.9 grams of protein, high levels of dietary fiber, essential amino acids and vitamins, especially vitamin B (Gani *et al*., 2012). The clipping process can be carried out at different stages to obtain green fodder, dry the plant for silage, carbohydrate-rich barley grains were used as for humans or animal feed, form of grain, green fodder or grown as a mixture with legume crops to improve the nutritional value of feed (Al-Taher *et al*., 2018). As well as used to reclaim salt soils, despite the importance of this crop, the production per unit area in Iraq still low, it is scientifically proven that this crop produces feed in economic quantities, may be used to produce grain and forage (Al-Qaisi *et al*., 2018). The total cultivated area reached 1.158 million hectares with an average productivity of 134 million tons, In Iraq, it is estimated that the percentage of cultivated area is 36% of the total area planted with cereal crops and productivity reached 303114 tons per year (Directorate of Agricultural Statistics, 2017). The barley crop contributes to coarse feed by between 3-8% of the total coarse feed for animals, barley yields gave 2-3 clippes during the season, an average of 5-6 tons of green fodder per acre, depending on the variety and regrow ability, the yield of green fodder and protein content varies depending on the clipping date (Al-Kenani, 2019).

Due to the lack of available studies on the response of barley crop to the recurrence of the clipping, this study was conducted on six varieties of barley, to determine clipping number each variety gives with the best grain yield achieved and to determine the best varieties that gives a balanced product (forage-economic).

Table 1. Some physical and chemical properties of soil before planting*.

Properties	Unit	Value
Electrical Conductivity (EC)	ds.m^{-1}	4.2
pH		7.84
Available nitrogen	Mg. kg^{-1}	22.76
Available phosphorus		10.98
Available potassium		127.49
Organic Matter	g/ kg^{-1}	9.63
Total salts	g/ L^{-1}	3.5
Soil types		
Clay soil	g/ kg^{-1}	389.00
Sandy soil		128.00
Silt soil		483.00
Soil Texture	Silt Clay mixed	

* Analysis was carried out in Soil Science Department Laboratory, Agriculture College, Al-Muthanna University.

Materials and Methods

The experiment was carried out during the winter season 2018-2019 at the research station, Agriculture College, Al Muthanna University, to determine the effect of clipping number and planting dates in the crop and the components of six varieties of barley, for three dates were 15/10, 1/11 and 15/11. The experiment included the study of three factors, the first of which is the planting dates (15/10, 1/11 and 15/11), the second factor is the varieties, which used six varieties of barley crop, namely Amal, Buraq, IBA99, Bohoth 244, Samir and IBA265 and symbolizes them (V_1, V_2, V_3, V_4, V_5 and V_6), the third factor is the clipping number included without a clipping, one, two and three clipping (W_0, W_1, W_2 and W_4) respectively. The land of experiment plowed perpendicular tillage with mulching plow, the harrowing and leveling process was then carried out, table 1, shows some chemical and physical properties of the soil of the experiment.

The land was divided according to the design used to the plot with an area of (2×2 m). Split split-plot arrangement and RCBD design with three replicates were used, a total of 216 experimental units, included three replicates in each replicate 72 experimental units, cultivation was carried out on the lines, 20 cm distance

Table 2: Effect of Clipping number, planting dates, varieties and Interaction on Spikes number / m^2.

Clipping (C)	Dates (T)	Varieties						Clipping X Dates
		V_1	V_2	V_3	V_4	V_5	V_6	
C_0	T_1	170.0	250.4	249.2	269.6	223.3	254.4	236.2
	T_2	223.3	224.2	207.1	239.6	205.4	237.9	222.9
	T_3	186.0	192.0	182.8	208.0	206.8	172.8	191.4
C_1	T_1	227.9	252.9	242.1	263.8	227.5	24.5	243.6
	T_2	244.2	234.6	234.1	195.4	253.8	227.5	231.6
	T_3	199.6	162.4	228.0	258.4	150.4	156.3	192..5
C_2	T_1	281.2	177.1	296.2	280.8	251.7	319.2	267.7
	T_2	194.2	290.4	268.8	200.7	240.0	197.9	232.0
	T_3	128.8	147.2	146.8	249.1	160.8	140.1	162.1
C_4	T_1	186.2	267.1	287.9	196.7	185.8	257.5	230.2
	T_2	201.7	222.9	205.4	205.4	233.8	164.2	205.6
	T_3	160.0	171.2	148.0	211.6	100.8	110.4	150.3
Varieties (mean)		200.3	216.0	224.7	231.6	203.3	207.1	Date (mean)
$LSD_{0.05}$ (V)		N.S						
$LSD_{0.05}$ (T*C)		39.88						
$LSD_{0.05}$ (T*C*V)		N.S						
Date X Varieties	T_1	216.4	236.9	268.9	252.7	222.1	269.6	244.4
	T_2	215.8	243.0	228.8	210.3	233.2	206.9	223.0
	T_3	168.6	168.2	176.4	231.8	154.7	144.9	174.1
$LSD_{0.05}$ (V)		11.99						Clipping (mean)
$LSD_{0.05}$ (T*V)		23.73						
Clipping X Varieties	C_0	193.1	222.2	213.0	239.1	211.8	221.7	216.8
	C_1	223.9	216.6	234.7	239.2	210.5	210.4	222.6
	C_2	201.4	204.9	237.3	243.5	217.5	219.1	220.6
	C_3	182.6	220.4	213.8	204.6	173.5	177.4	195.4
$LSD_{0.05}$ (C)		14.83						
$LSD_{0.05}$ (C*V)		N.S						

Table 3: Effect of Clipping number, planting dates, varieties and Interaction on grain number/ spike^{-1}.

Clipping (C)	Dates (T)	Varieties						Clipping X Dates
		V_1	V_2	V_3	V_4	V_5	V_6	
C_0	T_1	53.60	44.40	55.13	46.0	44.07	49.80	48.83
	T_2	46.47	44.33	52.53	47.87	47.27	45.13	47.27
	T_3	40.47	45.40	42.20	49.87	43.33	43.83	44.18
C_1	T_1	52.27	46.33	50.33	45.40	39.33	47.77	46.94
	T_2	46.07	42.93	46.07	45.33	46.0	51.33	46.29
	T_3	54.07	48.87	45.20	41.47	42.80	36.40	44.80
C_2	T_1	45.80	46.47	48.27	52.67	44.53	43.60	46.89
	T_2	46.67	43.60	43.47	41.47	42.87	46.13	44.03
	T_3	46.67	41.20	36.07	39.73	39.20	38.33	40.20
C_4	T_1	32.73	43.33	52.67	43.67	41.93	46.47	43.47
	T_2	45.73	42.69	47.40	43.33	45.20	46.20	45.08
	T_3	30.87	33.40	27.93	36.27	30.07	33.73	32.04
Varieties (mean)		45.12	43.57	45.61	44.42	42.23	44.06	Date (mean)
$LSD_{0.05}$ (V)		N.S						
$LSD_{0.05}$ (T*C)		3.51						
$LSD_{0.05}$ (T*C*V)		N.S						
Date X Varieties	T_1	46.10	45.13	51.60	46.93	42.52	46.91	46.53
	T_2	46.23	43.37	47.37	44.50	45.33	47.20	45.67
	T_3	43.02	42.22	37.85	41.83	38.85	38.08	40.31
$LSD_{0.05}$ (V)		1.10						Clipping (mean)
$LSD_{0.05}$ (T*V)		4.04						
Clipping X Varieties	C_0	46.84	44.71	49.96	47.91	44.89	46.26	46.76
	C_1	50.80	46.04	47.20	44.07	42.78	45.17	46.01
	C_2	46.38	43.76	42.60	44.62	42.20	42.69	43.71
	C_3	36.44	39.78	42.67	41.09	39.07	42.13	40.20
$LSD_{0.05}$ (C)		1.95						
$LSD_{0.05}$ (C*V)		4.93						

between line and another, separated the secondary plots from each other (0.5 m), seeds were sown according to the dates of the experiment, seed quantity (100) kg.ha^{-1} (Extension bulletin, 2012). Nitrogen fertilizer was added according to the experimental treatments, by four equal batches in the form of urea fertilizer (46 N), the first after the plant eruption, the second after the first clipping, the third after the second clipping and the fourth after the third clipping. The phosphate fertilizer was added in the amount of 100 kg.ha^{-1} in the form of triple superphosphate (20% P), in one batch during the preparation of soil for planting. The soil was irrigated as needed after each clip, the harvest was carried out at the beginning of April for the first date until the last third of the same month. The traits studied were: Spikes number of m^2, grains number/ spike^{-1}, 1000 grain Weight (g), Grain yield (ton.ha^{-1}) and Biological production (ton.ha^{-1}).

The data were analyzed statistically using the Genstat statistical program, the least significant difference test (L.S.D) was used to compare the mean averages of the coefficients at the level 0.05 (Al-Rawi and Khalaf Allah, 1980).

Results and Discussions

Spikes number/ m^2

Table 2, showed that a significant effect ($P \leq 0.05$) in clipping number and planting dates and the interaction in the spikes number, the cultivated plants exceeded the date (15/10) with the highest average of 244.4 m^2, on the 15th of November, the cultivated plants recorded the lowest average of 174.1 m^2, the reason behind the first date is due to the length of life of the crop, which allows to prolong the duration of the tiller formation, led to more effective photosynthesis, which was reflected in the increase in the number of spikes due to the development from tillers to spikes, this finding was consistent with Samarah and AL-Issa, (2006), the results showed a significant difference ($P \leq 0.05$) among clipping treatments, one-time clipping treatment was recorded the highest average of 222.6 m^2, comparison of control and two clipping treatments with averages of 216.8 and 220.6 m^2 respectively, The treatment of the three clipping was the lowest mean was 195.4 m^2, The difference in the number of clipping may be due to the increase in the number of

Table 4: Effect of Clipping number, planting dates, varieties and Interaction on 1000 grains weight (g).

Clipping (C)	Dates (T)	Varieties						Clipping X Dates
		V_1	V_2	V_3	V_4	V_5	V_6	
C_0	T_1	49.33	44.67	54.00	45.33	50.67	46.67	48.44
	T_2	48.00	44.00	53.33	44.00	54.67	48.27	48.71
	T_3	42.67	48.00	52.00	44.00	44.00	46.67	46.22
C_1	T_1	42.67	45.33	49.33	39.00	52.00	45.33	45.61
	T_2	44.0	46.67	50.67	42.67	45.33	44.00	45.56
	T_3	42.67	52.00	49.33	38.33	38.67	44.00	44.17
C_2	T_1	42.67	49.33	49.33	30.67	42.67	42.67	42.89
	T_2	42.67	44.00	44.00	42.67	45.33	42.67	43.56
	T_3	37.33	38.67	36.00	36.00	34.67	41.33	37.33
C_4	T_1	36.00	40.00	46.67	33.33	40.33	44.00	40.06
	T_2	37.33	33.33	38.67	36.67	38.67	34.67	36.56
	T_3	33.33	40.00	28.00	29.33	29.33	29.33	31.56
Varieties (mean)		41.56	43.83	45.94	38.50	43.03	42.47	Date (mean)
$LSD_{0.05}$ (V)		2.40						
$LSD_{0.05}$ (T*C)		4.11						
$LSD_{0.05}$ (T*C*V)		N.S						
Date X Varieties	T_1	42.67	44.83	49.83	37.08	46.42	44.67	44.25
	T_2	43.00	42.00	46.67	41.50	46.00	42.40	43.59
	T_3	39.00	44.67	41.33	36.92	36.22	40.33	39.82
$LSD_{0.05}$ (V)		2.94						Clipping (mean)
$LSD_{0.05}$ (T*V)		NS						
Clipping X Varieties	C_0	46.67	45.56	53.11	44.44	49.78	47.29	47.79
	C_1	43.11	48.00	49.78	40.00	45.33	44.44	45.11
	C_2	40.89	44.00	43.11	36.44	40.89	42.22	41.26
	C_3	35.56	37.78	37.78	33.11	36.11	36.00	36.06
$LSD_{0.05}$ (C)		2.32						
$LSD_{0.05}$ (C*V)		NS						

spikes per unit area due to the increase in the number of tillers, Agreed with Al-Zarigawi *et al*., (2015).

The interaction between the varieties and the planting dates of (item research-244 date 15/10) recorded the highest average number of spikes reached 231.6 spike/ m^2, while the interaction between clipping treatments and planting dates was the highest average (267.7 spike/ m^2), comparison (first clipping with first date), (control with first date), (the first clipping with the second date), (the second clipping with the second date) and (the third clipping with first date), with averages of 243.6, 236.2, 231.6, 232 and 230.2 spike/ m^2 respectively.

Grain number/ spike^{-1}

Table 3, shows the superiority of cultivated plants by date 15/10, it gave the highest average of 46.53 grain / spike^{-1}, comparison of plants of the second date 1/11 recorded an average of 45.67 grain / spike^{-1}, while the third date 15/11 gave the lowest average in this capacity was 40.31 grain / spike^{-1}. The results showed significant differences in the number of grains in the spike, the control was significantly higher average 46.76 grain/ spike^{-1}, compared to one-time clipping treatment, the average was 46.01 grain/ spike^{-1}, the second and third clipping treatments gave the lowest mean of 43.71 and 40.20 grain/ spike^{-1} respectively. This is because frequent clipping had led to a re-growth, thus reducing the period of development of spikes, Because there was not enough time for the florets to form, the lack of food to fill the grain, atrophy and death of some grains (Al-Kanani, 2019).

The interaction between the clipping number and the planting dates (control- the first date) recorded the highest average of 48.83 grain/ spike^{-1}, comparison (Comparative treatment - second appointment), (the first clipping - the first date), (the first clipping - the second date), (the second clipping-the first date) and (the third clipping-the second date), which gave mean averages (47.27,29 46., 46.29, 46.89 and 45.08) grain/ spike^{-1} respectively.

While the interaction between varieties and planting dates showed superiority (IBA-first date), which recorded the highest average of 51.60 grain/ spike^{-1}, comparison (Samir - second date), which recorded an average of 47.20 grain/ spike^{-1}, while (Samir - the third date) recorded the lowest average of 38.08 grain/ spike^{-1}.

Table 5: Effect of Clipping number, planting dates, varieties and Interaction on grain yield (t.ha^{-1}).

Clipping (C)	Dates (T)	Varieties						Clipping X Dates
		V_1	V_2	V_3	V_4	V_5	V_6	
C_0	T_1	3.19	5.32	5.55	4.04	3.27	4.62	4.33
	T_2	5.21	4.67	4.53	4.30	4.05	5.14	4.65
	T_3	2.86	4.59	4.21	3.21	3.95	3.53	3.71
C_1	T_1	2.97	4.64	5.03	4.33	4.16	5.01	4.36
	T_2	3.92	4.22	4.87	3.28	4.13	5.21	4.13
	T_3	2.49	3.98	4.46	3.29	2.81	4.46	4.24
C_2	T_1	5.07	3.91	5.39	3.90	3.80	5.12	4.55
	T_2	3.95	4.82	4.18	3.19	3.30	2.88	3.72
	T_3	1.90	2.66	2.25	3.05	2.03	1.77	2.29
C_4	T_1	2.26	3.53	4.78	2.25	2.07	4.46	3.23
	T_2	3.51	2.77	2.67	3.10	2.90	1.39	2.72
	T_3	2.03	2.33	2.37	2.30	1.87	1.44	2.06
Varieties (mean)		3.27	3.35	4.18	3.35	3.29	3.53	Date (mean)
$LSD_{0.05}$ (V)		0.51						
$LSD_{0.05}$ (T*C)		0.65						
$LSD_{0.05}$ (T*C*V)		N.S						
Date X Varieties	T_1	3.37	4.35	5.19	3.63	3.33	4.83	4.12
	T_2	4.15	4.12	4.06	3.47	3.59	3.44	3.80
	T_3	2.30	3.39	3.30	3.96	2.67	2.31	2.82
$LSD_{0.05}$ (V)		0.54						Clipping (mean)
$LSD_{0.05}$ (T*V)		0.90						
Clipping X Varieties	C_0	3.76	4.66	4.73	3.85	3.76	4.43	4.23
	C_1	3.10	4.28	4.79	3.63	3.70	3.96	3.91
	C_2	3.64	3.80	3.94	3.38	3.04	3.28	3.51
	C_3	2.60	2.88	3.26	2.55	2.28	2.43	2.67
$LSD_{0.05}$ (C)		0.33						
$LSD_{0.05}$ (C*V)		NS						

1000 grains weight (g)

Table 4, shows a significant superiority of IBA99, with the highest mean of 1000 grain at 45.94 g compared to the Buraq and IBA265, which gave averages of 43.83 and 43.03 respectively, Amal had the lowest average of 41.56 g, due to the low number of spikes m^2, a lack of competition between plants, increases grain weight (Al-Taher and Al-Hamdani, 2017; Jadou and Baqer, 2012). As for the effect of the planting date, the results showed that the first date (15/10) exceeded the highest average of 44.25 g, compared to the second date (1/11), which recorded an average of 43.59 g, while the third date (15/11) recorded the lowest average of 40.33 g. The reason for the low grain weight on the third date is because of the high temperatures during the period of full grain, leads to small size due to rapid moisture loss, storage capacity reduces, thus a decrease in the 1000 grain weight (Al-Qaisi, 2018). The results showed that the comparison of treatment without a clipping was higher average of 47.79 g, compared to the one-time clipping treatment that gave an average of 45.11 g. The third was the lowest average of 36.06 g. The decrease in the size of the existing tissue may be due to photosynthesis, food depletion, Shorten the growth time of the crop at repeated of clipping, resulted in a low accumulation of chemical components in the grain (Latif and Ramadan, 2002).

As for the interaction between planting dates, varieties, the highest average was 49.83 (IBA99 - first date 15/10), compare with (IBA265 - first date) and (IBA99- second date), the average was 46.42 and 46.67g respectively.

Grain yield (t.ha^{-1})

The results of table 5, showed a significant superiority of IBA 99, gave the highest average of 4.18 t.ha^{-1}, while Amal gave the lowest average 3.27 t.ha^{-1}, comparison of the rest of the experimental species (Buraq, Bohoth 244, Samir and IBA265), which recorded averages of (3.35, 3.35, 3.29 and 3.53) t.ha^{-1} respectively. This may be due to the superiority of the IBA 99 due to its superiority in some components of the product. As for the planting dates of, note that the first date (15/10) exceeded the highest average of 4.12 t.ha^{-1}, compared to the second date,

Table 6: Effect of Clipping number, planting dates, varieties and Interaction on biological yield (t.ha^{-1}).

Clipping (C)	Dates (T)	Varieties						Clipping X Dates
		V_1	V_2	V_3	V_4	V_5	V_6	
C_0	T_1	9.87	11.83	13.29	11.06	10.85	11.60	11.42
	T_2	12.64	11.93	9.77	12.04	11.37	10.67	11.40
	T_3	12.04	11.37	10.67	10.04	11.15	8.73	10.36
C_1	T_1	9.91	11.81	12.08	10.97	12.52	11.37	11.44
	T_2	9.79	11.58	11.83	10.52	11.39	11.21	11.05
	T_3	8.75	12.00	10.42	11.23	10.33	6.96	9.95
C_2	T_1	12.04	9.68	10.68	9.97	11.33	11.83	10.92
	T_2	9.94	13.01	11.70	10.45	10.81	9.63	10.92
	T_3	8.42	7.90	7.33	8.29	5.48	8.67	7.68
C_4	T_1	8.23	13.01	11.79	8.71	8.22	10.35	10.05
	T_2	8.83	10.10	8.41	10.04	9.84	9.91	9.52
	T_3	6.62	6.56	8.42	7.38	6.00	5.79	6.79
Varieties (mean)		9.59	10.88	10.37	10.20	9.91	9.81	Date (mean)
$LSD_{0.05}$ (V)		1.41						
$LSD_{0.05}$ (T*C)		1.56						
$LSD_{0.05}$ (T*C*V)		N.S						
Date X Varieties	T_1	10.01	11.58	11.96	10.18	10.73	11.29	10.96
	T_2	10.30	11.66	10.43	10.76	10.85	10.35	10.73
	T_3	8.46	9.40	8.73	9.65	8.14	7.80	8.70
$LSD_{0.05}$ (V)		1.44						Clipping (mean)
$LSD_{0.05}$ (T*V)		N.S						
Clipping X Varieties	C_0	10.85	11.64	10.60	11.60	10.98	10.68	11.06
	C_1	9.48	11.80	11.44	10.91	11.41	9.85	11.82
	C_2	10.13	10.20	9.91	9.57	9.21	10.04	9.84
	C_3	7.89	9.89	9.54	8.71	8.02	8.68	8.79
$LSD_{0.05}$ (C)		0.68						
$LSD_{0.05}$ (C*V)		1.99						

averaged 3.80 t.ha^{-1}, the third date recorded the lowest average of 2.82 t.ha^{-1}, the reason for the superiority of the first date is due to its superiority in the component of the product of the grains number and the 1000 grain weight (Rashid *et al*., 2010). The results showed that the comparative treatment exceeded the highest average of 4.23 t.ha^{-1}, compared to the first clipping, which recorded an average of 3.91 t.ha^{-1}, the three-time clipping gave the lowest average of 2.67 t.ha^{-1}. The reason may be that the early clipping of the growth leads to an increase in grain yield, repeated clipping twice reduced the grain yield, due to the depletion of processed food in the process of vegetative regrowth, the formation of branches and thus reduced the weight of grain spike, causes the low yield, the reason for the superiority of the comparative treatment is that the clipping leads to the cutting of branches, configure new tillers, it is not enough time and conditions to grow and develop normally (Ziyara, 2013).

Biological yield (t.ha^{-1})

Table 6, show that the superiority of Buraq with the highest average in this capacity amounted to 10.88 t.ha^{-1}, a comparison of the rest of the experimental class IBA99, Bohoth 244, Samir, IBA265 and Amal, averaged 10.37, 10.20, 9.91, 9.81 and 9.59 t.ha^{-1}, agreed with Al-Sahoki *et al*., (2013) pointed to the reason for the difference in the rates of the biologic yield to genetic differences between the varieties. The first planting date was 15/10 significantly had the highest average of 10.96 t.ha^{-1}, compared to the second date, which gave an average of 10.73 t.ha^{-1}, while the third date recorded the lowest average reached 8.70 t.ha^{-1}. The reason for the superiority of the first date is due to its superiority in grain yield than the rest of the dates (Hessan and Moftha, 2012). The results showed that the comparative treatment (without clipping) was significantly higher than the highest average, a comparison of the one-time clipping treatment an average score of 11.06 and 10.82 t.ha^{-1} respectively, while three times clipping gave the lowest average for this characteristic reached 8.79 t.ha^{-1}. The reason for the superiority of the comparative treatment (without clipping), superiority in some of the components of the product, such as the grains number and the 1000 grains weight, which is reflected on the biological production.

The interaction gave (Buraq × one time clipping) the highest average of the biological crop amounted to 11.80 t.ha^{-1}, compared to the other, while (Amal × three times clipping) recorded the lowest average for this trait, reached 7.89 t.ha^{-1}. There was a significant effect of interaction between clipping and planting dates, (one-time clipping × first date 15/10) recorded the highest average of 11.44 t.ha^{-1}, comparison for most experiment treatments, While (the third clipping × third date) recorded the lowest average of 6.79 t.ha^{-1}.

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