Effect of some selective herbicides on several varieties of wheat (Triticum aestivum L.) and its associated weeds.

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Abstract

The experiment was conducted at the research station of the Field Crops Department of the College of Agriculture, Tikrit University, during the winter season 2022-2023, with the aim of knowing the effect of the concentrations of some herbicides, as well as the competitive ability of some bread wheat varieties. A completely randomized block design (split-factorial) was used. The experiment includes two factors. The first factor (herbicides) in (main plot): Selective weed herbicides to combat the weeds accompanying the wheat crop. In addition to the first indoor treatment (Atlantis) to combat narrow and broad-leaved weeds, with three concentrations (480, 320, 160) g/ha + (480) milliliters of diffuser for every 400 liters/ha. Secondly (Topic) to combat the narrow -leaved weeds at a concentration of (600, 300, 900) C3/ha, ml per 400 liters/ha. In addition to the comparison treatment untreated (control), where it was sprayed with distilled water only. The second factor is the variety factor : three varieties of soft wheat crop, namely (Badriya, Gad and Bentloo). The results of the experiment showed Badriya variety recorded the lowest weed percentage for weed density trait (113.38) plants/m2, and recorded the highest value for total grain yield trait (3.20) tons/ha, and Jad variety recorded the highest value for spike number trait and biological yield trait (314.3) spike/m2 and (7.8) tons/ha respectively with a percentage of control reaching (50.04)%, while no significance was recorded for chlorophyll percentage trait and harvest index trait. It was noted that the treatment of the herbicide Atlantis at a concentration of (320) g/ha was superior to the trait of weed density, the percentage of weed control, number of spikes and total grain yield, which reached (90.98) plants/m2, (57.14)%, (310.7) spikes/m2 and (80.72) tons. ha, respectively, while the treatment of the herbicide Topik at a concentration of (600) cm3 recorded a significant effect on the trait of chlorophyll, which reached (43.84) sbad, while it was not significant in the trait of biological yield and harvest index.

Keywords: : wheat, weeds, herbicide, grain yield , variety. Introduction

Wheat is one of the most important crops globally due to the financial returns it generates, in addition to the size of the cultivated area, in addition to the percentage of protein and calories it gives to the body, at a rate of (25%), as it ranks first globally in addition to the cultivated area [1]. The availability of water, soil and suitable environmental conditions made Iraq one of the most important countries in which wheat was grown. While it was not a country with high productivity compared to other developed countries, it achieved self-sufficiency by relying on wells and running water last year [2] The most important reasons for the low yield in Iraq are the failure to follow the correct scientific methods of crop service, in addition to the most important reason, which is the weeds, which is considered the largest factor determining productivity in wheat [3]. Systemic herbicides are among the best herbicides due to the speed of absorption and reaching the effective area and their high effectiveness against thin and broad weeds, which varies according to the type of herbicide and its concentration [4]. Chemical herbicides are considered one of the easiest ways to control weeds due to their low price, ease of use and avoidance of mechanical damage to the plant [5]. It was found that wheat varieties compositions genetic differ among or themselves in terms of their resistance to weeds and have a high competitive ability to resist and reduce weeds [6]. It has been proven that using the appropriate variety played a major role in resisting weeds, limiting their germination and reducing their number, thus positively affecting the total yield [7.]

Material and Methods

Prepare samples:

A field experiment was carried out at the research station of the Field Crops Department of the College of Agriculture, Tikrit University, during the winter seasons 2022-. 2023. The experimental land was plowed in two perpendicular plows with a rotary plow, smoothed with disc harrows, and the land was leveled with a leveling machine. The seeds were planted manually on lines spaced 20 cm apart, and then the recommended quantities of chemical fertilizers were added to all experimental treatments. Nitrogen fertilizer (urea 46 N%) was added at a rate of (200 kg.ha) and in two batches, the first when planting the wheat crop and the second batch. At the branching stage of wheat crop growth, as for the triple superphosphate fertilizer (P2O5% 45), the entire quantity was added at once before planting at a rate of 100 kg. E-1 The planting date was 15/11/2022, and the harvest date was 15/5/ 2023. A completely randomized block design (split-factorial) was used. The experiment includes two factors. The first is factor (herbicides) in (main plot): Selective weed herbicides to combat the weeds accompanying the wheat crop. In addition Table (1) In addition to the comparison treatment untreated (control), where it was sprayed with distilled water only. . The seconed is the variety factor: three varieties of soft wheat crop, namely (Badriya, Gad and Bentloo. (

Studied traits:

-1Weeds density after 30 days of spraying the herbicide (m2) the number of weeds in the wooden square is calculated:

-2Percentage of weed control 30 days after spraying the herbicide:The control rate is calculated according to the following equation: Control ratio%= Number of weeds in the comparison treatment- Number of weeds in the control treatment \setminus Number of weeds in the control treatment \times 100 [8 .[

-3Chlorophyll percentage : was measured by chlorophyll Minolta device .

-4Number of spikes (m2) : the number of spikes in the wooden square is calculated .

-5Grain yield ton/h : It was estimated on the basis of the grain weight (kg) for the area of m2 harvested from each experimental unit, then the weight was converted to ton/h [9. [

-6Biological yield ton/h : at the stage of full maturity, the plants were harvested from their base with the soil surface at a rate of one square meter from each experimental unit and their weights were measured .

-7Harvest index: It was calculated by the following equation [10.]

Harvest index = (grain yield / biological) \times 100

Results and Discussion

_1Density of weeds 30 days after spraying the herbicide (m2.(

The results of Table No. (1) indicate that the highest significant value was recorded for the weed density characteristic in the comparison treatment (control)was (227.66) plants/m2, while the lowest significant value was recorded for the Atlantis herbicide treatment at the recommended concentration was (112.50) plants/m2, and this is consistent with [9,12.]

The results in the table show that the highest statistical value was recorded in the treatment of the variety (Jad) compared to the varieties implemented in the experiment, as it was (167.21) plants/m2. While the density of the Weeds accompanying the (Badriya) variety had a lower significant value (113.28) plants/m2, this explains the difference between the wheat crop varieties in the competitive ability between the Weed plants on the main growth components (water, light, and nutrients) [7,12.]

The interaction recorded the highest significant value when treated with the indoor treatment of the Jad variety (338.60) plants/m2, while the lowest value was for the Badriya variety and the Atlantis herbicide treatment at the recommended concentration (54.40) plants/m2.

-2Percentage of weed control 30 days after spraying the herbicide. (%)

The results of Table No. (2) indicate that the herbicide rates and concentrations, the herbicide Atlantis, in the recommended concentration, achieved the highest control value of (57.14)%, while the comparison coefficients recorded the lowest statistical value of (0.00)%. The reason for the decline in the weed was due to its efficiency in inhibiting the inhibitory enzyme aceto-lactactic syntase (ALS). To synthesize amino acids, and this applies to [10,6]. As for the Jad variety recorded the highest statistical control value, which was (50.04)%, while the Bentello variety recorded the lowest control value, which amounted to (18.62)%, which indicates that there is a difference in the competitive ability of the varieties among them, and this matches what was found [6,11]. In the interaction, the Jad variety of the hirbicide Atlantis, at the recommended concentration, recorded the highest control rate of (69.98)%, while the comparison treatments recorded the lowest control rate of (0.00)%. This is consistent with [7,12.[

-3Chlorophyll ratio (Spad.(

The results of Table No. (3) indicate that there are significant differences in herbicides rates and concentrations. The herbicide Topik achieved a concentration of (600) g/ha of (43.84) spad, while the control rates recorded a rate of (39.13) spad, This is consistent with [7,12]. The results of the same table also indicate that there are no significant differences in the rates of genetic compositions. The interaction recorded the highest significant value for the herbicides (Topic) at a concentration of (600) C3/ha for the variety (Badriya) of (45.40) spad, followed by the rest of the combinations, while the control rates for the variety Bentlo recorded a rate of (35.40) spad.

-Number of spikes (m2): 4

The results of Table (3) indicate that there are significant differences herbicide rates and concentrations. The Atlantis herbicide achieved the concentration of (320) g/ha (3.75) spikes/m2, while the control rates recorded the lowest descriptive value of (1.74) spikes/m2. This is consistent with [9,12]. As for the genetic composition rates, the Jad variety achieved the highest statistical value of (341.3) spikes/m2, followed by the Bentloo variety with a rate of (266) spikes/m2, while the Badriya variety achieved the lowest rate of

spikes of (1.49) spikes/m2. The difference between the varieties in the yield is due to the difference in genetic compositions and their ability to compete with weeds, which is consistent with [7,12] . The interaction recorded the highest significant value for herbicide (Topic) at a concentration of (600) C3/ha in the (Jad) variety, with a number of spikes reaching (452) spikes/m2, followed by the rest of the combinations, while the (Badriya) variety had the lowest interaction value, recording (113.48) spikes/m2.

-5Total grain yield (ton.ha-1: (

The results of Table No. (6) indicate that there are significant differences in the rates rates of the herbicides and concentrations, the achieved herbicide Atlantis the concentration(320)g/h (3.75) ton.ha, followed by control rates of (1.74) ton.ha. The reason for the superiority of the herbicide Atlantis in the recommended concentration is due to its superiority in plant height in poison, the number of grains per spike, and the area of the flag leaf. This is consistent with [11]. Likewise, the difference in yield between varieties is due to the difference in genetic structures and their ability to compete with Weeds. This is consistent with [11,12.]

Regarding of the varieties, as the Benteloo variety achieved the highest statistical value of (3.20) ton.ha, followed by the Jad variety with a rate of (3.10) ton.ha, while the Badriya variety achieved the lowest grain yield rate of (1.49) ton.ha, this is consistent with [7,9.]

The interaction recorded the highest significant value for the herbicide (Atlantis) at the concentration(320)g/h in the variety (Bentloo), with grain yield of (4.86) ton.ha, followed by the rest of the compounds, where the variety (Badriya) had the lowest value of the interaction, recorded (1.36) ton.ha.

-6Biological yield tons/ha :

The results of Table No. (5) indicate that there are no significant differences between the rates and concentrations of herbicides. As for the rates of genetic compositions, the Jad and Bentlu varieties achieved the highest statistical value of (7.08) and (6.17) tons per hectare, respectively, while the Badriya variety achieved the lowest rate of grain yield of (3.55) tons per hectare, which is consistent with [9,12]. The interaction recorded the highest significant value for the herbicides (Topic) at the recommended concentration (600) C3/ha in the (Jad) variety, with a biological yield of (8.41) tons per hectare, followed by the Topic treatment (900) C3/ha and the control for the same variety, followed by the rest of the combinations, while the (Badriya) variety had the lowest interaction value in all herbicides concentrations. -7Harvest index:

The results of Table No. (6) indicate that there are no significant differences in the rates and concentrations of herbicides of genetic compositions . As for the rates of genetic compositions, there are no significant differences . Also, the interaction did not record any significant value .

Varieties	Badriya	Bentloo	Jad	
Herbicides				
Atlantis- 480 g.h	122.40 def	154.43 bc	116.00 ef	130.94 b
Atlantis-320 g.h	54.40 g	117.2 def	101.37 f	90.98 d
Atlantis-160 g.h	113.20 f	168.00 bc	148 cde	143.09 b
Topik-900 C ³ .h	114.40 ef	125 def	177 b	138.8 b
Topik- 600 C ³ .h	98.20 f	120.67def	118.63def	112.50 c
Topik-300 C^3 .h	124.00 def	145.20cde	170.93 bc	146.71 b
Control	166.40 bc	178.00 b	338.60 a	227.66 a
	113.28 c	144.01 b	167.21 a	

Table (1) showing the Herbicides used in the experiment, their concentrations , types, and origin of those types.

Table (2) shows	s the effect	of study	factors	on the	density	of we	eeds 30	days at	fter	spraying	the
herbicide(m2.(

Varieties	Badriya	Bentloo	Jad	
Herbicides				
Atlantis- 480 g.h	122.40 def	154.43 bc	116.00 ef	130.94 b
Atlantis-320 g.h	54.40 g	117.2 def	101.37 f	90.98 d
Atlantis-160 g.h	113.20 f	168.00 bc	148 cde	143.09 b
Topik-900 C ³ .h	114.40 ef	125 def	177 b	138.8 b
Topik- 600 C ³ .h	98.20 f	120.67def	118.63def	112.50 c
Topik-300 C ³ .h	124.00 def	145.20cde	170.93 bc	146.71 b
Control	166.40 bc	178.00 b	338.60 a	227.66 a
	113.28 c	144.01 b	167.21 a	

*Different letters mean there is a significant difference.

Table No. (3) shows the effect of study factors on the percentage of weed control.(%)

Varieties	Badriya	Benteloo	Jad	
Herbicides				
Atlantis- 480 g.h	26.56fghi	13.31 ijk	65.27 ab	35.05 c
Atlantis-320 g.h	67.29 ab	34.16 efg	69.98 a	57.14 a
Atlantis-160 g.h	31.54 fg	5.34 jk	55.72 bc	30.87 c
Topik-900 C ³ .h	31.23 fg	29.52 fgh	47.20 cde	35.98 c
Topik- 600 C ³ .h	41.07 def	32 fg	63.17 ab	45.41 b
Topik-300 C ³ .h	25.04 ghi	18.67 hig	48.96 dc	30.00 c
Control	0.00	0.00	0.00	0.00
	31.82 b	18.62 c	50.04 a	

*Different letters mean there is a significant difference.

Varieties	Badriya	Bentloo	Jad	
Treatments				
Atlantis- 480 g.h	41.00 ab	43.60 ab	39.66 ab	41.42 a
Atlantis-320 g.h	43.13 ab	43.00 ab	41.80 ab	42.64 a
Atlantis-160 g.h	43.00 ab	38.26 b	39.00 ab	40.08 a
Topik-900 C ³ .h	41.00 ab	39.86 ab	40.86 ab	40.57 a
Topik- 600 C ³ .h	45.40 a	44.13 ba	42.00 ab	43.84 a
Topik-300 C ³ .h	42.26 ab	43.66 ba	40.73 ab	42.22 a
Control	41.1ab	35.40 b	40.90 ab	39.13 b
	42.41 a	41.13 a	40.71 a	الكلوروفيل

Table (4) shows the effect of study factors on chlorophyll properties

*Different letters mean there is a significant difference.

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Varieties	Badriya	Bentloo	Jad	
Treatments				
Atlantis- 480 g.h	116.00 df	285.2	298.4abcd	233.2a
Atlantis-320 g.h	225.33 bcdf	318 abc	401 ab	314.7a
Atlantis-160 g.h	152.00 cdef	266.9	296 abcd	283.3a
Topik-900 C ³ .h	63.6 f	240 bcdef	304 abcd	202.5a
Topik- 600 C ³ .h	97.33 ef	286. abcd	452 a	277.6a
Topik-300 C ³ .h	77.33 f	238 bcdef	329.2 ab	214.8a
Control	62.67 f	228bcdef	309 abcd	b199
	113.48 b	266 a	341.3 a	

ent letters mean there is a significant difference.

Table No. (6) shows the effect of study factors on the characteristic of total grain yield (ton.h-1 (

Varieties	Badriya	Bentloo	Jad	
Herbicides				
Atlantis- 480 g.h	1.36 c	3.05 abc	3.30 abc	2.57 abc
Atlantis-320 g.h	2.32 bc	4.86 a	4.09 ab	3.75 a
Atlantis-160 g.h	1.34 c	3.22 abc	3.16 abc	2.57 abc
Topik-900 C ³ .h	1.19 c	2.37 bc	2.48 bc	2.01 c
Topik- 600 C ³ .h	1.98 bc	4.08 ab	3.72 ab	3.26 ab
Topik-300 C ³ .h	1.14 c	2.78 abc	2.93 abc	2.28 bc
Control	1.13 c	2.06 bc	2.04 bc	1.74 c
	1.49 b	3.20 a	3.10 a	

*Different letters mean there is a significant difference.

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Varieties	Badriya	Bentloo	Jad	
Herbicides				
Atlantis- 480 g.h	3.88 c	4.42 abc	6.01 abc	4,71 a
Atlantis-320 g.h	5.85 abc	6.52 abc	6.72 abc	6.36 a
Atlantis-160 g.h	3.97 bc	6.54 abc	6.48 abc	5.66 a
Topik-900 C ³ .h	3.29 c	5.84 abc	5.19 abc	4.77 a
Topik- 600 C ³ .h	3.3 c	6.42 abc	8.41 a	6.04 a
Topik-300 C ³ .h	2.49 c	5.25 abc	8.37 a	5.37 a
Control	2.12 abc	8.2 ab	8.38 a	6.9 a
	3.55 b	6.17 a	7.08 a	

Table No. (7) shows the effect of the study factors on the biological yield characteristic, tons/ha

*Different letters mean there is a significant difference.

Table No.	(8) s	hows t	he effect	of the	study	factors or	1 the	harvest	index t	rait
	· ·									

Varieties	Badriya	Bentloo	Jad	
Treatments				
Atlantis- 480 g.h	57.95a	41.31 a	58.71 a	52.61 a
Atlantis-320 g.h	49.00 a	99.05 a	52.13 a	66.72 a
Atlantis-160 g.h	37.91 a	52.72 a	63.53 a	51.39 a
Topik-900 C ³ .h	37.30 a	39.05 a	54.06 a	43.47 a
Topik- 600 C ³ .h	77.52 a	32.13 a	72.44 a	60.70 a
Topik-300 C ³ .h	57.61 a	88.17 a	35.18 a	60.32 a
Control	27.94 a	32.09 a	32.95 a	30.99 a
	49.30 a	54.93 a	52.71 a	

*Different letters mean there is a significant difference.

Conclusion

The results of the experiment showed significant differences between the varieties used in this study, as Bentlow variety had the highest yield, Bentlow variety had the highest total yield, Badriya had the lowest number of weeds, and Jad variety had the highest number of spikes. There were also significant differences in the rates and concentrations of

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