DOI : 10.35124/bca.2019.19.2.3997

Biochem. Cell. Arch. Vol. 19, No. 2, pp. 3997-4001, 2019 | www.connectjournals.com/bca | *ISSN 0972-5075*

RESPONSE OF WHEAT TO WEED CONTROL BY USING DIFFERENT HERBICIDES AND EFFECTINTO YIELD GRAIN

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(Received 19 March 2019, Revised 31 July 2019, Accepted 12 August 2019)

ABSTRACT : A field experiment was conducted at the Mahaweel Wheat Research Station of the National Program for the Development of Wheat Cultivation in Iraq in Babylon province during the agricultural season 2016-2017 with the aim of identifying the effect of newly introduced wheat herbicides in Iraq (pallas, sortie and ponanza) into weed control of wheat (Class: Aba 99) and the effect of the grain yield and the accompanying weeds. Use the randomcomplete block design (RCBD) and three replicates. The treatment of Pallas gave less average number of weeds (leaves narrow,leaves broad and the total number was 1.3, 3 and 4.3 plants. m^2 respectively, while weedy gave the highest average values 33, 28.2 and 61.2 plants. m^2 respectively, so the control percentage of these characteristics was 96.1%, 89.4% and 92.9%, respectively. Theseherbicides also affected the same effect into inhibition ofthe dry weight of weeds was 96%, 94% and 88%, respectively. The behavior of the herbicides differed in their effect on the components of the crop. The highest sortie treatment gave average a total of 61 grains.spike^{-1}. Pallas gave the highest average grain yield of 698 g. m^2.

Key words : Yield grain,weed control, response wheat.

INTRODUCTION

Triticum aestivum L. is the first place in Iraq and the world in terms of the cultivated area, the quantity of production and The economic return achieved, in addition to providing the human with about 25% of the calories and protein so it is a major food crop for more than 1.5 billion people living in 40 countries representing 35% of the world population (Harrison and Lien, 1989). The productivity of the unit of land in this crop was doubled at the end of the 20th century due to the increasing use of modern methods of production of improved varieties, pesticides, fertilizers and mechanization. However, the food gap is still increasing due to the abuse of natural resources from side and increase the population with an engineering transition on the other hand while the food is increasing with numerical moderation (Elsahoki *et al*, 2009). Iraq is one of the first citizens of the emergence of wheat, where the factors of production are available, such as water, soil and climatic conditions, but the productivity of this crop is still low compared to the rate of global production and developed countries (Shati, 2014). This is due to the failure to follow the scientific methods to grow this crop and it service, The most important of which is the weeds control, is ainfluential and determining factor in the growth and production of this crop (Shati and Al-Lami). This crop in Iraq is exposed to various agricultural pests, especially the weeds, which causes a loss of grain yield of 30-50% and may reach 70% depending on the type and intensity of the weeds prevailing in the field. In Iraq, there are about 12 species of narrow-leaves,weeds and 16 types of broad-leaves weeds (Shati, 2008). These weeds cause large losses in the productivity of the area unit. Therefore, chemical herbicides were used to control these plants and gave very good results. The excessive use of these herbicides led to some kind of resistance of some types of weeds so companies producing to herbicides have been manufacturing herbicides characterized by high efficiency and high selectivity and rapid evaporation of the environment and low rates of use. These herbicides have been used by researchers in several countries of the world and have achieved very good results in this regard. In Iraq appeared of past years there has been resistance in some of the wild barley species (Abu Suweif) to some herbicides specialized in narrow weed control with wheat. The aim of this research is to find out the effect of some herbicides in reducing these weed and other accompanied weeds of wheat and the effect on grain yield.

MATERIALS AND METHODS

A field experiment was conducted at the Mahaweel Wheat Research Station of the National Wheat Development Program in Iraq during the agricultural season 2016-2017. The aim of knowing the effect of herbicides such as pteranza, ponanza andpallas in the control of wheat weeds (Class Aba 99) and the effect of grain yield and its components. The soil of the experiment was plowed with a two-pronged plow, and was supported by disk harrows and settled settlement bales.

Use the design of random complete block design (RCBD) with four replicates, divided experimental land into an experimental unit area of experimental unit 30 m^2 (5 m × 6 m). The wheat was planted on the lines between the line and The other 20 cm and seed rate 140 $kg.h^{-1}$ in 26-11-2016 and harvested in 13-5-2017, The soil was fertilized with nitrogen fertilizer at a rate of 200$kg.h^{-1}$ (urea 46% N) in the first three batches at planting, the second after one month of the first batch in the third and the third at elongation. Phosphate fertilizer was added at 120$kg.h^{-1}$ (DAP46% P and 18% N) one batch of soil preparation (Jaddoa, 1995).

The herbicide treatments were used as follows:

T_1 = Sortie with a rate of 500 $g.h^{-1}$(a.i.:Iodosulfuron).

T_2 = Ponanza at a rate of 150 $g.h^{-1}$(a.i.:Sulfosulfuron).

T_3 = Pallas at a rate of 125 $cm^3.h^{-1}$ (a.i.:Pyaxosulam).

T_4 = weedy.

A back filter was used based on the use of 400 $liters.h^{-1}$ of herbicide spray in 3-5 leave of weed, 30 days after the emergence of wheat seedlings. The weed species were diagnosed (Table 1), while calculating their numbers using a wooden square of 1 m^2 (Aldrich and Kremer, 1997) and control percentage % (Table 2).

At the harvest, the weeds were cut from the soil surface level of each experimental unit to one square meter, placed in a paper bag, punctured and air-dried and then weighed. The percentage limits for reducing the number of weeds were calculated as in the equation used by Shati (2006).

$$\text{Control percentage\%} = \frac{\text{Number of weeds in weedy} - \text{Number of weed in control}}{\text{Number of bushes in comparative treatment}} \times 100$$

Percentage of inhibition ofthe dry weight of the weeds was calculated using the following equation (Al-Chalabi, 2003).

Inhibition ratio (%) = 100 6 (A / B × 100)

As:

A = dry weight of the bush in the control treatment.

B = dry weight of the bush in comparison treatment.

The number of spikes per square meter was calculated from the mean lines of each experimental unit. And then took 10 of them, and then spread the grains and calculated each grain for each spike and then extracted the average number of spike grains. Harvested one square meter of experimental unit and threshing when harvested,and then took 1000 grains and weighed with a sensitive electrical balance. Then these grains were added to the grain harvested from each square meter and weighed,as representing the productivity of the unit area.

After the tabulation and the collection of data for all studied characteristics, statistically analyzed by the design of random sectors and averaged the mean averages using the least significant difrences at the probability level of 0.05 (Steel and Torrie, 1980).

RESULTS AND DISCUSSION

The Table 1 shows the types of weeds in the experiment is accompanying, which includes narrow weeds of leaves and broad weeds of leaves and classified these weeds as a winter weed sawing in wheat fields in Iraq.

Table 2 shows significant differences in the effect of herbicides in the number of broad and narrow weeds and their total number. The pallas was given an average value 1.3 $plant.m^{-2}$, with no significant difference between the two types of sortie and ponanza, which gave an average of 2.3 and 2.4 $plant.m^{-2}$, respectively, while the weedy was given highest average number of narrow weeds value 33.0 $plant.m^{-2}$. Thus, these herbicides reduced the number of narrow leave weeds by 96.1% and 92.7% respectively, compared to weedy (Table 3). It is noted from Table 2 that the behavior of two herbicides (sortie and pallas) were different, as they affected the broad weeds compared with ponanza herbicide, where they gave the lowest average number of broad-leaves weeds was 3.0 and 3.0 $plant.m^{-2}$, while gave the herbicide

Table 1 : The types of weeds in the experiment.

English name	The scientific name
Broad weedsof leaves	
Milk thistle	*Silybumm arianum* L.
Dwarf mallow	*Malvapr aviflora* L.
Field bind weed	*Convolvulus arvensis* L.
Wild mustard	*Sinapis arvensis* L.
Narrow weeds of leaves	
Wild out	*Avena fatua* L.
Rigid rye grass	*Lolium rigidum* Gau.D.
Bulbous barley	*Hordeum bulbosum* L.

of ponanza average number of weeds 18.0 plant.m^{-2}. It also gave the weedy highest average value 28.2 plant.m^{-2}, thus reducing two herbicide sortie and pallas number of weedbroad leaves by 89.4% and 89.4% compared to the weedy. These results are due to the difference in the chemical composition of these herbicides in their effect on the weed species, where the weed absorbs herbicides by leaves mainly and by the roots of the secondary degree. These herbicides inhibit the vital activities of the weed, especially inhibition of the enzyme Aceto lactate spnthase (ALS) and also leads to the cessation of manufacturing amino acides and then stopped the division of cells and growth and then the death of the weed. This result was reinforced by Shati *et al* (2007), who used herbicides in weed control of wheat and obtained very good results in reducing them. Herbicides used the same behavior to influence the total number of weeds, where the superiority of the sortie and the pallas over the ponanzaherbicide gave the lowest average of the total number of weeds values 5.3 and 4.3 plant.m^{-2}, while the weedy was given the highest average of this value was 61.2 plant.m^{-2}. Thus, the total control percentage of these two herbicides compared to the weedy was 91.3% and 92.9%, respectively.

Herbicides, in their effect on the dry weight of weeds, used the same behavior in influencing their numbers, whether broad or narrow, and the total number of weeds. The pallas gave an average of the dry weight of the weeds value 3.2 g.m^{-2}, which is not significantly different from the Sortie and Ponanza, which gave an average of this characteristic value 5.3 g.m^{-2} and 6.6. g.m^{-2} compared to the weedy that gave highest value 80.4 g.m^{-2}. These herbicides inhibited the dry weight of the narrow leave weeds by 96.0%, 91.5% and 93.4% respectively, as compared with the weedy.

The pallas were significantly superior to Ponanza in inhibiting the dry weight of the broad-leaf bush. The dry weight of these two isolates was 91.5%, 96% (Table 3) compared to the input. This result was due to the chemical nature. The ponanza herbicide affects only leaf thinness, as shown in Tables 2 and 3. Herbicides were treated according to their specialization in the overall dry weight of the bush. The inhibitory rate ranged from 88.0% as in the treatment of pallas to 27.6% as in the treatment of ponanza.

The dry weight of weed indicates the strength of competition between crop and weed to extract growth requirements such as water, nutrients, light and CO_2 and the reflection of this competition on the ability to accumulate dry matter.

The low dry weight of the weed caused by herbicides indicates that these herbicides killed the living tissue that undergoes photosynthesis. It also indicates that the demolition exceeded the construction process in the tissues and then decrease the accumulation of dry matter and matched this result with Habbani (Al-Hayani).

The results of Table 4 showed significant differences in the number of spikes, number of spike grains and grain yield. The treatment of the pallas herbicide gave the highest average number of spikes per unit area value 483.3 spike.m^{-2}, compared with the weedy that gave the lowest average for this characteristic value 279.2 spike.m^{-2}. This result was due to the effectiveness of these herbicides and the reduction of the growth ofweeds and the elimination of numbers and dry weights (Table 2). It also allowed the crop to grow non-compete for water, Light and nutrients and then to increase the efficiency of photosynthesis process and increase their yield.

The number of spikes is one of the important yield components that will be determined from the early plant life in the formation of tillers. The competition for growth requirements between the weed and the crop is affected by the photosynthesis process and reduces the chances of the survival of tillers and their arrival intothe formation stage of spikes, the tillersare which do not reach this stage may not have the chance to grow and fail in carry the spikes, reducing the number of spikes as in the weedy treatment. This result was similar to that demonstrated by Brian (2000) and Shati (2008) that the chemical control of the wheat weeds leads to an increase in the number of spikes per unit area. The herbicides significantly affected in the number of spike grains. Sortie herbicide gave a higher average number of spike grains (61.6 grain.spike^{-1}), which was not significantly different with ponanza and pallas, while weedy treatment gave least average value 44.0 grain.spike^{-1}.

The number of spike grains is a very sensitive component of the environment. This component is determined before three weeks of the spikes expulsion.

The increase of dry matter during the critical phase before the expulsion of the spike increases the spike grains and vice versa. During this duration, a competition between the fast growing stem and the spike on the resulting carbohydrate decreases competition by eliminating the weeds with herbicides that provide a suitable environment for the crop plants to grow from not to compete for growth requirements, this is reflected in the activities of the biological crop and the amount that allows it to exploit most of the food available in the composition of grain and then increase the duration of

Table 2 : Weeds number (plant.m^{-2}) and dry weight of weeds (g.m^{-2}).

Herbicides	Rate of use g-ml.m^{-2}	Weeds number (plant.m^{-2})			Dry weight of weeds(g.m^{-2})		
		Narrow	Broad	Total	Narrow	Broad	Total
Sortie	125	2.3	3.0	5.3	6.6	11.8	18.4
Ponaza	150	2.3	18.0	20.4	5.3	57.0	58.7
Pallas	125	1.3	3.0	4.3	3.2	6.5	9.7
Weedy	0.0	33.0	28.0	61.2	80.4	75.0	81.1
LSD0.05		7.9	9.9	10.9	13.4	6.7	20.7

Table 3 : Percentage of control and inhibition of weeds.

Herbicides	Rate of use g-ml.m^{-2}	Weeds number (plant.m^{-2})			Dry weight of weeds(g.m^{-2})		
		Narrow	Broad	Total	Narrow	Broad	Total
Sortie	125	93	89.4	91.3	91.5	84.3	77.3
Ponanza	150	92.7	36.2	66.7	93.4	24.0	27.6
Pallas	125	96.1	89.4	92.9	96.0	91.8	88.0
Weedy	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LSD 0.05							

Table 4 : Effect of herbicides in grain yield and its components.

Herbicides	Rate of use	Number of spikes (g.-cm^{3}.h^{-1})	Number grain of spike	Weight of 1000 grain	Grain yield (g.m^{2})
Sortie	500	456.0	61.6	32.0	528
Ponaza	600	449.3	60.3	32.6	537
Pallas	500	483.3	58.0	32.6	698
Weedy	0.0	279.3	44.0	30.0	174
L.S.D 0.05		31.3	8.8	N.S	157.4

the grain filling, and the number of grain controlled by available ready-made foodstuffs. This result was agreed, as explained by Al-Lami (2004).

The treatment of pallas herbicide was givenhighest grain yield value 698 g.m^{-2} while gave two herbicide ponanza and sorter average grain yield values 537 and 528 g.m^{-2} comparison with weedy treatment, which gave average yield was less value 174 g/m^{2}.

CONCLUSION

The results show the effect of herbicides on weeds growth, which allows the crop to grow without environmental stress,such as competition for growth requirements (water, nutrients, light and so on), thus increasing the efficiency of photosynthesis in the source and its accumulation and transfer to the downstream.

This result was further enhanced by what Chat and Stome (2006) showed that the use of wheat weed herbicides leads to increased grain yields.

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