EVALUATION OF CHEVALIER WG AND ATLANTIS OD HERBICIDES TO CONTROL WEEDS IN WINTER WHEAT FIELDS

I. A. Said 1,2, D. M.A. Jaff 3

Researcher
Assist. Prof.

1Plant Production Department, Khabat Technical Institute, Erbil Polytechnic University
2Field Crops Department, College of Agriculture, Salahaddin University
3Biology Department, College of Education, Salahaddin University

ABSTRACT

Herbicides are much more than just chemicals to control weed plants, and they can also influence the ecosystems. So, it is necessary to choose new herbicide with low active ingredients in order to reduce environmental issues, as well as control weed plants. A field experiment was conducted to evaluate the efficiency and to compare two herbicides containing similar active ingredients, Chevalier WG and Atlantis OD, as they contain metsulfuron-methyl and iodosulfuron-methyl sodium at different rates. Chevalier contains 30 g/l of each active ingredient; whilst Atlantis OD has 10 g/l of metsulfuron-methyl and 2 g/l of iodosulfuron-methyl sodium. The results showed that all treatments significantly were active to control the weeds in both wheat varieties. Narrow-leaves Weeds density was decreased density 91.70 and 94.14% by Atlantis OD minus 25% in Aras and Simeto respectively, and the yield of Aras was increased 255%. In accordance with the results, a herbicide with low active ingredients, particularly from the sulfonylurea group such as Atlantis OD, more likely to be recommended for weed control and environmental concerns.

Keywords: herbicides; chevalier, atlantis, wheat; weeds; yield

*Received:12/7/2019, Accepted:25/11/2019*
INTRODUCTION
Wheat crop is regarded the most important economic plant. It is classified first, followed by rice, maize and barley in terms of importance (13). However, there are constraints which are accountable for low wheat yield such as using of poor quality seeds, improper sowing, low seeding rate and imbalance use of fertilizers and irrigation; as well as weeds disruption, as it is the key factor in diminishing wheat yield (12). In addition, Abdul Khaliq (2) affirm that weed infestation in crop lands is the most devastating factor influencing adversely crop productivity; then, resulting in direct loss to quality and quantity of the products. The impact of weeds on crop is through competition on basic requirements of growth directly or to be indirect via allelopathy effect, and both decrease crops yield (3). According to studies in Iraq, weeds can cause in wheat yield reduction by 13-43% (1). Furthermore, several weed species have been found to cause yield reduction; including Lolium rigidum, Sinapis arvensis, Raphanus raphanistrum, Avena fatua, Malva parviflora, Phalaris minor and Melilotus indicus (16). The most effective method to control the weeds is herbicides, but during the past few decades this agrochemical has resulted in serious ecological and environmental problems involving weeds, crop plants and microorganisms (2). So, it is always recommended to use low doses during the process of weed management, particularly those that have sulfonylurea, which is deemed less harmful to the environment and thus more effective at low rates (8). Furthermore, both Atlantis OD and Chevalier WG have recently been registered in Iraq as herbicides to control broad and narrow annual weeds. Both herbicides, produced by the Bayer Crop Science, contain Metsulfuron methyl and Iodosulfuron methyl sodium that are active ingredients of the sulfonylurea group (4), and are widely used to control broad leaf weeds as well as some annual grasses particularly Avena sativa in wheat fields (17). The Chevalier is most important herbicide recommended by the Ministry of Agriculture in Iraq to suppress weeds in wheat fields (9). Both active ingredients are adsorbed through leaves and stop the weeds growth after 48 hours by inhibiting ALS enzymes; then prevent new leaves formation (12). Thus, this paper studies a comparison between the two herbicides in controlling weeds in winter wheat field.

MATERIALS AND METHODS
Field experiment was conducted at Grdarasha research station of Agriculture College / Salahaddin University to evaluate the effectiveness and efficiency of the two new herbicides (Chevalier WG and Atlantis OD) used to control weeds in the wheat field. Chevalier WG herbicide was obtained from the Blue Field agricultural corporation, while Atlantis OD was supplied by Bayer Crop Science in Germany via their Amman office. Certified wheat seeds including Simeto and Aras (durum and soft varieties respectively) were obtained from Erbil Directorate of Agricultural Research. The seeds were cultivated in a prepared field using Randomized Complete Block Design (RCBD) with three replicates in November 2015. After the crops growth reached four leaves stage, the herbicides were sprayed at three doses (+25% of recommended rate, recommended rate and -25% of the recommended dose). Then, the following parameters were considered to illustrate the evaluation:

Plant material:
Wheat plants were sampled after the application of herbicides at flowering growth stage. Stem and spike lengths were examined (table-2)

Weed Control Efficiency (WCE):
The following formula was used to describe the efficiency of the herbicides as implemented by (Singh et al, 2013):

\[ WCE = \left( \frac{x-y}{x} \right) \times 100 \]

Where \( x \) = weed dry weight in weedy check and \( y \) = weed dry weight in treated plots (table-3).

Yield Parameters:
Grains yield per hectare, 1000 grains weight (g), and number of grains per spike as well as the percentage of protein content were studied.
The prevalent species of weeds in the study area were Avena sativa, Galium tricorne and Brassica napus. Some species were also found in the field but with low density. However, the herbicides were significantly effective at low doses to control approximately all species of weeds (Table-3). Chevalier-R recorded the minimum control for both broad and narrow leaves for Simeto experiment plots which were 87.79 and 77.76, respectively. In contrast, Soltani and Saeedipour (2015) concluded that weeds dry matter were decreased as a result of increasing the rate or dose of Chevalier; whilst, the effectiveness of Atlantis was increased by increasing its dose to diminish the weed density. Razzaq et al. (15) also found that controlling weeds was enhanced by increasing Atlantis application rates; however, according to Malekian et al. (11) applying lowest rate (14.4 g/ha) of both active ingredients were effective markedly to diminish the weeds compared to (18 g/ha).

The prevalent species of weeds in the study area were Avena sativa, Galium tricorne and Brassica napus. Some species were also found in the field but with low density. However, the herbicides were significantly effective at low doses to control approximately all species of weeds (Table-3). Chevalier-R recorded the minimum control for both broad and narrow leaves for Simeto experiment plots which were 87.79 and 77.76, respectively. In contrast, Soltani and Saeedipour (2015) concluded that weeds dry matter were decreased as a result of increasing the rate or dose of Chevalier; whilst, the effectiveness of Atlantis was increased by increasing its dose to diminish the weed density. Razzaq et al. (15) also found that controlling weeds was enhanced by increasing Atlantis application rates; however, according to Malekian et al. (11) applying lowest rate (14.4 g/ha) of both active ingredients were effective markedly to diminish the weeds compared to (18 g/ha). Zand et al. (96) also confirmed in their work that weeds population was reduced by 96.4%...
when (15+3 g/ha) of metsulfuron-methyl and iodosulfuron methyl sodium respectively applied; compared to (45+45 g/ha) rate, as reduced the weeds by 89.3%. Thus, low doses of metsulfuron methyl and iodosulfuron methyl sodium is sufficient to inhibit amino acid biosynthesis then prevent new leaves formation (12). Furthermore, all yield parameters were improved by both herbicide doses which recorded higher yield in comparing to the weedy check; exclusive protein percentage was not significant (Table-2). The results are similar to the finding’s of Soltani and Saeedipour (19) results. Based on the data obtained from this study, it can be concluded that all treatments were effective to diminish the weed problem particularly Avena sativa, which is the dominant weed species in the field. The Atlantis OD herbicide which contains less metsulfuron methyl and iodosulfuron methyl sodium, 10 and 2 g/L respectively, is efficient to suppress the weed plants even at a low dose (minus 25% of the recommended dose). In addition, it did contribute to enhance the crop yield for both varieties. Thus, herbicides such as Atlantis OD with low active ingredients should be recommended in wheat fields for better weed controlling, environmental concerns and much more cost effective.

**REFERENCES**


4. Bayer Crop Science of Iraq. Herbicides products. Available at: [https://www.iraq.cropscience.bayer.com/Products/Herbicides/Atlantis-OD-42.aspx](https://www.iraq.cropscience.bayer.com/Products/Herbicides/Atlantis-OD-42.aspx)


8. Kovach, J., C. Petzoldt, J. Degnil and J.Tette. 1992. A method to measure the environmental impact of pesticides, IPM program, Cornell University, New York State Agricultural Experiment Station


