Available Online at EScience Press
Plant Protection
ISSN: 2617-1287 (Online), 2617-1279 (Print)
http://esciencepress.net/journals/PP

EFFICACY OF DIFFERENT WEEDICIDES AGAINST BROADLEAF WEEDS OF WHEAT IN SUGARCANE WHEAT CROPPING SYSTEM

Wali Muhammad[1], Abdul Hayee Abid[1], Muhammad Ashraf Ali[2], Muhammad Nasir[1], Quratulain Haneef[3]
[1] Pest Warning and Quality Control of Pesticides, Agriculture Department, Muzaffargarh, Punjab, Pakistan.
[2] Pest Warning and Quality Control of Pesticides, Agriculture Department, Rajanpur, Punjab, Pakistan.
[3] Pest Warning and Quality Control of Pesticides, Agriculture Department, Multan, Punjab, Pakistan.

ARTICLE INFO

Article history
Received: 14th March, 2021
Revised: 30th March, 2021
Accepted: 31st March, 2021

Keywords
Wheat Weeds
Weedicides
Weed Management
Cropping System

ABSTRACT

The present study was conducted in a farmer field of Tehsil Kot Addu, District Muzaffargarh to evaluate the efficacy of different weedicides available in the market against wheat sown in sugarcane field along with their cost benefit ratio. There were total six treatments including a check. Five weedicides including Aim, Logron, Atlantis, Affinity and Buctril-super were used at the doses of 20 g, 16 g, 160 ml+160 g, 800 g and 300 ml/acre respectively. The randomized complete block design was adopted with four replications of treatment. Results revealed that Atlantis resulted maximum (85%) weed population followed by the Affinity resulting 78% weed population reduction. Maximum yield (5.05 tonne/Acre) was resulted from spray of Atlantis followed by use of Atlantis i.e. 4.43 Tonne/Acre. Atlantis also resulted maximum cost benefit ratio i.e.5.2 as compared with control and all other weedicides tested against wheat weeds.

Corresponding Author: Wali Muhammad
Email: walientomologist@gmail.com

INTRODUCTION

An important member of plants family "Poaceae", wheat (*Triticum aestivum*) is well known cereal crop of the world and known as staple food for 1/3 of the world's population including Pakistan. In Pakistan, it is grown on large scale in rainfed and irrigated areas resulting about 21 million tons annual production (Malik et al., 2009). Mostly wheat is consumed for daily routine chapatti, biscuit, bread, cakes, noodles, and pasta. Livestock sector is also dependent on wheat straw as alternative of green fodder and wanda along with some other uses in paper industry and domestic needs (Hameed et al., 2019).

In Pakistan, wheat yield is very low than estimated potential of approved varieties. There are many factors affecting the yield, but weeds are considered most detrimental pest of wheat crop which are continuously persisting in wheat fields (Riaz et al., 2009). Weeds are responsible for lower wheat yield due to competition for air, space, water and other necessary nutrients required for wheat causing about 40% grain yield and deteriorating the food and feed stuff for both humans and animals (Arnon, 1972; Khalil et al., 2008; Oad et al., 2007). Yield losses due to weeds vary depending upon weed population, weed species and their intensity to growth. Weeds are also responsible for aesthetic loss along with quality and quantity loss of wheat (Ashiq et al., 2003).

Weeds are characterized on the bases of their leave venation and number of cotyledons. Some weeds are called narrow leaf weeds and mostly are monocots.

While some weeds are shady, and dicots called as broadleaf weeds (Khalil et al., 2008). *Cirsium arvense* (Leh), *Carthamus oxyacantha* (Pohli), *Medicago polymorpha* (Maina), *Rumex dentatus* (Jangli Palak), *Anagallis arvensis* (Billi Booti), *Melilotus indica* (Senji), *Convolvulus arvensis* (Lehli) and *Chenopodium album* (Bathu) are important weeds of wheat crop reported from the irrigated areas of Punjab, Pakistan (Ahmad et al., 1993; Ashiq et al., 2003).

Weed management in wheat crop is carried out through different means i.e. manual weeding, mechanical weeding, allelopathy, biological and chemical weed control. These weed control methods are affective based on time and intensity of application. Among all these methods chemical control is the most effective, economical, and quick responding as compared to others (Bibi et al., 2008; Marwat et al., 2008).

The present study was, therefore, designed to evaluate the efficacy of different weedicides of wheat in the agroecological zone of Muzaffargarh in sugarcane wheat cropping system. The data were also used for the estimation of cost benefit ratio resulted after spray of different weedicides.

MATERIALS AND METHODS

A wheat field sown after harvesting of sugarcane crop was selected with heavy weed infestation in Bait Easan Wala, Tehsil Kot Addu, District Muzaffargarh after 1st irrigation (30 days of sowing). The field was measured using mearing tape, divided into 24 subplots each with dimensions of 6 meter × 4 meter. These subplots were allotted with random treatments using balloting method and knapsack hand sprayer was calibrated for water use estimation. There were total six treatments including a check as shown in Table 1.

Table 1: Treatments used against wheat weeds in sugarcane wheat cropping system.

Treatment	Name of Weedicide	Dose/Acre	Dose/Plot
T_1	Check	00	00
T_2	Aim	20 g	0.91 g
T_3	Logron	16 g	0.73 g
T_4	Atlantis	160 ml+160 g	7.34 ml+7.34 g
T_5	Affinity	800 g	36.8 g
T_6	Buctril-super	300 ml	13.8 ml

Pretreatment weed population was recorded from 1 meter square area of each sub plot. Weedicides were sprayed on 27-12-2020. Post treatment weed population was recorded after 10 days of treatment and percent reduction was calculated using pretreatment data. Mature crop was harvested from 1 meter square area of each subplot and manually threshed. The grain yield was recoded after harvesting of matured crop and cost benefit ratio was calculated through using the methodology of Amoabeng et al. (2014). Percent reduction of weed population was calculated as described by Yadav et al. (2017).

$$\text{Increase over control} = \frac{(T - C)}{C} \times 100$$

Where, T = Treated and C = Control

Data regarding basic production units like number of tillers per meter square and number of grains/spike were also recorded at the time of harvesting (15-4-2021) using the one meter square quadrate.

RESULTS AND DISCUSSION

Effects of weedicides on percentage weed reduction

Table 2 shows weeds population before treatment and after treatment in different treatments after using weedicides for weed control. The maximum weed control was attained from the spray of Affinity against weeds of wheat in sugarcane-wheat cropping system. Minimum weed control was recorded in plots where Aim and Logron were applied.

Effect of weedicides on production units

Table 3 shows the effect of different weedicides on production units of wheat crops. Results revealed that Atlantis was the best weedicide which resulted in maximum number of tillers/m^2 (261) followed by Affinity (257) as compared with minimum tillers in check plot i.e. 212 only. The Maximum thousand grain weight was obtained from Atlantis plot (44 grams) followed by Logron and Affinity (41grams) and minimum thousand grain weight was resulted from check plot i.e. 33 grams.

Logron has resulted in maximum number of grains/spike (45) followed by Atlantis (44) while check plot resulted in minimum grains/spike i.e. 25 grains/spike as shown in Table 3.

Table 2: Effect of weedicide sprays on weed population/m^2 in wheat crop.

Treatment	Before Treatment	After Treatment	% Reduction
Check	44	54	0
Aim	47	25	54
Logron	43	25	54
Atlantis	45	12	78
Affinity	49	8	85
Buctril-super	43	16	70

Table 3: Effect of weedicides on production units of wheat crop.

Treatment	1000 grain weight (gm)	Tillers/m^2	Grains/spike
Check	33	212	25
Aim	38	241	41
Logron	41	253	45
Atlantis	44	261	44
Affinity	41	257	42
Buctril-super	40	249	43

Effect of weedicides on grain yield

Weedicides had positive effect on grain yield. Grain yield increased to the maximum (5 tons) where Atlantis was applied followed by the Logron plot with 4 tons of production. The minimum production was observed in check plot where weeds had detrimental effect on wheat production as shown in Figure 1.

Cost benefit ratio

Weedicides resulted in overall positive effect on cost benefit ratio as shown in Table 4. Highest cost benefit ratio (1:5.2) was estimated from the plot where Atlantis was sprayed followed by that (1:4.8) where Logron was applied. The minimum cost benefit ratio (1:1.8) was observed in the check plot. The use of weedicides had been found beneficial for the farmers in terms of economical return as shown in Table 4. The similar findings were also reported by Abbas (2007) and Bibi et al. (2008) revealing that the use of weedicides had positive effect on 1000 grains weight and ultimately on economic benefits of the farmer as shown in Table 4.

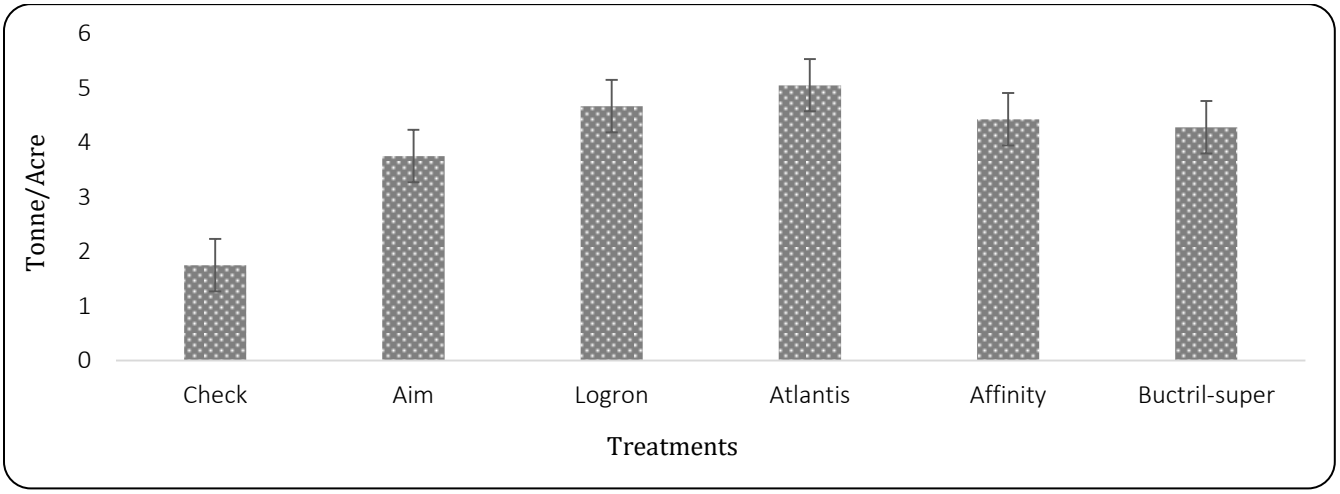

Figure 1: Effect of weedicides on grain yield of wheat.

Table 4: Cost benefit ratio resulted from the application of different weedicides.

Treatment	Cost benefit ratio
Check	1: 1.8
Aim	1: 3.9
Logron	1: 4.8
Atlantis	1: 5.2
Affinity	1: 4.6
Buctril-super	1: 4.4

However, of all the tested weedicides, the treatment with Atlantis gave the best results in terms of cost benefit ratio. Hameed et al. (2019) had also observed the similar results after applying different post emergence weedicides in wheat crop i.e. the highest weeds reduction was resulted by Buctril-super as shown in this trial which was recorded up to 70%. However, grain yield was different from the present study because the trial was conducted in rain-fed areas while the present research was conducted irrigated area. The results are also in agreement with the studies conducted by Zahoor et al. (2012) and Amare et al. (2014) revealing that Buctril-super was effective among the tested weedicides in wheat as post emergence weed killer.

CONCLUSION

In the present study, successful weed control in wheat crop was attained with Atlantis as weedicide spray. However, it has initial stress on crop, but positive effects were observed on production units resulting in higher population reduction (78%) of weeds, maximum yield (about 5 tons/acre) and the highest cost benefit ratio of 1:5.2.

AUTHORS' CONTRIBUTION

All the authors equally participated in designing the study, collecting data, identification of weeds, performing statistical analysis, writing and editing the manuscript.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

REFERENCES

Abbas, M., 2007. Effect of herbicide with and without urea on broad leave weeds and yield of wheat, Department of Agronomy. University of Agriculture, Faisalabad, Pakistan.

Ahmad, K., Shah, Z., Khan, I., Khan, M., Khan, M.Q., 1993. Effect of post-emergence herbicides application and hand weeding on wheat and weed pressure. Pakistan Journal of Weed Science Research 6, 40-45.

Amare, T., Sharma, J.J., Zewdie, K., 2014. Effect of weed control methods on weeds and wheat (*Triticum aestivum* L.) yield. World Journal of Agricultural Research 2, 124-128.

Amoabeng, B.W., Gurr, G.M., Gitau, C.W., Stevenson, P.C., 2014. Cost: benefit analysis of botanical insecticide use in cabbage: implications for smallholder farmers in developing countries. Crop Protection 57, 71-76.

Arnon, I., 1972. Crop production in dry regions. Leonard Hill, London.

Ashiq, M., Nayyar, M.M., Ahmad, J., 2003. Weed Control Handbook for Pakistan. Ayub Agriculture Researcg Institute, Faisalabad, Pakistan.

Bibi, S., Marwat, K.B., Hassan, G., Khan, N.M., 2008. Effect of herbicides and wheat population on control of weeds in wheat. Pakistan Journal of Weed Science Research 14, 111-119.

Hameed, Z., Malik, M.A., Safdar, A., Ansar, M., Shaheen, F., Ijaz, A., Kalim, K., 2019. Comparative efficiency of different post-emergence herbicides for controlling broadleaved weeds in rain-fed wheat. Pakistan Journal of Agricultural Research 32, 78.

Khalil, M.F., Hassan, G., Ahmad, G., Shah, N.H., 2008. Individual and combined effect of different herbicides on weed control in wheat. Pakistan Journal of Weed Science Research 14, 131-139.

Malik, A.U., Hussain, I., Ahmad, M., Haji, M.A., Ali, M., 2009. Demonstration and evaluation of effect of weedicides on broad leaved weeds on wheat yield. The Journal of Animal and Plant Sciences 19, 193-196.

Marwat, K.B., Saeed, M., Hussain, Z., Gul, B., Rashid, H., 2008. Study of various herbicides for weed control in wheat under irrigated conditions. Pakistan Journal of Weed Science Research 14, 1-8.

Oad, F.C., Siddiqui, M.H., Buriro, U.A., 2007. Growth and yield losses in wheat due to different weed densities. Asian Journal of Plant Sciences 6, 173-176.

Riaz, T., Khan, S.N., Javaid, A., 2009. Weed flora of Gladiolus fields in district Kasur, Pakistan. The Journal of Animal and Plant Science 19, 144-148.

Yadav, A., Sachan, S.K., Kumar, A., 2017. Evaluation of some integrated pest management modules against shoot and fruit borer (*Leucinodes orbonalis guenee*) in brinjal (*Solanum melongena* L.). Plant Archives 17, 457-462.

Zahoor, F., Malik, M.A., Mehmood, K., Rasheed, M., Ansar, R., Hussain, M., Kazmi, M.H., Jamil, M., 2012. Optimizing herbicide use in wheat (*Triticum aestivum*) under rain-fed conditions. African Journal of Agricultural Research 7, 4858-4866.