

Productivity of Wheat (*Triticum aestivum* L.) as affected by low dose herbicides for management of canary grass (*Phalaris minor*) Seeds

¹Sandeep Kumar, ²Vikrant, ³Vivek, ⁴Savita Tomar & ⁵Mukesh Kumar

^{1,2 & 5}Dept. of Agronomy, R.M.P. (P.G) College Gurukul Narsan (Haridwar) U.K.-247670

³Associate Professor, Dept. of Agronomy, Narain College, Shikohabad, Distt. Firozabad (U.P.)

⁴Assistant Professor, Dept. of Agronomy, J.V. College Baraut, Baghpat (U.P.)

ARTICLE DETAILS

Article History

Received: 30 May 2017

Accepted: 15 June 2017

Published Online: 15 July 2017

Keywords

Wheat, *Phalaris minor*, Seeds

ABSTRACT

A field experiment was conducted at R.M.P. (PG) College Gurukul Narsan (Haridwar) U.K. during Rabi of 2015-16 & 2016-17 to study the effect of continuous and rotational use of fenoxapop, sulfosulfuron and clodinafop on control of *Phalaris Minor* and Productivity of Wheat. Application of all the 3 herbicides resulted in 35-50 % increase in Wheat yield over weedy plots chesing first year of application. With continued application of these herbicides the increase in yield remained 23-27 % in sulfosulfuron-sprayed plots, 12-23 % in fenoxaprop-sprayed plots ceived rotational treatment of herbicides. Mortaility declined from 85-100 % and 10 % with fenoxaprop and 30-40 % with sulfosulfuron.

Rice-Wheat is an important cropping system in India comprising 10 mha. In India since 1970s isoproturon- a phenylurea herbicide and an intibitor of PS II in photosynthesis provided effective control of grassy weeds especially *Phalaris Minor* in Wheat maintaining yields. Its continuous use has resulted in the evolution of resistance in *Phalaris Minor* to this herbicided in Haryana and Punjab (Malik and Singh, 1995; Yaduraju et. al. 1995; Walia et.al., 1997). The resistance affected area range between 0.8 and 1.0 mha in north western India which is on the increase. Since weed populations resistant to one category of herbicides are know to be managed by herbicides with alternate mode of action, three alternate herbicides, viz. fenoxaprop-p-ethyl, clodinafop-propargyl and sulfosulfuron were recommended for management of herbicide- resistant populations of *Phalaris Minor* in 1997-98. While fenoxaprop and clodinafop are inhibitors of acetyl co onzyme-a- carboxylase (AC case), the first enzyme in fatty acid synthesis path, sulfosufuron is an inhibitor of acetolaclate the first enzyme.

Material and Methods

A permanent herbicidal trial was conducted R.M.P. (PG) College Gurukul Narsan (Haridwar) farm during 2015-16 & 2016-17 Wheat PBW550 was sown in November each year. *Phalaris Minor* population was reported to be resistant to isoproturon in the area. The soil was clay loam in texture pH 7.6, low in organic carbon 0.30 % available phosphors 12 kg/ha and postasium 240 kg/ha. Recomnded dose of fertilizers 120-60-60 N.P.K. kg/ha applied to all the treatments. Sulfosulfuron (25 g/ha), fenoxaprop (120 g/ha) and clodinafop (60 g/ha), a replicate treatment and a weedy check. A single plot of 20 m × 60m was kept for each treatment. The same herbicide was sprayed in the some plot continuously for investigation. Weedy plots were maintain as such over the years. The sequence of herbicides in rotational treatment has been clodinafop for 1 year sulfosulfuron in the second year fenoxaprop treatments were reported in the same order. All herbicides applied by knopsack sprayer using flat nozzle 500 litre/ha at 2-3 leaf stage. Observation for *Phalaris Minor* density/m² were recorded. Each plot was divided in to 4 Slab-plots for the purpose of creating replication for recording yield

date at the time of harvest. The data was analyzed statistically by employing a three factor analysis of variance in a R.B.D.

Phalaris Minor seed collected from different plots sprayed continuously observations were recorded 30 days after spray. Fresh weight of 5 plant/treatment was recorded 30 days of the spray.

Result and Discussion

Weed flora-

Phalaris Minor constituted about 49 % of the total weed flora a the start of the investigation. The other predominant weed were 9 % *Rumex maritimus* 7 % *chenopodium albu*, 5 % *cornopus didymus* 8% *Anagallis arvensis* 3 % *Medicago denticulate* constituted rest of the weed flora. The weed spectrum however, changed with herbicide sprays when *Phalaris Minro* was constrolled by the new herbicides.

Shift in *Phalaris Minor*

The density on the use of all the three herbicides irrespective of the site (Table 1). The decline continued till 2015-16 in sulfosufuron and fenoxaprop and till 2016-17 in clodinafop and rotational treatment after which it started to increase. The increase in significantly more in 2016-17 than the previous year. A similar increase in the density of this weed under rotational treatment of herbicides and clodinafop sprayed plots was observed 2016-17 over the previous year. The values were higher than the mean values in fenoxaprop sprayed plots at both the sites in 2015-16 and in 2016-17 and also in clodinafop sprayed in 2016-17 at the sites. An initial decline in weed density in sulfosufuron and fenoxaprop sprayed plots and upto 2015-16 in clodinafop sprayed plot and in plots receiving rotation treatment of herbicides is indicative of the good efficiency of these herbicides against the weed. A continuous decline in the density of this weed in weedy plots was also observed till 2015-16 and was 60 % of the mean density over the years. The increase in weed density even in plots receiving rotational treatment effective because the mode

of evolution of resistance in this weed metabolic detoxification of herbicides.

Wheat Yield

The grain yield in herbicide treated plot in 2015-16 was 35-56 % higher (5-6 t/ha) as compared to weedy plots (3 t/ha). This yield however, declined over the years. It remained only 12.28 % higher in 216-17 except for plots sprayed with clodinafop was still 35% higher (Table 2). The yield in fenoxaprop sprayed plots at lesser than mean value. While interaction effect of herbicide and year on Wheat yield was significant. The decline in yield could possibly be due to the facts that (i) there may be an increased competition provided by the broad leaved weeds that start to emerge and provide competition after the management of *Phalaris Minor* (ii) selection of *Phalaris Minor* population insensitive of the herbicides used and competition provided by those while and increased competition of a broad leaved weed *Rumex spinosus* has been reported after the management of *Phalaris Minor* (Sidhu et. al. 2000).

Table:-1 Density of *Phalaris Minor* (No./m²) as affected by herbicide sprays continuously in the plots.

Treatments	2015-16	2016-17	Mean (Herbicide)
Sulfosulfuron	35	57	46.0
Fenoxaprop	58	109	83.5
Clodinafop	16	37	26.5
Rotational	20	81	50.5
Weedy	122	131	126.5
CD (P=0.05)	-	15.9	-

Table:-2 Grain yield of Wheat (t/ha) as affected by herbicide sprays of continuously in the plot

Treatments	2015-16	2016-17	Mean (Herbicide)
Sulfosulfuron	4.2	3.8	4.0
Fenoxaprop	3.8	3.3	3.5
Clodinafop	4.2	4.1	4.1
Rotational	4.3	3.8	4.0
Weedy	3.1	2.7	2.9
CD (P=0.05)	NS	-	-

REFERENCES

1. Malik, R.K. and Singh S. 1995. Little seed canarygrass (*P.minor*) resistance to isoproturon in India. *Weed Technology* 9:419-425.
2. Sidhu, D, Walia, U.S. and Brar, L.S. 2000. Herbicidal control of *Rumex spinosus* (Kandiali Palak) in Wheat (*Triticum aestivum L.*). *Indian Journal of Weed Science*. 32:156-159.
3. Walia, U.S., Brar, L.S. and Dhaliwal, B.K. 1997. Resistance to isoproturon in *Phalaris Minor*. *Retz in Punjab. Plant Protection Quarterly* 12:138-140.
4. Yaduraju, N.T., Ahuja. K.N. and Bansal K.C. 1995. *Phalaris minor* resistance to isoproturon In: Abstracts, Biennial conference of Indian Society of Weed Science, Annamalai University, Tamil Nadu. India pp 124.