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EFFECT OF WEED CONTROL CULTURAL PRACTICES ON *PHALARIS MINOR* AND OTHER WEEDS IN WHEAT FIELD.

SANJEEV KUMAR AND ABHA AGARWAL
Department of Botany, Bareilly College.
Bareilly 243 005 (U.P.) INDIA

Ten weed species were observed at experimental site of wheat in Kargaina village, Bareilly U.P. to study the effect of weed control cultural practices on *Phalaris minor* and other weeds in wheat field. Experimental field was infested with 52.13% *Phalaris minor.* Results indicated that cultural treatment of two hand-weeding (30 & 60 DAS) proved to be superior to the rest of the treatments. Close row spacing (15cm) and higher seed rate (125kg/ha) treatments resulted in less population and dry weight of *Phalaris minor* and other weeds as compared to stale seed bed preparation treatment. Early sowing treatment has not been very effective in reducing the population and dry weight of *Phalaris minor* and other weeds in comparison to other cultural treatments. Maximum dry weight of crop was recorded under two hand-weeding (1.305kg/m^2) treatments as compared to higher seed rate (1.164kg/m^2), close row spacing (1.158kg/m^2) and stale seed bed preparation (1.112 kg/m^2) treatments. Weed control cultural practices indicate that better control of *Phalaris minor* and other weeds can give higher wheat yields and economic returns.

Keywords : *Phalaris minor*, weed, wheat, Weed control cultural practices.

Wheat is one of the most important food grain crop grown in Uttar Pradesh during the rabi season. Wheat crop gets infested with heavy population of *Phalaris minor* and other weeds like *Avena fatua, Cynodon dactylon, Chenopodium album, Melilotus indica, Lathyrus aphaca, Vicia hirsuta, Fumaria parviflora, Anagallis arvensis, Medicago denticulata,* etc. Weeds are unwanted and undesirable plants that interfere with the utilization of land and water resources and this adversely affects crop production and human welfare. Weeds being well adopted, highly competitive with crop plants, interfere with agriculture operation and ultimately reduce the economic produce. Weed infestation during the crop period causes more than 53% reduction in grain yield, depending on the weed densities and type of weed flora present (Singh *et al*. 2002), which necessitates an immediate attention for their control. *Phalaris minor* is an annual grass weed and with the development of resistance against isoproturon (Malik and Singh 1993), it has emerged as the most problematic weed causing yield stagnation of wheat, during last few years. Yield losses especially with the infestations of *Phalaris minor* alone are estimated from 25-50% and under very severe infestation the losses may go upto 80% and even more (Malik *et al*. 1996). The management of this weed has now become a major concern, so as to sustain wheat productivity. *Phalaris minor* and other weeds can also be expensive to control with herbicides and thus farmers need effective weed control cultural practices that enhance crop competitiveness and result in better control of *Phalaris minor* and other weeds. Cultural practices need to be manipulated in such a way that they become more favourable for crop growth and less to weeds. They need to be not only eco-friendly but also be cost effective reducing the use of costly labour and chemicals. The cultural practices of weed control might become effective in reducing the crop weed competition and to maintain the production and productivity of wheat. Keeping these points in view the present investigation was planned to study the effect of weed control cultural practices on *Phalaris minor* and other weeds in wheat field.

MATERIALS AND METHODS

Field investigations were carried out during winter season of 2005-06 at Kargaina village in Bareilly district (U.P.). The soil of the experimental field was sandy clay loam in texture (37.2% sand, 42.4% silt and 20.4%

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clay), medium in available nitrogen (240kg/ha) medium in available phosphorus (16.45kg/ha) and rich in available potash (201kg/ha) with 0.60% organic carbon content. Wheat cultivar PBW 343 was sown on 25 November 2005 with row spacing of 20 cm using 100 kg seeds/ha. Six weed control cultural treatments replicated three times were laid out in a randomized block design. Wheat crop was fertilized with recommended dose of nitrogen, phosphorus and potash (120:60:40). Weed control cultural treatments applied, were stale seed bed preparation, close row spacing (15cm), higher seed rate (125kg/ha). Early sowing (01 Nov.) two hand -weeding (30 & 60 DAS) and weedy (control). The plot experiment size was 3x2 metre square. Stale seed bed preparation was achieved by giving light irrigation 15 days before sowing and the emerged weeds were removed by hand weeding method. The data of weed population and weed dry weight of *Phalaris minor* and other weeds were recorded at 120 days after sowing of the wheat crop with the help of a 50x50 cm quadrate. *Phalaris minor* plant height and number of tillers/plant were also recorded at 120 DAS. Observations on wheat plant height (cm), number of tillers/plant, number of grains/spike, 1000 grain weight (g), crop dry weight (kg) and grain yield (kg/ha) were recorded at the time of harvest.

RESULTS AND DISCUSSION

Phalaris minor was the major weed in experimental field. Other weeds observed were *Avena fatua, Cynodon dactylon, Chenopodium album, Melilotus indica, Lathyrus aphaca, Vicia hirsuta, Fumaria parviflora, Anagallis arvensis, Medicago denticulata and Coronopus didymus,* etc.

Effect on *Phalaris minor* and other weeds

Phalaris minor (52.13%) was the major weed in wheat field. *Phalaris minor* plant height and number of tillers/plant were reduced significantly in the treatment of two hand weedings (30 & 60 DAS) and in close row spacing of 15cm plots as compared to other cultural treatments and weedy. Stale seed bed preparation, higher seed rate and early sowing cultural treatments were not very effective in reducing the plant height and number of tillers/plant of *Phalaris minor* in wheat field than two hand weeding treatment.

The weed control cultural practices had noticeable influence on plant population of *Phalaris minor* and other weeds. Two hand weedings reduced significantly plant population of *Phalaris minor* (94.57%) and other weeds (84.44%). Significantly, lower plant population of *Phalaris minor* and other weeds were recorded in close row spacing and higher seed rate treatments. Stale seed bed preparation and early sowing treatments also affected in reducing the plant population of *Phalaris minor* and other weed as compared to weedy (control). *Phalaris minor* and other weeds population was significantly lower in all the cultural treatments than weedy.

Phalaris minor and other weeds dry weight reduced significantly by different cultural treatments than deweeding. Minimum dry weight of *Phalaris minor* and other weeds were recorded in two hand-weeded plots (1.68 and 4.34g/m^2, respectively) followed by close row spacing (27.48 and 27.56g/m^2), higher seed rate (31.03 and 26.19g/m^2), stale seed bed preparation (52.07 and 36.82g/m^2) and early sowing (72.98 and 45.87g/m^2) treatments. *Phalaris minor* population and weed dry matter reduced significantly in the treatment of two hand weeding (Kumar *et al.* 2006). The early sowing of 01 Nov. treatment was not very effective in reducing the infestation of *Phalaris minor* and other weeds as compared to other cultural treatments. All the weed control cultural practices reduced population and dry weight of weeds significantly as compared to weedy (control).

Effect on crop

All the weed control cultural practices resulted in significant improvement in crop growth characters, yield attributes and yields of wheat than weed. Hand weeding at 30 and 60 days after sowing provided weed free environment for better crop growth and increased the grain yield

Table 1: Effect of weed control cultural practices on various morphological attributes of *Phalaris minor* and other weeds.

Treatment	Plant height (cm)	Number of tillers/ plant	Weed population (number of plants/m^2)		Weed dry weight (g/m^2)	
			Phalaris minor	Other weeds	*Phalaris minor*	Other weeds
Stale seed bed preparation	81.86	3.13	37.66	27.34	52.07	36.82
Close row spacing (15cm)	78.06	2.90	23.00	21.66	27.48	27.56
Higher seed rate (125 kg/h)	80.90	3.20	24.66	20.34	31.03	26.19
Early sowing (1 Nov.)	84.46	3.66	46.66	32.67	72.98	45.87
Two hand weeding (30 & 60 DAS)	54.20	0.73	2.66	7.00	1.68	4.34
Weedy (Control)	91.30	4.06	49.00	45.00	85.76	89.72
S.Em $\pm$	1.54	0.31	5.32	4.81	4.25	3.79
C.D. at 5%	4.85	0.92	16.01	17.43	13.39	11.96

Table 2: Effect of weed control cultural practices on various morphological attributes and grain yield of wheat**.**

Treatment	Plant height (cm)	Number of tillers/ plant	Spike length (cm)	Number of grains/spike	1000 grain weight (g)	Crop dry weight (kg/m^2)	Grain yield (kg/ha)
Stale seed bed preparation	90.76	3.83	9.65	40.36	37.30	1.112	3722
Close row spacing (15cm)	92.03	4.36	10.26	41.30	40.12	1.158	3989
Higher seed rate (125 kg/h)	91.56	4.30	10.19	41.23	40.35	1.164	4022
Early sowing (1 Nov.)	90.28	3.36	9.54	39.36	34.90	1.071	3575
Two hand weeding (30 & 60 DAS)	95.00	5.00	10.46	46.90	44.62	1.305	5268
Weedy (Control)	88.40	3.13	9.13	36.60	32.85	1.070	3471
S.E.m $\pm$	0.93	0.45	0.26	1.51	1.31	4.24	232
C.D. at 5%	2.95	1.44	0.83	4.52	4.13	13.36	731

DAS = Days after sowing

of wheat. The highest plant height, number of tillers/plant, spike length, number of grains/spike, 1000 grain weight (g), crop dry weight (1.305kg/m^2) and grain yield (5268 kg/ha) were recorded under two hand weeding (30 & 60 DAS) treatment due to lesser weed competition and lowest production of weed dry weight. The number of spikes, spike length, number of grains/spike and 1000 grain weight were influenced significantly being highest in two hand weedings (Singh and Ali 2004). Weedy check had recorded significantly lowest yield attributes and crop dry weight (1.070kg/m^2) due to the higher infestation of *Phalaris minor* and other weeds. Weed competition in weedy plots caused more than 18.01% reduction in the crop dry weight of wheat. Weed competition resulted in significant

decrease in wheat plant height, productive tillers/m row length, grains/panicle and 1000 grain weight and lowered crop yield by 27.2% (Pandey and Verma 2002).

Close row spacing of 15cm and higher seed rate of 125kg/ha treatments significantly increased the plant height, number of tillers/plant, spike length, number of grains/ spike, 1000 grain weight (g), crop dry weight and grain yield of wheat as compared to stale seed bed preparation and early sowing treatments. Plant density and row spacing influence weed incidence. A narrow (15cm) spacing was superior to wide (30 and 45cm) spacing in minimizing weed competition and increasing productive tillers and yield (Bhan 1968). The higher crop dry weight (1.164 kg/m^2) and grain yield of wheat (4022kg/ha) were recorded with higher seed rate treatment followed by close row spacing, stale seed bed and early sowing treatment. The number of tillers increased significantly with corresponding increase in the seed rate from 100 to 125 and 125 to 150 kg/ha reported by Singh *et al.* (2002). Early sowing treatment was not very effective in increasing the crop dry weight and grain yield of wheat as compared to other cultural treatments. The crop weed competition decreased under different cultural practices as compared to weedy (control) due to control of *Phalaris minor* and other weeds resulting in better crop growth, yield attributes, crop dry weight and grain yield of wheat. Presence of weeds throughout the growth period reduced the grain yield by 34.11%.

CONCLUSION

From the study it could be concluded that two hand weedings (30 and 60 DAS), higher seed rate (125Kg/ha) and close row spacing (15cm) treatments are good methods of controlling the *Phalaris minor* and other weeds; and increased the grain yield of wheat significantly.

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