Journal of the Kalash Science, Special Volume, 2013 : 89-92 ISSN : 2321-7634

Effect of sowing times and weed contol measures on weed species and grain yield of wheat

A. K. Singh
Department of Agronomy, T. D. P. G. College, Jaunpur (U.P.)

Abstract

A field experiment was conducted during rabi seasons of 1996-97 and 1997-98 revealed lower density of *Coronopus didymus, Melilotus indica* and *Polygonum plebejum* in late sown crop, whereas density *of Phalaris minor* remained statistically same when compared with timely sown crop. Application of tralkoxydim at 0.40 and 0.50 kg ha^{-1} resulted compete control *of P. minor* but other dominant weed remain uncontrolled, whereas various rates of pendimethalin resulted significant reduction of all weed species as compared to weedy check. Timely sown crop recorded higher total weed density, total weed dry weight and grain yield of crop than late sown crop. All the rate of pendimethalin and tralkoxydim at 0.4 and 0.5 kg ha^{-1} reduced total weed density and weed dry weight which lead higher grain yield as compared to weedy check. Statistically similar grain yield was recorded in pendimethalin at 1.00 and 1.25 kg ha^{-1} treated plot when compared with weed-free condition.

Keyword: wheat, weed contol, ghrain yield, isoproturon

Introduction

In general, isoproturon is used at commercial scale to control grassy as well as some non-grassy weeds in wheat *crop.* Continuous use of isoproturon has shown a trend to the dominance of *Avena spp* and resistance of *Phalaris minor* against isoproturon (Malik *et al.* 1995) during recent years make a challenge for researcher to give a herbicide which can be used at commercial scale, as a substitute of isoproturon in wheat crop. Sowing time plays an important role not only in obtaining good yields but also influence weed intensity and their growth (Singh *et al.* 1997). Considering, these points in mind, the present experiment was planned and conducted.

Materials and methods

A field experiment was carried out at Crop Research Center of G.B. Pant University of Agriculture & Technology Pantnagar during winter season of 1996-97 and 1997-98. The experiment was laid out in split plot design with two sowing time (timely sown 20-Nov. and late sown 20 Dec) as main plots and eight weed control treatments as sub-plots with four replications (Table-1). The experimental plot had silty loam soil which is high in organic carbon (1.06 %) and available phosphorus (27.76 kg ha^{-1}) and medium in available potassium (138.85 kg ha^{-1}) with a pH of 7.15. Wheat cv. UP-2338 was sown at 100 kg seed/ha in rows 20 cm apart, crop was fertilized at 120 kg N, 60 kg P_2O_5 and 40 kg K_2O ha^{-1}. The field was infested with natural population of weeds. Herbicides were applied with knapsack sprayer using 650 litre water ha^{-1}.

Results and Discussion

Important weed species recorded in experimental field were *Phalaris minor* Retz. *Cornopus didymus* L. (Sm.), *Melilotus indica* All and *Polygonum plebejum* (Roth) Hook. besides other associated weeds viz, *Anagallis arvensis* L., *Chenopodium album L., Lathyrus aphaca* L., *Rumex acetosella* L., *Spergula arvensis* L., *Vicia sativa* L., *Avena ludoviciana,* Durien., *Cynodon dactylon* (L.) Pers., *Polypogon monspeliensis and Cyperus rotundus.*

The population of P. *minor* at 90 days stage did not vary due to sowing time, whereas, population of *C. didymus, M. indica* and *P. plebejum* were significantly higher in timely sown crop as compared to late sown crop during both the year (Table 1). The emergence of *P.*

minor has been reported to be maximum in December planting, whereas field preparation during late sowing in December has destroyed first flush of *P. minor,* therefore no significant difference was found in density of *P. minor* in both sowing time (Yaduraju & Ahuja 1997). On the other hand density of non-grassy weeds were significantly less in late sown crop as compared to timely sown crop during both the years, it may be due to destroy of first flush weeds during field preparation of late sown crop.

Pendimethalin, at all, the rates resulted into significantly less density of weeds as compared to weedy check during both the years at 90 days stage of crop growth (Table 1). Reduction in density of C. *didymus, M. indica* and *P. plebejum* were comparatively higher than *P. minor* when compared with corresponding weedy check by application of pendimethalin. In general, pendimethalin at 1.00 and 1.25 kg ha^{-1} has caused complete control of non-grassy weeds, whereas significant reduction of *P. minor* was noticed when compared with weedy check and pendimcthalin at 0.75 kg ha^{-1} during both the years (Table 1).

Table 1 Population of dominant weed species as influenced by sowing time and weed control measures at 90 days after sowing

Treatment	Dose kg ha^{-1}	Population of dominant weed species (No. m^{-2})							
		Phalaris minor		*Coronopus didymus*		*Melilotus indica*		*Polygonum plebejum*	
		1997	1998	1997	1998	1997	1998	1997	1998
Sowing Time									
Timely sown		18.8(1.68)	22.4(1.96)	39.3(2.25)	42.4(2.34)	17.4(1.76)	16.1(1.74)	14.8(1.67)	11.4(1.56)
Late sown		16.3(1.52)	19.0(1.87)	23.1(1.91)	27.1(1.99)	11.9(1.63)	9.4(4.48)	3.3(0.97)	4.5(1.12)
SEm±		0.041	0.053	0.014	0.061	0.021	0.039	0.05	0.054
CD at 5%		NS	NS	0.062	0.27	0.09	0.17	0.22	0.24
Weed control									
Pendimethalin	0.75	30.0 (3.40)	48.5(3.89)	1.0(0.38)	0.5(0.25)	0.5(0.20)	0(0)	0(0)	0(0)
Pendimethalin	1.00	3.5(1.31)	6.0(1.87)	0(0)	0.5(0.27)	0(0)	0(0)	0(0)	0(0)
Pendimethalin	1.25	1.5(0.74)	5.0(1.63)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)
Tralkoxydim	.30	17.5(2.89)	25.5(3.26)	62.5(4.10)	68.5(4.20)	28.0(3.30)	25.5(3.24)	16.0(2.64)	15.5(2.70)
Tralkoxydim	0.40	0(0)	0.5(0.27)	62.0(4.07)	70.0(4.21)	31.5(3.41)	25.0(3.20)	17.5(2.57)	15.5(2.62)
Tralkoxydim	0.50	0(0)	0(0)	59.5(4.02)	68.5(4.18)	26.0(3.19)	25.0(3.19)	18.5(2.77)	15.5(2.66)
Weedy		87.5(4.46)	80.0(4.37)	64.5(4.07)	70.0(4.24)	31.0(3.44)	26.5(3.26)	18.5(2.57)	17.0(2.74)
Weed-free		0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)
SEm±		0.13	0.129	0.125	0.091	0.103	0.052	0.089	0.094
CD at 5%		0.37	0.37	0.36	0.26	0.29	0.15	0.25	0.27

DAS – Days after sowing Figures in parentheses are transformed value.

Tralkoxydim did not influence non-grassy weeds. Density of *P. minor* was significantly reduced by application, of tralkoxydim when compared with weedy check. Tralkoxydim @ 0.40 and 0.50 kg ha^{-1} was resulted into complete control of *P. minor* at 90 days stage of crop growth during both the years, except during 1998 with Tralkoxydim at 0.40 kg ha^{-1} (Table 1). Similar results were also reported by Kumar *et al.* (1997).

Less weed density and dry matter per unit area was recorded in late sown crop as compared to timely sown crop (Table 2). It is due to less density of dominant non-grassy weeds in late sown crop than timely sown crop (Table 1). The grain yield of wheat crop was significantly more in timely sown crop while, weed density and dry weight were also higher in timely sown crop as compared to late sown crop. It indicates that yield of wheat crop is not affected by weeds only but it

is interaction of different resources, environmental factors and management practices. The management practices and resources are similar in both sowing time while environmental factors were different at all stages of crop growth in timely and late sown crop. This may be reason for higher production of grain yield in timely sown crop as compared to late sown crop during both the years. Weed index is the per cent ratio of yield reduced due to presence of weed and yield of weed-free plot. It was calculated on the basis of corresponding weed-free yield in different sowing time and yield of weed-free plot in timely and late sown crop were variable that is why calculated value of weed index were varying in 1997 and 1998 (Table 2). In both the years the weed control treatments lowered the total weed population and dry weight per unit area over weedy check, except tralkoxydim at 0.30 kg.ha^{-1} at 90 days stage of crop growth. Application of various rates of pendimethalin has resulted into significantly lower density and dry weight as compared to all rates of tralkoxydim (Table 2). It is due to control of grassy and non-grassy weeds by application of pendimethalin, whereas tralkoxydim check the growth of grassy weeds only. Kumar *et al.* (1997) also reported that traJkoxydhn has checked the growth of grassy weed but broad leaf weeds were remained unchecked in tralkoxydim treated plots. Pendimethalin at 1.00 and 1.25 kg ha^{-1} has recorded significantly lower weed population and dry weight as compared to other weed control treatment but they remained at par among themselves during 1998 at 90 days stage of crop growth (Table 2).

Table 2 Influence of sowing time and weed control measures on total weed population and weed dry weight and their effect on grain yield and weed index.

Treatment	Dose (kg ha^{-1})	Weed population (No. m^{-2}) 90 DAS		Weed dry weight (gm^{-2}) 90 DAS		Grain Yield (kg ha^{-1})		Weed Index (%)	
		1997	1998	1997	1998	1997	1998	1997	1998
Sowing Time									
Timely sown		113.8(3.51)	118.3(3.70)	108.9(3.52)	106.6(3.38)	4699	4905	18.19	17.7
Late sown		65.9(3.14)	72.5(3.38)	57.5(3.06)	61.0(3.28)	3796	3954	15.45	18.08
SEm±		0.05	0.035	0.06	0.037	105	65	-	-
CD at 5%		0.22	0.16	0.27	0.17	468	290	-	-
Weed Control									
Pendimethalin	0.75	40.0 (3.66)	50.5(3.91)	44.3(3.75)	59.1(4.06)	4387	4723	14.00	12.48
Pendimethalin	1.00	5.5(1.82)	8.5(2.20)	6.0(1.89)	8.8(2.22)	4940	5190	3.39	3.88
Pendimethalin	1.25	2.5(1.07)	6.5(1.99)	2.7(1.09)	7.0(2.04)	4948	5241	2.57	2.93
Tralkoxydim	0.30	153.5(4.99)	171.0(5.06)	143.9(4.90)	154.1(4.95)	3777	3843	25.82	28.68
Tralkoxydim	0.40	141.5(4.85)	147.5(4.91)	127.5(4.71)	119.7(4.69)	3990	4053	21.69	24.91
Tralkoxydim	0.50	137.5(4.85)	145.5(4.88)	120.6(4.68)	118.3(4.67)	3741	3670	26.63	32.13
Weedy		238.0(5.39)	233.5(5.38)	220.4(5.31)	203.2(5.23)	3048	3323	40.25	38.28
Weed-free		0(0)	0(0)	0(0)	0(0)	5115	5395	0	0
SEm±		0.143	0.118	0.148	0.12	180	171	-	-
CD at 5%		0.41	0.34	0.42	0.34	515	489	-	-

DAS – Days after sowing Figures in parentheses are transformed value.

Reduction in total weed population and dry weight by application of herbicide leads to significant higher production of economic yield as compared to weedy check. Various rates of pendimethalin has recorded relatively higher grain yield as compared to different rates of tralkoxydim (Table 2). The reason for higher production of pendimethalin treated plot than tralkoxydim treated plot was control of grassy as well as non-grassy weeds by pendimethalin. Pendimethalin at 1.25 kg ha^{-1} was recorded statistically similar grain yield as in case of

weed-free and pendimethalin at 1.00 kg ha^{-1} treated plot, whereas other weed control treatment has noticed significantly lower grain yield during both the years. Among the various rates of tralkoxydim, relatively higher grain yield was-recorded by tralkoxydim at 0.40 kg ha^{-1} because lower rate of tralkoxydim did not able to provide .complete control of grassy weed particularly *P. minor,* while higher rate of tralkoxydim suppressed the initial growth of the crop. Weed index indicate the losses of yield due to presence of weed at critical stages, therefore higher weed index was noticed in tralkoxydim treated plot as compared to pendimethalin during both the years. Tralkoxydim at 0.50 kg ha^{-1} resulted into more reduction of weed dry weight and weed density as compared to other rates of tralkoxydim (Table 2) but weed index was also higher because of phytotoxic effect of tralkoxydim on initial growth stage of crop.

References

Kumar, S., G. Singh, & Y.S. Shivay 1997. Performance of tralkooxydim and isoproturon for broad spectrum weed control and Wheat (*T. aestivum*) growth. *Indian J. Agronomy*, **42:** 471-478.

Maiik, R.K., S. Singh & S. Singh 1995. Little seed canary grass *(P.minor)* resistance to isoproturon in India. *Weed Technol.,* **9:** 419-425.

Singh, K., R.S. Malik, S. Kumar & R.S Panwar 1997. Effect of sowing dates and herbicides in controlling weeds in durum wheat. *Indian J. Weed Sci.,* **29:** 205-206.

Yaduraju, N.T. & K.N. Ahuja 1997. Grass weed competition in wheat in relation to its time of planting and weed emergence. *Indian J. Weed Sci*., **29:** 167-169.