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Research Article

Ready mix combination of pinoxaden and clodinafop for efficient control of grass weeds in wheat

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ABSTRACT

Ready mix combination of pinoxaden 2.53% + clodinafop- propargyl 2.53% (Traxos 5EC) was evaluated for the control of grass weeds in wheat. It was very effective in controlling *Phalaris minor* Retz. (Littleseed canarygrass) and *Avena ludoviciana* Dur. (Wild oat), but was ineffective for control of broad-leaf weeds. The optimum dose of Traxos 5EC (Pinoxaden 2.53% + clodinafop- propargyl 2.53%) for control of grass weeds was 50-60 g a.i. /ha The efficacy of Traxos 5EC at 50-60 g a.i./ha having the reduced doses of clodinafop and pinoxaden (25+25 to 30+30 g/ha) in controlling grass weeds in wheat was similar to the recommended rates of clodinafop 60 g/ha, pinoxaden 50 g/ha and fenoxaprop 120 g/ha. The wheat grain yield among these herbicides was similar and provided 83.0-100.9% higher grain yield compared to untreated weedy check.

Keywords: *Avena ludoviciana*, fenoxaprop, reduced herbicide rate, *Phalaris minor*

1. Introduction

Wheat (*Triticum aestivum* L) has been a staple food for a large population and its assured production is essential for national food security. Weed infestation is one of the major biotic factors, limiting wheat production and productivity. The losses caused by weeds depend on the weed type and their intensity (Afentouli and Eleftherohorinos, 1996; Balyan and Malik, 1989; Balyan *et al*., 1991; Walia and Brar, 2001). Wheat is generally infested with both grassy and broad-leaf weeds but grass weeds are of major concern. Among grass weeds, Littleseed canarygrass (*Phalaris minor* Retz.) and wild oat (*Avena ludoviciana* Dur.) are serious problems in irrigated wheat (Balyan *et al*., 1991, Singh *et al*., 1995). Littleseed canarygrass is mainly observed in rice-wheat system, whereas wild oat dominates irrigated and well drained light soils. Both the weeds are highly competitive and can cause yield reduction in the range of 15 to 100% in wheat (Afentouli and Eleftherohorinos, 1996; Balyan and Malik, 1989; Balyan *et al*., 1991; Chhokar and Malik 2002; Chhokar *et al*., 2008; Malik and Singh, 1995; Walia and Brar, 2001). Among various methods of weed management, chemical weed control in wheat is preferred due to cost and time effectiveness (Chhokar *et al*., 2012). For sustaining wheat productivity, effective weed control is a must. Thus the present study was undertaken with the objective to evaluate the bio-efficacy of Traxos 5EC (Pinoxaden 2.53% + clodinafop- propargyl 2.53%) against grass weeds in wheat.

2. Materials and methods

A field experiment for evaluation of bio-efficacy of Traxos 5EC (Pinoxaden 2.53% + clodinafop- propargyl 2.53%) at 40, 50 and 60 g a.i./ha along with a standard clodinafop at 60 g/ha, pinoxaden 50 g/ha, fenoxaprop 120 g/ha and untreated weedy check (Table 1) was conducted during the *Rabi* season of 2011-12 and 2012-13 at the research farm of the Indian Institute of Wheat and Barley Research, Karnal, Haryana, India. Wheat variety DPW 621-50 was sown on 12th and 26th November during *Rabi season* of 2011-12 and 2012-13, respectively, using a seed rate of 100 kg/ha at a row spacing of 20 cm. Fertilizer and irrigation applications were done according to recommended package of practice for wheat. Each weed control treatment was replicated thrice in randomized block design (RBD). The soil of the experimental field was clay loam with pH of 8.2 and organic carbon content 0.38%.

Table 1. Performance of Traxos 5EC (Pinoxaden 2.53%+clodinafop 2.53%) against grass weeds in wheat (Two years pooled data)

Weed control treatment	Dose/ha g a.i. (Product dose ml or g/ha)	Weeds population (No./m^2)			Weeds dry weight (g/m^2)			Weed Control Efficiency %		
		Littleseed canarygrass	Wild oat	Total grass weeds	Littleseed canarygrass	Wild oat	Total grass weeds	Littleseed canarygrass	Wild oat	Total grass weeds
Weedy Check	-	10.82 (117.3)*	3.99 (15.0)	11.51 (132.3)	14.06 (199.7)	14.39 (209.6)	20.24 (409.2)	--	---	--
Pinoxaden 2.53% + clodinafop 2.53% (Traxos 5EC)	40 (800)**	2.49 (5.3)	1.14 (0.3)	2.55 (5.7)	4.27 (17.9)	1.00 (0.0)	4.27 (17.9)	91.0	100.0	91.0
Pinoxaden 2.53% + clodinafop 2.53% (Traxos 5EC)	50 (1000)	1.41 (1.0)	1.00 (0.0)	1.41 (1.0)	1.07 (0.2)	1.00 (0.0)	1.07 (0.2)	99.9	100.0	99.9
Pinoxaden 2.53% + clodinafop 2.53% (Traxos 5EC)	60 (1200)	1.14 (0.3)	1.00 (0.0)	1.14 (0.3)	1.00 (0.0)	1.00 (0.0)	1.00 (0.0)	100.0	100.0	100.0
Pinoxaden (Axial 5.1 EC)	50 (1000)	1.14 (0.3)	1.00 (0.0)	1.14 (0.3)	1.60 (2.3)	1.00 (0.0)	1.60 (2.3)	98.9	100.0	98.9
Clodinafop propargyl (Topik 15 WP)	60 (400)	1.88 (2.8)	1.00 (0.0)	1.88 (2.8)	1.80 (2.9)	1.00 (0.0)	1.80 (2.9)	98.6	100.0	98.6
Fenoxaprop (Puma power 10 EC)	120 (1200)	3.37 (11.0)	1.00 (0.0)	3.37 (11.0)	6.35 (41.1)	1.00 (0.0)	6.35 (41.1)	79.4	100.0	79.4
CD at 0.05		1.29	0.27	1.23	2.09	1.55	1.64			

*Note: * Figures in the parentheses are the means of original values and statistical analysis done after square root transformation*

***Product doses of herbicides as ml or g/ha are given in parentheses*

Herbicides were applied at 39 and 43 days after sowing (DAS) during first and second year, respectively with knap sack sprayer fitted with flat fan nozzles using 350 litres water/ha. Surfactant (Puma activator) was used with fenoxaprop @ 500 ml/ha. Population of grass weeds was recorded at 40-45 days after herbicide application and dry weight of weeds was recorded at 120 DAS. The observations on weeds were recorded by placing a quadrate of 50 cm X 50 cm at two places in each plot. Visual assessment of crop phytotoxicity after application of herbicide was also noted using the specific parameters like chlorosis, necrosis, wilting, scorching, hyponasty and epinasty. Based on weed dry weight, weed control efficiency (WCE) was calculated using the following formula;

$$WCE = \frac{WDC - WDT}{WDC} \times 100$$

Where, WDC = weed dry weight in weedy check; WDT= weed dry weight in a treatment.

Recording for various yield attributing characters and yield of wheat was also done at harvesting. Crop was harvested on 21st April during both the years. The results of repetition of the experiments were similar, so pooled analysis was performed. Differences among treatment means were determined using ANOVA and when the F test was significant, means were compared with least significant difference (LSD) test at 5% level of significance. Square root transformation $\{\sqrt{(x+1)}\}$ was done for weed density and dry weight before statistical analysis.

3. Results and discussion

Grass weeds, littleseed canarygrass and wild oat were the main weeds infesting the experimental field during both the years. Littleseed canarygrass dominated with a density of 117.3 plants/m^2 with accumulated dry weight of 199.7 g/m^2 under untreated control (Table 1). The dry matter accumulated by wild oat was 209.6 g/m^2 under untreated control during. Various weed control treatments caused significant reduction in population and dry weight of grass weeds (littleseed canarygrass and wild oat) compared to untreated weedy check, which resulted in significantly higher yields over untreated control. Ready mixture of pinoxaden 2.53% + clodinafop 2.53% (Traxos 5EC) at all the doses provided excellent control of wild oat. Whereas, effective control of littleseed canarygrass was observed with higher dose (50-60 g a.i./ha) of the ready mix. Traxos 5EC at 40 g a.i./ha was significantly poor in reducing the total dry weight of grass weeds compared to higher doses of this ready mixture (50 to 60 g a.i./ha) as well as recommended application of clodinafop 60 g/ha and pinoxaden 50 g/ha. The application of fenoxaprop provided poor control of littleseed canarygrass compared to clodinafop 60 g/ha, and pinoxaden 50 g/ha. The effective littleseed canarygrass control with clodinafop and pinoxaden has also been reported earlier (Chhokar and Malik, 2002; Chhokar *et al*., 2007).

The significantly lowest (27.3 q/ha) wheat grain yield was recorded under season long weedy check while all other herbicide treatments were at par with each other (Table 2).

Table 2. Effect of various weed control treatments on yield and yield attributes of wheat (Two years pooled data)

Weed control treatment	Dose/ha (g a.i.)	Tillers /m^2	Biomass (q/ha)	Grain Yield (q/ha)	1000 Grain weight (g)
Weedy Check	-	313.3	105.1	27.3	33.0
Pinoxaden 2.53% + clodinafop 2.53% (Traxos 5EC)	40 (800)*	411.4	149.9	51.4	35.8
Pinoxaden 2.53% + clodinafop 2.53% (Traxos 5EC)	50 (1000)	438.6	152.9	53.1	35.7
Pinoxaden 2.53% + clodinafop 2.53% (Traxos 5EC)	60 (1200)	428.0	151.2	53.2	35.8
Pinoxaden (Axial 5.1 EC)	50 (1000)	436.4	152.3	52.9	35.7
Clodinafop propargyl (Topik 15 WP)	60 (400)	427.2	151.1	52.8	35.8
Fenoxaprop (Puma power 10 EC)	120 (1200)	422.0	150.2	51.2	35.6
CD at 0.05		35.5	10.6	2.4	0.9

*Note: *Product doses of herbicides as ml or g/ha are given in parentheses*

The maximum yield reduction due to grass weed competition throughout the growing season was 47.7%. This reduction was mainly due to significant reduction in tillering and 1000 grain weight. The untreated weedy control had the thinnest grains having 1000 grain weight of 33.0 g. Weedy check had the significantly lowest effective tillering (313.3 m^{-2}) while, all the herbicides treatments had statistically similar effective tillering. Similarly, crop biomass was statistical similar among various weed control treatments except weedy check. Earlier studies have also reported littleseed canarygrass and wild oat as highly competitive weeds causing significant wheat yield reduction (Afentouli and Eleftherohorinos, 1996; Balyan and Malik, 1989; Balyan *et al.,* 1991; Chhokar *et al.,* 2008; Walia and Brar, 2001).

The ready mixture having reduced doses of clodinafop propargyl and pinoxaden performed similar to their respective double doses alone in controlling weeds and producing wheat yield. The observations on phytotoxicity recorded showed no adverse effect of Traxos 5EC to wheat crop. Earlier results (Chhokar *et al.,* 2007) have also shown excellent crop safety and grass weed control (littleseed canarygrass and wild oat) when pinoxaden (Axial 5 EC) is applied at 30-200 g a.i./ha and yielded similar to fenoxaprop and clodinafop. However, pinoxaden optimum dose observed was 35-50 g/ha.

Based on this study, it can be concluded that the optimum dose of Traxos 5EC (Pinoxaden 2.53% + clodinafop-propargyl 2.53%) is 50-60 g a.i./ha for control of grass weeds (littleseed canarygrass and wild oat). This ready mixture at reduced doses of clodinafop and pinoxaden had similar weed control efficacy as observed with their alone application at recommended doses (Clodinafop 60 g/ha and pinoxaden 50 g/ha).

References

1. Afentouli CG and IG Eleftherohorinous 1996. Littleseed canarygrass (*Phalaris minor*) and short spiked canarygrass (*Phalaris brachystachys*) interference in wheat and barley. *Weed Science* **44:** 560-565.
2. Balyan RS and RK Malik. 1989. Influence of nitrogen on competition of wild canarygrass (*P. minor*) in wheat. *Pestology* **13**: 5-6.
3. Balyan RS, RK Malik, RS Panwar and S Singh. 1991. Competitive ability of winter wheat cultivars with wild oat (*Avena ludoviciana*). *Weed Science* **39**: 154-158.
4. Chhokar RS, RK Sharma and Indu Sharma. 2012. Weed management strategies in wheat: A review. *Journal of Wheat Research* **4(2)**: 1-21
5. Chhokar RS and RK Malik. 2002. Isoproturon resistant *Phalaris minor* and its response to alternate herbicides. *Weed Technology* **16**: 116-123
6. Chhokar RS, RK Sharma and RPS Verma. 2007. Pinoxaden for controlling grass weeds in wheat and barley. *Indian Journal of Weed Science* **40**: 41-46.
7. Chhokar RS, S Singh and RK Sharma. 2008. Herbicides for control of isoproturon-resistant Littleseed Canarygrass (*Phalaris minor*) in wheat. *Crop Protection* **27**: 719-726.
8. Malik RK and S Singh. 1995. Littleseed canarygrass (*Phalaris minor* Retz.) resistance to isoproturon in India. *Weed Technology* **9**: 419-425.
9. Singh S, RK Malik, RS Balyan and S Singh. 1995. Distribution of weed flora of wheat in Haryana. *Indian Journal of Weed Science* **27**: 114-121.
10. Walia US and LS Brar. 2001. Competitive ability of wild oats (*Avena ludoviciana* Dur.) and broad-leaf weeds with wheat in relation to crop density and nitrogen levels. *Indian Journal of Weed Science* **33**: 120-123.