



Lolium, an emerging grassy weed of wheat in Haryana and its chemical control

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Wheat (*Triticum aestivum*L.) is the second most important grain crop of India after rice and thus crucial for the food security of the country. Wheat competes with several grassy and broad-leaf weeds during its growth period depending upon the adopted agronomic practices, soil types, underground water quality, weed control techniques and cropping system. For realizing potential crop yield, proper weed management is essential. Survey of weed flora of wheat fields has shown moderate to heavy infestation of new grassy weed of *Lolium* spp. in North-Eastern districts of the state under high moisture conditions which have threatened wheat cultivation in some fields (AICRPWC 2014 and 2015).

To study the infestation level of this new emerging weed species, a systematic survey of wheat fields was done in 11 districts, viz. Ambala, Kurukshetra, Karnal, Panchkula, Yamuna Nagar, Jind, Panipat, Kaithal, Sirsa, Fatehabad and Hisar districts of state. Twenty fields in each district were surveyed during January - March, 2015, as this period depicted most appropriate representation of majority of weed species and the weeds have cumulative effects of all agronomic practices, soil type, fertilizer and irrigation application and weed control measures adopted during initial crop growing period. The road map of Haryana state was followed and routes were planned to establish sampling localities as equidistantly as possible (about 10 kms) avoiding inhabited areas. Four observations on density of individual weeds were recorded per field at one spot by using quadrant (0.5 x 0.5 m), 80-100 meters deep inside the fields. Pooled average values of observations of relative density were thus calculated as per method suggested by Misra (1968) and Raju (1977). To test the efficacy of various herbicides, a field experiment was conducted at farmers' field in V. Danoura, Distt. Ambala (Haryana) by keeping a plot size of 150 m² with three replications during Rabi 2004-15 and

2015-16. Wheat variety HD2967 was planted on 15.11.2014 and 20.11.2015, during first and second years, respectively. Herbicides pendimethalin alone at 1500 g/ha, pendimethalin + metribuzin 1500 + 175 g/ha (TM) and pendimethalin 35% + metribuzin 3.5% (RM) at 1925 g/ha were applied as pre-emergence using 500 litres of water/ha. Isoproturon at 1000 g/ha was applied 5 days after first irrigation by mixing in 10 kg urea while post-emergence herbicides sulfosulfuron at 25 g/ha, mesosulfuron + iodosulfuron (RM) at 14.4 g/ha and pinoxaden at 50 g/ha were applied at 40 DAS using 375 litres of water. All herbicide sprays were done by knapsack sprayer using flat fan nozzle. In field experiment, data on density and dry weight of weeds was recorded using 0.5 x 0.5 meter quadrant from four places in a plot at 75 DAS which was subjected to $(\sqrt{x+1})$ transformation before analysis. Data on percent control of *Lolium* spp. was recorded at 120 DAS which was subjected to arc sin⁻¹ transformation before analysis.

Survey of *Lolium* infestation

Maximum population of *Lolium* 49.1 plants/m² occurred in Yamuna Nagar district with a frequency of 55%, followed by Panchkula (41.32 plants/m²), Ambala (32.2 plants/m²), Kurukshetra (27.5 plants/m²) and Karnal 24.0 plants/m². In south western districts of Hisar, Sirsa and Fatehabad although infestation occurred but with less density in a range of 1.45-3.5 plants/m² and only at 10-15% locations surveyed (Figure 1).

Chemical control in wheat

Weed flora present in the experimental field consisted of grassy weeds *Lolium* spp. (70%), *Phalaris minor* (20%) and broad-leaf weeds *Chenopodium album*, *Rumex dentatus* and *M. indica* (10%). All herbicides except pinoxaden and sulfosulfuron proved effective against *Lolium* spp. in wheat (Table 1). These herbicides proved effective against *P. minor* (data not given). Pre-emergence

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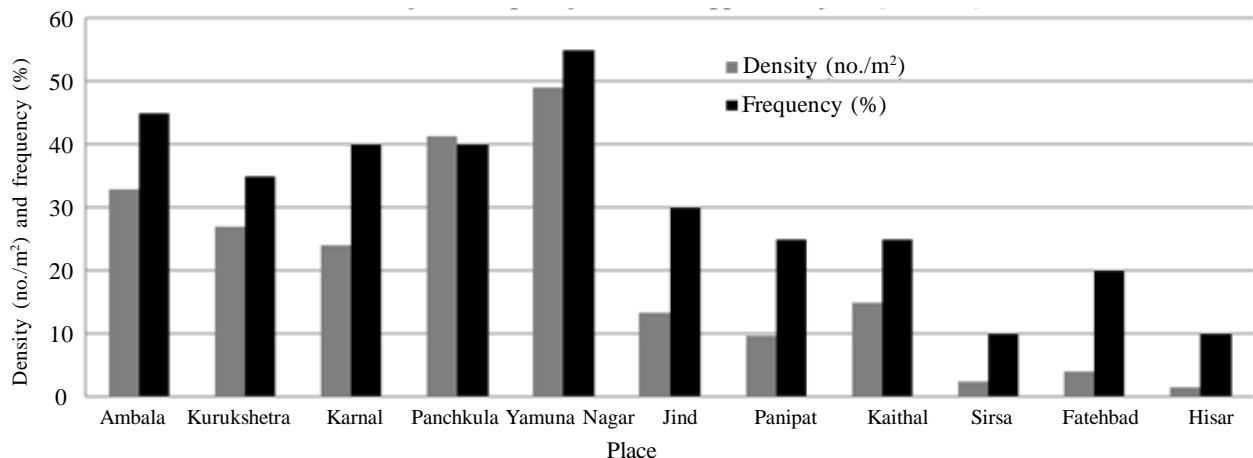


Figure 1. Density and frequency of *Lolium* spp. in wheat in Haryana

Table 1. Effect of different herbicides on density, dry weight , WCE (%) of *Lolium* spp. and grain yield of wheat

Treatment	<i>Lolium</i> spp. (no./m ²) 75 DAS		<i>Lolium</i> dry wt. (g/m ²) 75 DAS		WCE (%) 75 DAS		Visual control (%) 120 DAS		Grain yield (t/ha)	
	2014-15		2014-15		2014-15		2014-15		2014-15	
	2014-15	2015-16	2014-15	2014-15	2014-15	2015-16	2014-15	2015-16	2014-15	2015-16
Pendimethalin (1500 g/ha) PE	1.9 (2.7)	1.9 (2.7)	2.17 (3.7)	2.27(4.2)	91.7	87.8	79.5 (95)	71.9 (90)	4.25	4.80
Pendimethalin + metribuzin (TM) (1500 + 175 g/ha) PE	1.7 (2.0)	1.5 (1.3)	2.10 (3.4)	1.72(2.0)	92.3	94.2	82.3 (97)	77.2 (95)	4.40	4.86
Pendimethalin + metribuzin (RM) (1925 g/ha) PE	1.6(1.7)	1.7 (2.0)	2.0 (3.0)	1.78(2.2)	93.3	93.6	79.5 (95)	77.2 (95)	4.42	4.88
Sulfosulfuron (25 g/ha)35 DAS	7.3 (52)	7.1 (50.3)	6.99 (47.9)	5.98(34.7)	-6.4	0	0(0)	0(0)	3.82	4.06
Pinoxaden (50 g/ha)35 DAS	7.5 (55.7)	6.7 (44.7)	6.76 (44.8)	5.95(34.4)	0.44	0.86	0(0)	0(0)	4.03	4.12
Mesosulfuron + iodosulfuron (RM) (14.4 g/ha)35 DAS	2.3 (4.7)	1.7 (2.0)	2.60 (5.8)	1.83(2.7)	87.1	92.2	69.5 (88)	74.8 (90)	4.48	4.90
Isoproturon (1000 g/ha) 25 DAS	0.6 (2.7)	1.6 (1.7)	2.52 (5.4)	1.68(2.0)	87.9	94.2	67.4 (85)	81.8 (97)	4.02	3.20
Weedy	7.2 (50.7)	6.8 (45.7)	6.78 (45.0)	5.99(34.7)	0	0	0(0)	0(0)	3.25	0.12
LSD (p=0.05)	0.6	0.64	0.1	0.69	-	-	7.4	11.1	0.15	0.12

PE-Pre-emergence

application of pendimethalin alone at 1500 g/ha or in conjunction with metribuzin at 1500 +175 g/ha as tank mixture provided 90-97% control of *P.minor* with only 1.3-4.2 plants/m². Isoproturon applied at 1000 g/ha as urea mix after first irrigation proved very effective with 1.7-5.4 plants/m² exhibiting 85-97% control of *Lolium*. Ready mix combination of pendimethalin (35%) + metribuzin (3.5%) caused significant reduction in density and dry weight of *Lolium* during both years of study. The herbicides pinoxaden and sulfosulfuron at their applied rates proved effective against *P.minor* but did not cause any inhibition of *Lolium*. Grain yield of wheat followed the same trend as density and dry weight of weeds. Weed control efficiency with use of pendimethalin at 1500 g/ha was 91.7 and 87.8% during 2014-15 and 2015-16, respectively which slightly increased by use of metribuzin as tank

mixture or in ready mixture with pendimethalin. Grain yield was maximum (4.48 and 4.90 t/ha) during 2014-15 and 2015-16, respectively in plots treated with mesosulfuron+iodosulfuron (RM) at 14.4 g/ha which was at par with pendimethalin +metribuzin (TM) and pendimethalin+metribuzin(RM) applied as pre-emergence due to excellent control of *Lolium* as well as *P.minor* present in the experimental field.

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