

Herbicidal weed control in blond psyllium (*Plantago ovata*) grown on Aridisols under irrigated condition

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ABSTRACT

A field study was conducted on the Aridisols during the winter seasons (*rabi*) of 2001–02 and 2002–03 to evaluate suitable herbicide for management of weeds in blond psyllium (*Plantago ovata* Forsk.). Application of oxadirygl @ 50 g/ha 15 days after sowing (DAS) recorded maximum seed yield (1,833 kg/ha) and net returns (Rs 25,244/ha) closely followed by pre-emergence application of isoproturon @ 600 g/ha which gave seed yield of 1,729 kg/ha and net returns of Rs 23,1220/ha. Due to phytotoxic effect on the crop, oxyfluorfen applied @ 50 or 75 g/ha 15 DAS remained inferior to oxadirygl 50 g/ha applied 15 DAS.

Key words: Herbicides, Blond psyllium, Weed management, Seed yield, Net return, Weed dry matter

Blond psyllium is an important medicinal crop of Rajasthan. Due to low cost of production and higher return from the crop, area under this crop is increasing rapidly (52,700 ha in 1995 to 0.1 million ha in 2000) in Rajasthan. It is sown dry, followed by 2 light irrigations to facilitate seedling emergence. Besides, the initial growth of the crop is pretty slow. These 2 factors result in heavy weed infestation in the crop. Information on the use of herbicides in blond psyllium is meagre. This trial was therefore planned to see performance of newly launched herbicides as pre- and post-emergence application in blond psyllium.

MATERIALS AND METHODS

The field experiment was conducted at Agricultural Research Station, Mandor (Jodhpur), during the winter seasons of 2001–02 and 2002–03. The soil was loamy sand, alkaline in nature (pH 8.2), low in organic carbon (0.21%) and nitrogen, medium in available phosphorus (34 kg/ha) and potassium (290 kg/ha). Twelve treatment combinations comprised various doses and methods of application of oxyfluorfen, oxadirygl and isoproturon along with weedy and weed-free check were laid out in randomized block design with 3 replications (Table 1). Blond psyllium variety 'GI 2' was sown in the second week of November at 30 cm row-to-row spacing during both the years of study. Seeds @ 5 kg/ha were placed in furrows and covered with a thin layer of soil with the help of brushwood. A basal dose of 15 kg N and 25 kg P₂O₅/

ha was applied at the time of sowing and 15 kg N/ha was applied 30 DAS. The crop was irrigated after sowing, 7 DAS, at tillering, flowering and seed-development stages of crop growth. The predominant weed species in the field were: *Chenopodium album* L., *C. murale* L., *Melilotus indica* L., *Asphodelus tenuifolius* Cav., *Cynodon dactylon* (L.) Pers., *Spergula arvensis* L., *Fumaria parviflora*, *Anagallis arvensis* L., *Cichorium intybus* L. and *Rumex dentatus* L.

RESULTS AND DISCUSSION

Weed growth and plant count

Plant count and weed dry weight were significantly influenced with different weed-control treatments (Table 1). Minimum weed dry weight was recorded with oxadirygl @ 50 g/ha applied 15 DAS. Reduction in the dose of oxadirygl from 50 to 25 g/ha significantly increased the weed dry weight by 354 g/m² and decreased the plant count/m row by 4. Reduction in plant stand was due to smothering effect of heavy weed growth at low dose of oxadirygl. Application of isoproturon @ 600 g/ha (pre-emergence) reduced the weed dry weight by 386 g/m² compared to weedy check. Pre-emergence application of oxadirygl @ 100 g/ha proved less effective than oxadirygl 50 g/ha applied 15 DAS. This treatment increased the weed dry weight by 70 g/m².

Seed yield and yield attributes

Application of oxadirygl @ 50 g/ha 15 DAS gave the

Table 1. Growth, yield attributes, seed yield, weed dry matter and economics of blond psyllium as influenced by herbicidal application (pooled data of 2001–02 and 2002–03)

Treatment	Plant count/ m row length		Plant height (cm)	Spikes/ m row	Seeds/ spike	Spike length (cm)	Seed yield (kg/ha)	Biomass (kg/ha)	Harvest index (%)	Weed dry weight (g/m ²)	Net returns* (Rs/ha)
	Initial	Final									
Oxyfluorfen 25 g/ha 15 DAS	22	17	29	139	78	2.76	648	2,415	26.8	468	4,164
Oxyfluorfen 50 g/ha 15 DAS	21	18	30	140	98	3.07	971	3,150	30.8	66	9,728
Oxyfluorfen 75 g/ha 15 DAS	23	22	31	131	92	2.67	772	2,605	29.6	98	5,896
Oxyfluorfen 100 g/ha (pre. em.)	21	21	31	124	91	2.91	753	2,635	28.6	162	5,304
Oxadirgyl 25 g/ha 15 DAS	22	18	31	156	81	3.14	609	2,005	30.4	400	3,462
Oxadirgyl 50 g/ha 15 DAS	22	22	29	225	133	4.11	1,833	5,405	33.9	46	25,244
Oxadirgyl 75 g/ha 15 DAS	21	22	31	193	125	3.75	1,627	4,890	33.3	47	21,286
Oxadirgyl 100 g/ha 15 DAS	23	23	30	184	105	3.62	1,322	4,180	31.6	116	15,546
Isoproturon 600 g/ha (pre. em.)	22	22	31	232	123	3.95	1,729	5,285	32.7	86	23,122
Isoproturon 600 g/ha (pre. em.)	23	22	30	194	117	3.97	1,502	4,730	31.8	106	19,036
Weed-free season long	24	22	30	237	137	4.18	1,860	5,380	34.6	0	24,480
Weedy (C)	22	17	31	73	58	2.58	394	1,325	29.7	472	92
CD (P = 0.05)	NS	3	NS	25	10	0.20	213	377		28	

*Sale rate of blond psyllium seed Rs 18/kg, cost of cultivation of the crop Rs 7,000/ha

best performance, as it resulted in the maximum seed yield of 1,833 kg/ha. The harvest index of crop recorded under this treatment (33.9%) was very close to that observed under weed-free check (34.6%). The spikes/m row, seeds/spike and spike length were significantly improved by 208, 129 and 59%, respectively, over weedy check with oxadirgyl @ 50 g/ha applied 15 DAS. Higher seed yield and harvest index were owing to longer weed-free period that prevailed under oxadirgyl @ 50 g/ha 15 DAS, which in turn increased the yield attributes and decreased the dry matter and population of weeds. When the dose of oxadirgyl was reduced from 50 to 25 g/ha, significant decrease in yield and yield attributes was observed. It was due to poor control of weeds in this treatment, as evident from higher weed dry matter (400 g/m²) recorded at harvest. Increase in dose of oxadirgyl from 50 to 75 g/ha reduced the seed yield by 206 kg/ha though it was non-significant. Phytotoxic effect of oxadirgyl on the upper portion of the leaves was observed when dose of oxadirgyl increased from 50 to 75 g/ha. However, this effect was completely recovered with irrigation applied 2 weeks after spray.

Pre-emergence application of isoproturon @ 600 g/ha was proved next best treatment as the seed yield with this treatment (1729 kg/ha) was found at par with weed-free season-long and oxadirgyl 50 g/ha 15 DAS. The seed yield with isoproturon @ 600 g/ha as pre-emergence application was improved by 167% over weedy check. Yield attributes were also improved in the same pattern. Compared to weedy check, the weed dry matter was suppressed by 386 g/m² with pre-emergence application of isoproturon @ 600 g/ha. Post-emergence application of isoproturon @

600 g/ha proved less effective practice, as it significantly reduced seed yield and biomass by 13.2 and 10.5% compared to pre-emergence application of isoproturon. Singh and Chauhan (1994) recorded the maximum seed yield of blond psyllium with pre-emergence application of 500 g isoproturon followed by weeding 20 DAS. Parihar and Singh (2001) also reported similar results.

Oxyfluorfen was found ineffective for blond psyllium. Increase in the dose oxyfluorfen from 25 to 50 and 50 to 75 g/ha damaged the foliage of crop, which later recovered with irrigation applied to crop. Due to poor crop growth, oxyfluorfen applied @ 50 g/ha or 75 g/ha proved less effective than oxadirgyl @ 50 g/ha.

Economics

The highest net returns (Rs 25,244/ha) and benefit:cost ratio (3.25:1) were recorded with the application of oxadirgyl @ 50 g/ha 15 DAS. Decrease in dose of oxadirgyl from 50 to 25 g/ha reduced the net returns to Rs 3,462/ha. Increase in the dose of oxadirgyl from 50 to 75 g/ha was also proven uneconomical, as it reduced the net return by Rs 3,958/ha. Pre-emergence application of isoproturon @ 600 g/ha proved next best method of weed management, as it produced second highest net return of Rs 23,122/ha.

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