

Weed management in blonde psyllium (*Plantago ovata*) under north Gujarat condition

I. S. PATEL¹, M. V. PATEL, H. D. PATEL AND R. H. PATEL

Department of Agronomy, College of Agriculture, Gujarat Agricultural University,
Sardar Krushinagar 385 506

Received: August 1994

ABSTRACT

A field experiment was conducted during the winter (*rabi*) seasons of 1988–89, 1989–90 and 1990–91 to find out the most effective and economical weed management practice for blonde psyllium or *isabgul* (*Plantago ovata* Fors) crop. Hand-weeding treatments significantly suppressed the weed growth and produced more seed compared with weedy check. Among herbicides, only isoproturon (pre-emergence application at 0.50 or 0.75 kg ai/ha) gave similar control of weeds to that of hand-weeding. Pre-emergence application of isoproturon at 0.50 kg ai/ha recorded the highest net incremental cost: benefit ratio (1:9.20).

Psyllium or *isabgul* (*Plantago ovata* Fors) is a medicinal plant and commercially cultivated in north Gujarat. *Isabgul* is commonly sown broadcast as it gives 15.62% higher seed yield than line sowing (AICRPIME¹ & AP, 1982). Weed control in this broadcast sown crop by interculture and hand-weeding is cumbersome, costly and time consuming. It thus warrants the use of herbicides for timely and effective control of weeds. The present investigation was therefore undertaken to find out the effective and economical herbicide for controlling weeds in *isabgul* crop.

MATERIALS AND METHODS

A field experiment was conducted during the winter (*rabi*) seasons of 1988–89, 1989–90 and 1990–91 at the Agronomy Instructional Farm, College of Agriculture, Gujarat Agricultural University, Sardar Krushinagar on loamy sand soil.

The treatments consisting of pre-emergence spray of fluchloralin @ 0.90 kg ai/ha, pendimethalin @ 0.12 and 0.24 kg ai/ha, thiobencarb @ 1.50 kg ai/ha and isoproturon @ 0.50 and 0.75 kg ai/ha, hand-weeding once at 30 days after sowing and twice at 20 and 40 days weed-free as well as weedy control were compared in randomized block design with 4 replications. Variety 'Gujarat *Isabgul* 1' was sown broadcast in the first week of December with seed rate of 4 kg/ha. The recommended fertilizer dose of 25 kg N and 25 kg P₂O₅/ha was applied basal, remaining 25 kg N/ha was applied as top dressing at 30 days.

Weed population was counted from a quadrat of 0.5 m x 0.5 m, placed randomly at 2 places in each plot. Weeds from net plot were collected at harvest and weight was recorded after sun drying for respective plot. Weed control efficiency (WCE) was calculated.

Present address: ¹ Research Scientist, Regional Research Station, Gujarat Agricultural University, Sardar Krushinagar 385 506

RESULTS AND DISCUSSION

Weed

The dominant weed species in the experimental field were *Cynodon dactylon* L. Pers., *Cyperus rotundus* L., *Cenchrus biflorus* L., *Chenopodium album* L., *Chenopodium murale* L., *Asphodelus tenuifolius* Cavan., *Melilotus indica* L., *Tribulus terrestris* L., *Portulaca oleracea* L., and *Amaranthus* spp.

Effect on weeds

The population and dry weight of total weeds in isoproturon treated, hand-weeded and weed-free plots were significantly less

than those in the weedy control one during all the seasons (Table 1). Data on weed-control efficiency further indicated that these treatments controlled the weeds without any adverse effects on the crop (Table 2). The weed population in the plots treated with fluchloralin @ 0.90 kg ai/ha, pendimethalin @ 0.12 and 0.24 kg ai/ha and thiobencarb @ 1.50 kg ai/ha was significantly more than weed-free conditions but was at par with weedy control. This might be due to adverse effect of these chemicals on the germination of crop which resulted in poor competitiveness of the crop towards later stages (Table 2).

Table 1. Weed population, dry weed weight and weed control efficiency as influenced by weed control treatments in *isabgul*

Weed control treatment	Total weed population/ 0.25 m ²			Dry weed weight (kg/ha)			Weed-control efficiency (%)
	1988-89	1989-90	1990-91	1988-89	1989-90	1990-91	
Fluchloralin (pre.) 0.90 kg ai/ha	6.42 *(42.07)	6.82 (47.30)	3.36 (11.83)	995	1,126	956	5.78
Pendimethalin (pre.) 0.12 kg ai/ha	7.03 (50.39)	7.35 (54.80)	3.85 (16.16)	361	903	981	31.31
Pendimethalin (pre.) 0.24 kg ai/ha	5.11 (26.82)	5.64 (35.90)	3.67 (11.99)	827	899	666	26.81
Thiobencarb (pre.) 1.50 kg ai/ha	6.23 (39.50)	6.91 (49.70)	3.39 (12.15)	934	885	529	28.10
Isoproturon (pre.) 0.50 kg ai/ha	3.60 (13.80)	3.91 (17.90)	1.48 (2.75)	162	223	32	87.23
Isoproturon (pre.) 0.75 kg ai/ha	3.21 (10.57)	2.52 (6.90)	1.59 (2.67)	174	129	65	88.19
HW (30 DAS)	2.28 (5.37)	2.24 (5.25)	1.43 (2.17)	61	75	40	94.98
HW (20, 40 DAS)	2.07 (4.42)	2.12 (4.50)	1.49 (2.25)	17	97	32	95.58
Weed-free	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0	0	0	100.00
Weedy check	8.96 (80.65)	6.99 (51.00)	3.88 (15.24)	1,792	1,120	358	
CD (P = 0.05)	1.02	1.66	0.99	340	595	393	

* Figures in parentheses indicate original values; pre. Pre-emergence, DAS, days after sowing

Table 2. Growth, yield and economics of *isabgul* as influenced by weed control treatments

Weed control treatments	Plant weight (cm.)	Plant population (0.25 m)	Tiller/plant	1,000 seed weight (g)	Seed yield (kg/ha)				Gross return (Rs/ha)	Additional cost over control (Rs/ha)	Additional income over control (Rs/ha)	ICBR
					1988-89	1989-90	1990-91	Pooled				
Fluchloralin (pre.) 0.90 kg ai/ha	23.40	1.80 (3.70)	17.01	9.38	145	128	27	100	1,000	420	-8,900	-Ve
Pendimethalin (pre.) 0.12 kg ai/ha	26.48	3.97 (16.44)	19.33	9.91	269	438	98	268	2,680	120	-7,220	-Ve
Pendimethalin (pre.) 0.24 kg ai/ha	23.32	1.67 (3.45)	12.41	9.01	57	113	29	66	660	180	-9,240	-Ve
Thiobencarb (pre.) 1.50 kg ai/ha	27.95	4.60 (25.01)	17.69	9.83	718	814	96	543	5,430	390	-4,480	-Ve
Isoproturon (pre.) 0.50 kg ai/ha	30.22	7.63 (58.85)	15.36	12.39	1,385	1,200	1,119	1,235	12,350	240	2,450	1:9.21
Isoproturon (pre.) 0.75 kg ai/ha	30.37	7.07 (51.06)	20.10	12.08	1,486	1,239	1,121	1,282	12,820	330	2,920	1:7.85
HW (30 DAS)	31.44	8.10 (65.92)	13.82	10.20	1,522	1,286	1,142	1,316	13,160	573	3,260	1:4.69
HW (20, 40 DAS)	31.37	8.11 (66.31)	13.10	11.90	1,550	1,311	1,198	1,353	13,530	907	3,630	1:3.00
Weed-free	31.98	8.06 (65.49)	16.90	12.83	1,612	1,396	1,384	1,464	14,640	1,315	4,740	1:2.60
Weedy check	31.57	7.93 (63.42)	10.84	8.74	1,049	1,038	884	990	9,990			
CD (P = 0.05)	1.48	1.45	NS	0.87	240	247	246	217				

Pre: Pre-emergence; HW, hand-weeding; DAS, days after sowing;

Selling price, seed Rs 10/kg; fuchloralin, Rs 180/litre, pendimethalin Rs 150/litre, thiobencarb Rs 110/litre, Isoproturon Rs 180/kg

Figures in parentheses indicated original value

Effect on seed yield

Seed yield was not affected significantly by increase in the number of hand-weedings. Among the herbicides, only isoproturon (pre-emergence application at 0.50 or 0.75 kg ai/ha) was at par with the cultural methods of weed control. Isoproturon applied at 0.50 and 0.75 kg ai/ha, hand-weeding once at 30 days and twice at 20 and 40 days as well as weed-free condition, respectively gave 24.8, 29.5, 32.9, 36.7 and 47.9% more seed yield over the weedy control (990 kg/ha). The higher seed yield in weed-free and isoproturon treatment was due to better weed control efficiency (Table 1) and higher test weight (Table 2). Weed control through fluchloralin, pendimethalin and thiobencarb substantially reduced the seed yield during all the years. These findings are in agreement with

Metha *et al.* (1983).

Economics

Among herbicides, application of isoproturon @ 0.50 or 0.75 kg ai/ha gave more realization compared with the weedy control. Weed-free treatment gave the highest gross return of Rs 14,640/ha compared with weedy control. However, application of isoproturon @ 0.50 kg ai/ha recorded the highest net increment cost: benefit ratio 1:9.20.

REFERENCES

- AICRPI M & AP, 1982. *Annual Research Report, 1981-82*. All India Co-ordinated Research Project on *Improvement of Medicinal and Aromatic Plants*, Anand, pp. 19-23
- Metha, H. M., Trivedi, G. C., Shah, C. B. and Patel, H. R. 1983. Efficacy of herbicides for weed control in Isabgul (*Plantago ovata* Forsk). Abstract of paper, ISWS/BHU Weed Science Conference, Varanasi, pp. 63.