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Weed shift in pigeonpea (*Cajanus cajan*)–wheat (*Triticum aestivum*) cropping system

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ABSTRACT

A study was carried out to examine the shift in weed flora in pigeonpea [*Cajanus cajan* (L.) Millsp.]–wheat (*Triticum aestivum* L. emend. Fiori & Paol.) cropping system due to weed-control practices. Fluchloralin due to effective control of weeds compared with hand-weeding, where regrowth of weeds especially of *Cyperus* was observed, recorded significantly higher yield of pigeonpea.

Isoproturon and 2,4-D due to better weed control recorded higher yield of wheat compared with the control. Shift in weed flora was noticed from dicots in the first year to monocots in the second year only during the rainy season.

The phenomenon of shift in kind and density of weed species is the result of manipulations of environmental factors, crop rotation and the weed-control practices. The continuous adoption of the same crop rotation coupled with the use of a particular weed-management practice may lead to shift in weed flora with time. Govindakrishan and Singh (1985) noticed a reduction in weed growth in succeeding wheat (*Triticum aestivum* L. emend. Fiori & Paol.) crop due to residual effect of metribuzin and oxyfluorfen applied to potato crop. A shift in weed flora is also said to occur when there is a reduction, increase or migration of weed flora (Holzner and Glauninger, 1982). Keeping this in view, present experiment was conducted to study the weed shift in pigeonpea [*Cajanus cajan* (L.) Millsp.]–wheat system due to weed-control practices besides studying the influence of both monocot and dicot weeds on grain yield of pigeonpea and wheat.

MATERIALS AND METHODS

The experiment was conducted during 1990–92 at New Delhi, on sandy-loam soil having pH 7.8, containing 189.4,19.4 and 209.1 kg/ha of available N, P and K respectively. The experiment was laid out in split-plot design with 3 replications.

Three weed-control practices, viz. fluchloralin 1.0 kg/ha pre-plant incorporation (ppi) and hand-weeding (at 15 and 30 days after sowing) and unweeded control, were tried as main plots during rainy season. These plots were sub-divided into 4 subplots with superimposition of 4 weed-control practices (isoproturon 0.75 kg/ha and 2, 4-D 0.5 kg/ha after first irrigation, hand-weeding at 4 and 6 weeks after sowing and unweeded control) during the winter season. 'UPAS 120' pigeonpea was planted in rainy season on 8 July 1990 and 17 July 1991 following a spacing of 60 cm x 20 cm in each main plot (size 5 m x 12 m). In winter, 'HD 2285' wheat was planted on 9 De-

Table 1. Weed growth in pigeonpea–wheat system as influenced by different treatments during rainy season

Treatment	*Cyperus*				Monocots		*Trianthema*				*Commelina*				Dicots			
	Count/ m^2		Dry weight (g/m^2)		Dry weight (g/m^2)		Count/ m^2		Dry weight/ m^2		Count/ m^2		Dry weight/ m^2		Count/ m^2		Dry weight/ m^2	
	1990	1991	1990	1991	1990	1991	1990	1991	1990	1991	1990	1991	1990	1991	1990	1991	1990	1991
Fluchloralin (1.0 kg/ha)	7.7	10.8	3.6	7.2	9.8	11.9	9.6	5.2	10.8	6.1	7.4	3.7	10.0	4.7	12.5	9.0	18.9	7.6
Hand-weeding	3.7	6.4	2.4	4.3	4.7	7.1	6.1	2.2	9.9	3.4	3.9	2.0	7.1	3.3	8.2	5.4	11.4	3.4
Unweeded control	11.9	15.8	7.3	10.8	15.9	17.8	13.0	10.7	16.5	12.3	8.2	5.6	13.4	2.0	15.6	16.4	19.1	12.7
CD (P = 0.05)	2.65	3.32	1.85	2.35	5.40	4.42	4.15	5.74	3.06	6.02	NS	1.98	6.09	1.51	2.20	5.40	6.31	4.98

cember 1990 and 15 December 1991 after the harvest of pigeonpea following a row spacing of 25 cm in subplots (5 m x 3 m). A basal dose of 20 kg N + 80 kg/ha was applied to pigeonpea at sowing.

RESULTS AND DISCUSSION

Rainy season

In the first year of experimentation dicot weeds, viz. *Trianthema monogyna* L. and *Commelina benghalensis* L., dominated the monocot weeds, while in the second year monocot dominated the dicot weeds. Though hand-weeding was more effective in reducing weed growth, the yield in the second year was significantly lower than that recorded in herbicide-treated plots. In the first year also, yield recorded in fluchloralin-treated plots was comparable to hand-weeded plots. Hand-weeding as expected was most effective against the dicot weeds. Count and dry weight of dicot weeds were significantly reduced due to hand-weeding compared with the control in the both the years and herbicide application in the first year. In the second year both hand-weeding and herbicide treatments were similar in the control of dicots. However, in general, the population and dry weight of dicot weeds were reduced greatly due to both the weed-control treatments.

Winter season

In winter, *Chenopodium* among broad-leaf weeds and *Phalaris* among grasses were the most dominating weed species in wheat. Isoproturon was effective against both grasses and broad-leaf weeds, whereas 2, 4-D relatively reduced the broad-leaf weeds. Plots treated with fluchloralin in the rainy season and superimposed with isoproturon in the winter did not encourage much the overall weed growth compared to hand-

Table 2. Weed growth in winter wheat as influenced both by main and subplot treatments (at harvest)

Treatment	*Chenopodium* (count/m²)		Broad-leaf weeds (count/m²)		*Phalaris* (count/m²)		Total dry weight (g/m²)	
	A	B	A	B	A	B	A	B
Rainy season Fluchloralin *Winter season*								
Isoproturon 0.75 kg/ha	1.2	0.7	2.7	1.7	1.6	0.7	1.2	1.6
2, 4-D 0.50 kg/ha	1.2	0.7	2.4	0.7	16.6	11.8	1.9	6.2
Hand-weeding	3.8	0.7	7.4	0.7	5.2	0.7	1.9	0.7
Unweeded control	7.9	5.6	12.2	5.6	14.7	7.6	4.2	7.9
Rainy season Hand-weeding *Winter season*								
Isoproturon 0.75 kg/ha	1.9	1.2	3.7	1.9	1.8	1.1	1.5	2.1
2, 4-D 0.50 kg/ha	1.2	0.7	1.8	0.7	12.7	8.9	2.4	11.8
Hand-weeding	2.8	0.7	5.2	0.7	5.0	0.7	1.9	1.3
Unweeded control	7.0	2.8	9.3	3.7	12.5	6.3	3.4	7.2
Rainy season Unweeded control *Winter season*								
Isoproturon 0.75 kg/ha	2.7	1.4	4.0	3.5	2.7	3.3	1.4	4.6
2, 4-D 0.50 kg/ha	1.4	1.4	2.1	1.6	8.4	7.6	1.5	6.5
Hand-weeding	4.0	0.7	6.0	0.7	4.5	0.7	1.7	0.7
Unweeded control	7.9	9.2	11.4	9.6	10.2	5.7	3.9	8.2
CD (P = 0.05)	2.70	3.36	3.83	3.87	5.35	4.97	0.88	2.47

A, 1990–91; B, 1991–92

Table 3. Grain yield (q/ha) of pigeonpea and wheat as influenced by different treatments

Treatment	Grain yield (q/ha)			
	Pigeonpea		Wheat	
	1990–91	1991–92	1990–91	1991–92
Rainy season				
Fluchloralin 1.0 kg/ha	26.2	24.2		
Winter season				
Isoproturon 0.75 kg/ha			38.0	43.8
2, 4-D 0.50 kg/ha			41.0	44.9
Hand-weeding			40.5	39.8
Unweeded control			33.8	35.8
Rainy season				
Hand-weeding	24.7	18.1		
Winter season				
Isoproturon 0.75 kg/ha			40.5	43.3
2, 4-D 0.50 kg/ha			43.6	46.2
Hand-weeding			37.5	38.8
Unweeded control			35.0	35.8
Rainy season				
Unweeded control	15.9	12.5		
Winter season				
Isoproturon 0.75 kg/ha			37.9	42.9
2, 4-D 0.50 kg/ha			39.8	44.2
Hand-weeding			37.6	37.8
Unweeded control			33.6	34.2

weeding and control plots, whereas 2,4-D restricted the growth of broad-leaf weeds only. Isoproturon and 2, 4-D were at par and significantly superior to unweeded control in controlling *Chenopodium album* L., whereas *Phalaris* was drastically reduced due to isoproturon and hand-weeding treatments. Isoprotuon and 2, 4-D due to better weed control recorded yield significantly higher than unweeded control in the first year, and were quite comparable to hand-weeding. In the second year, both recorded the yield significantly higher than hand-weeding treatment also.

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