

Integrated weed management strategies in okra under irrigated subtropical conditions of Jammu & Kashmir

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ABSTRACT

A field experiment was conducted during the rainy (*kharif*) seasons of 2007, 2008 and 2009 to find out the relative efficiency of weed management practices in Okra (*Hibiscus esculentus* L.). The result indicated that the highest weed control efficiency was achieved with the treatments fluchloralin 1.0 kg/ha preplant application+1HW followed by alachlor 2.0 kg/ha pre-emergence application + 1HW. The data on yield attributing characters *viz.*, number of pods/ plant and plant height were significantly influenced by various weed management treatments. The highest fresh pod yield was recorded with the application of fluchloralin 1.0 kg/ha preplant application supplemented with 1HW. Significantly lowest fresh pod yield of okra was recorded in weedy check plots.

Key Words : Okra, Integrated weed management strategies, Fluchchloralin

Okra is one of the important vegetable crops of Jammu & Kashmir state especially in sub-tropical irrigated and rainfed belt mainly grown in monsoon and summer season of the year. During the monsoon months, weeds dominate and become one of the important limiting factors responsible for the reduction of productivity of crop. The cost of the labour and many times inaccessible field conditions become the major problems for manual weeding. Hence, integration of chemical and physical methods become an important tool for controlling the weeds. The present investigation was carried out to identify suitable integrated methods for effective control of weeds in okra so that reduce the farmers extra expenditure incurred on manual weeding in scorching summer conditions.

MATERIALS AND METHODS

The investigation was carried out during the *kharif* seasons of 2007, 2008 and 2009 at the research farm of division of Agronomy, Foa, Chatha, Sher-Kashmir University of Agriculture Science and Technology-Jammu. The soil of the experimental site was sandy clay loam, having a pH of 7.76, low in available N, P and medium in K content. Planting of variety okra was done by dibbling at a spacing of 60cm x 30cm. The NP and K were applied 60, 30 and 30 kg/ha through urea, DAP and MOP respectively. The treatments comprised of T₁ one hand weeding (20DAS); T₂ two hand weeding (20, 40 DAS), T₃ trifluralin 1.0 kg/ha preplant application; T₄ fluchloralin 1.0 kg/ha preplant application; T₅ alachlor 2.0kg/ha preemergence application, T₆ oxyfluorfen 0.35 kg/ha pre-

emergence application; T₇ two directed burner flamings in inter-rows; T₈ trifluralin 1.0 kg/ha preplant application + 1HW; T₉ fluchloralin 1.0 kg/ha preplant application + 1HW; T₁₀ alachlor 2.0 kg/ha pre-emergence application + 1HW, T₁₁ oxyfluorfen 0.35 kg/ha Pre-emergence application + 1HW; T₁₂ two directed burner flamings in inter-rows + 1HW; T₁₃ weedy check and T₁₄ weed free. The data on dry weed weight (g/m²) at 60 days after sowing and the weed population/m² of various species of weeds was collected from plots of different treatments. Fresh pod yield (q/ha) was recorded by adding the weight of pods at different pickings. The weed control efficiency and weed index were calculated as per standard method.

RESULTS AND DISCUSSION

Weed population and weed dry weight

Significant treatment differences were recorded in weed population and weed dry weight in okra (Table 1) at 60 days after planting. The values of 3 years data indicated that lowest weed population and weed dry weight were recorded in treatments, fluchloralin 1.0 kg/ha preplant application+1HW which was however statistically at par with alachlor 2.0 kg/ha pre-emergence application + 1HW, trifluralin 1.0 kg/ha preplant application + 1HW and oxyfluorfen 0.35 kg/ha pre-emergence application + 1HW but significantly superior from the rest of the treatments which recorded higher weed population. Saimbhi *et al.* (1994) also reported the lowest dry weed weight with application pendimethalin and fluchloralin and the finding conforms to the present observations.

Table1. Effect of integrated weed management strategies on growth and yield of okra

Treatment	Weed population (no/m ²)			Weed dry matter (g/m ²)			Fresh pods (q/ha)		
	2007-08	2008-09	2009-10	2007-08	2008-09	2009-10	2007-08	2008-09	2009-10
T ₁ . One hand weeding (20 DAS)	10.6 (112.3)	10.6(111.0)	10.4(107.7)	5.6(29.88)	5.4(27.69)	5.1(25.01)	148.50	167.26	170.82
T ₂ . Two hand weedings (20, 40 DAS)	8.4 (69.3)	7.7(58.8)	7.6(56.7)	4.3(17.74)	4.1(15.84)	3.9(14.6)	211.30	221.75	229.72
T ₃ . Trifluralin 1.0 kg/ha preplant application	10.4(107.7)	9.6(91.6)	9.5(89.5)	5.4(27.85)	5.2(25.78)	5.0(23.91)	168.0	170.63	172.26
T ₄ . fluchloralin 1.0 kg/ha preplant application	9.3(97.7)	9.5(89.8)	9.4(86.7)	4.4(19.91)	4.5(18.84)	4.2(17.09)	188.7	175.46	196.84
T ₅ . Alachlor 2.0kg/ha preemergence application	9.8 (95.3)	9.4(87.2)	9.3(84.5)	5.0(23.63)	4.7(21.56)	4.6(20.40)	170.3	196.5	198.6
T ₆ . Oxyfluorfen 0.35 kg/ha pre-emergence application	9.5 (88.7)	8.6(73.3)	8.5(70.9)	4.8(21.85)	4.5(19.71)	4.3(17.87)	174.6	188.4	192.48
T ₇ . Two directed burner flamings in inter -rows	10.7 (102.3)	9.6(90.7)	9.5(89.0)	5.0(23.59)	4.8(1.75)	4.5(18.92)	168.4	179.6	182.44
T ₈ . Trifluralin 1.0 kg/ha preplant application + 1HW	7.9 (59.7)	6.7(43.8)	6.5(41.7)	4.1(15.58)	3.8(13.75)	3.6(11.96)	218.5	229.4	231.83
T ₉ . Fluchloralin 1.0 kg/ha preplant application+1HW	6.1(36.0)	5.4(28.5)	5.1(24.9)	3.1(8.40)	2.9(7.82)	2.7(6.08)	238.5	247.8	249.50
T ₁₀ . Alachlor 2.0 kg/ha pre-emergence application + 1HW	6.3(39.0)	5.7(31.4)	5.4(28.1)	3.4(8.40)	3.2(9.64)	3.0(8.15)	229.6	24B	242.02
T ₁₁ . Oxyfluorfen 0.35 kg/ha Pre-emergence application + 1HW	6.7(43.3)	6.3(39.4)	6.1(36.8)	3.7(12.64)	3.6(11.83)	3.2(9.59)	217.2	225.6	230.81
T ₁₂ . Two directed burner flamings in inter-rows + 1HW	9.2(83.7)	8.5(71.8)	8.5(69.6)	4.4(18.60)	4.3 (17.71)	4.1(15.5)	202.1	211.4	219.1
T ₁₃ . Weedy check	14.6(212.3)	14.1(198.7)	13.7(185.8)	13.6(184.70)	13.9(170.72)	12.9(166.87)	123.3	111.3	98.24
T ₁₄ . Weed free	1.00(0.0)	1.00(0.0)	1.00(0.0)	1.00(0.00)	1.00(0.00)	0.00	250.0	257.4	259.96
LSD (P=0.05)	0.3	0.4	0.2	0.3	0.5	0.4	15.5	17.4	4.9

The figures given in parenthesis are original values which are subject to square root transformation $\sqrt{x+1}$

Weed control efficiency and weed index

Weed control efficiency in okra showed pronounced superiority in the plots treated with fluchloralin 1.0 kg/ha preplant application+1HW (60.89%) followed by alachlor 2.0 kg/ha pre-emergence application + 1HW (59.09%), oxyfluorfen 0.35 kg/ha pre-emergence application (54.85%) and trifluralin 1.0 kg/ha preplant application + 1HW (50.20%) and were comparatively superior to all other treatments (Table 2). Contrary to above the values of weed index was recorded lower in case of fluchloralin 1.0 kg/ha preplant application + 1HW (4.11) followed by alachlor 2.0 kg/ha pre-emergence application (7.09%), trifluralin 1.0 kg/ha preplant application + 1HW (11.42%), oxyfluorfen 0.35 kg/ha pre-emergence application (12.22%). However an increasing trend in weed index has been observed with increase in weed population. The findings are in lines with Shaikh *et al.* (2002).

Yield attributes and yield

Number of pods/plant, plant height and fresh pod yield were significantly influenced by different weed

managements treatments during all the years. Highest number of pods/plants to the tune 20.1, 20.6 and 22.0, plant height of 56.5, 57.8 and 58.0 cm and fresh pod yield of 23.9, 24.8 and 24.9 q/ha were recorded with fluchloralin 1.0 kg/ha preplant application + 1HW during 2007, 2008 and 2009 respectively (Table 3). The treatment alachlor 2.0 kg/ha pre-emergence application was observed to be next best treatment in this respect which was followed by trifluralin 1.0 kg/ha preplant application + 1HW. This might have happened due to effective weed control by these treatments. Similar findings were observed by Sandhu *et al.* (1991).

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Table 2. Effect of integrated weed management strategies on weed population, weed drymatter, weed index and weed control efficiency of okra

Treatment	Weed population (no/m ²)			Weed dry matter (g/m ²)			Weed index*	Weed control efficiency** (WCE)
	2007-08	2008-09	2009-10	2007-08	2008-09	2009-10		
T ₁ - One hand weeding (20DAS)	10.7(112.3)	10.6(111.0)	10.4(107.7)	5.6(29.88)	5.4(27.69)	5.1(25.01)	36.59	25.36
T ₂ - Two hand weeding (20, 40 DAS)	8.4(69.3)	7.7(58.8)	7.6(56.7)	4.3(17.74)	4.1(15.84)	3.9(14.6)	13.63	44.09
T ₃ - Trifluralin 1.0 kg/ha PP application	10.4(107.7)	9.6(91.6)	9.5(89.5)	5.4(27.85)	5.2(25.78)	5.0(23.91)	33.42	30.27
T ₄ - Fluchloralin 1.0 kg/ha PP application	9.3(97.7)	9.5(89.8)	9.4(86.7)	4.6(19.91)	4.5(18.84)	4.2(17.09)	26.89	3.43
T ₅ - Alachlor 2.0kg/ha PE application	9.8 (95.3)	9.4(87.2)	9.3(84.5)	5.0(23.63)	4.7(21.56)	4.6(20.40)	26.32	32.89
T ₆ - Oxyfluorfen 0.35 kg/ha PE application	9.5 (88.7)	8.6(73.3)	8.5(70.9)	4.8(21.85)	4.5(19.71)	4.3(17.87)	27.61	37.34
T ₇ - Two directed burner flammings in inter-rows	10.2 (102.3)	9.6(90.7)	9.5(89.0)	5.0(23.59)	4.8(1.75)	4.5(18.92)	30.87	31.09
T ₈ - Trifluralin 1.0kg/haPP application+IHW	7.9 (59.7)	6.7(43.8)	6.5(41.7)	4.1(15.58)	3.8(13.75)	3.6(11.96)	11.42	50.20
T ₉ - Fluchloralin 1.0kg/haPP application+IHW	6.1(36.0)	5.4(28.5)	5.1(24.9)	3.1(8.40)	2.957(82)	2.7(6.08)	4.11	60.89
T ₁₀ - Alachlor 2.0 kg/ha PE application + IHW	6.3(39.0)	5.7(31.4)	5.4(28.1)	3.4(8.40)	3.3(9.64)	3.0(8.15)	7.09	59.09
T ₁₁ - Oxyfluorfen 0.35 kg/ha PE application+IHW	6.7(43.3)	6.3(39.4)	6.1(36.8)	3.7(12.64)	3.6(11.83)	3.2(9.59)	12.22	54.85
T ₁₂ - Two directed burner flammings in inter-rows+IHW	9.2(83.7)	8.5(71.8)	8.5(69.6)	4.4(18.60)	4.3(17.71)	4.1(15.5)	17.56	38.17
T ₁₃ - Weedy check	14.6(212.3)	14.1(198.7)	13.7(185.8)	13.6(184.70)	13.2(170.72)	12.9(166.87)	56.63	-
T ₁₄ - Weed free	1.0(0.0)	11.0(0.0)	1.0(0.0)	1.0(0.00)	1.0(0.00)	0.00	-	100.00
LSD (P=0.05)	0.3	0.4	0.2	0.4	0.5	0.5		

The figures given in parenthesis are original values which are subject to square root transformation $\sqrt{x+1}$. * Weed Index calculated on the basis of mean average fresh pods (q/ha) of three years, ** Weed control efficiency calculated on the basis of mean weed population values of three years, PP- Pre-plant, PE- Pre-emergence, HW- Hand weeding

Table 3. Effect of integrated weed management strategies on yield attributes and yield of okra

Treatment	Pods/plant			Plant height(cm)			Fresh pods (q/ha)		
	2007-08	2008-09	2009-10	2007-08	2008-09	2009-10	2007-08	2008-09	2009-10
T ₁ - One hand weeding (20DAS)	17.0	17.6	18.9	30.5	31.8	32.9	148.5	167.3	170.8
T ₂ - Two hand weeding (20, 40 DAS)	18.6	19.6	20.7	47.5	48.7	49.4	211.3	221.8	229.7
T ₃ - Trifluralin 1.0 kg/ha PP application	17.4	17.9	18.8	31.3	32.1	33.8	168.0	170.6	172.3
T ₄ - Fluchloralin 1.0 kg/ha PP application	18.1	18.9	20.2	41.0	40.9	42.0	188.7	175.5	196.8
T ₅ - Alachlor 2.0kg/ha PE application	17.7	18.3	19.6	34.4	35.7	36.2	170.3	196.5	198.6
T ₆ - Oxyfluorfen 0.35 kg/ha PE application	17.9	18.6	19.8	37.6	38.0	38.2	174.6	188.4	192.5
T ₇ - Two directed burner flammings in inter-rows	17.5	18.0	19.2	32.9	33.5	34.9	168.4	179.6	182.5
T ₈ - Trifluralin 1.0kg/haPP application+IHW	18.9	20.1	20.9	49.5	50.6	52.0	218.5	229.4	231.8
T ₉ - Fluchloralin 1.0kg/haPP application+IHW	20.0	20.6	22.1	56.5	57.8	58.0	238.5	247.8	249.5
T ₁₀ - Alachlor 2.0 kg/ha PE application + IHW	19.0	20.3	21.4	53.8	54.2	55.9	229.6	241.3	242.0
T ₁₁ - Oxyfluorfen 0.35 kg/ha PE application+IHW	18.7	19.9	20.1	55.5	47.8	47.7	217.2	225.6	230.8
T ₁₂ - Two directed burner flammings in inter-rows+IHW	18.3	19.3	20.4	42.7	43.1	44.4	202.1	211.4	219.1
T ₁₃ - Weedy check	16.6	17.0	17.5	23.2	24.4	30.1	123.3	111.3	98.2
T ₁₄ - Weed free	20.3	20.9	23.4	59.7	60.9	62.6	250.0	257.4	260.0
LSD (P=0.05)	2.8	2.9	3.5	8.0	7.4	8.2	15.45	17.4	14.9