



Weed management influence on weed dynamics and yield of summer lady's finger

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ABSTRACT

A field experiment was conducted during the summer seasons of 2013 and 2014 in Vertisol soil to evaluate the fruit yield and weed dynamics influenced by weed management practices at the College Farm, N.M. College of Agriculture, Navsari Agricultural University, Navsari. Results showed that three hand weeding (HW) at 20, 40 and 60 days after sowing (DAS) recorded significantly higher weed control efficiency with minimum weed population. All growth and yield attributes were significantly higher under three HW at 20, 40 and 60 DAS. Consequently, higher fruit yield (16.78 t/ha) was also registered with three HW at 20, 40 and 60 DAS and remained at par with two HW at 20 and 40 DAS and pendimethalin 1.0 kg/ha as pre-emergence + quizalofop-ethyl 0.04 kg/ha at 30 DAS. For achieving higher and profitable fruit yield, two HW at 20 and 40 DAS found appropriate. However, under a scarce labour situation, application of pendimethalin 1.0 kg/ha as pre-emergence + quizalofop-ethyl 0.04 kg/ha at 30 DAS was also found remunerative.

Key words: lady's fingers, Oxyfluorfen, Pendimethalin, Quizalofop-ethyl, Weed management

Okra [*Abelmoschus esculentus* (L.) Moench] belongs to family Malvaceae, known as Lady's finger, is one of the most important vegetables grown in tropical and sub-tropical parts of the world. Among the problems encountered in cultivation of okra, control of weeds is of utmost importance. Weeds are the silent robbers of plant nutrients, moisture, sun light and also compete for space that would otherwise be available to the main crop. Because of the slow growth rate of okra during the initial stages, weeds take advantage of moisture, soil fertility and environmental conditions to suppress the growth of the crop. Due to this weed competition, the crop remains weak and unhealthy, which results in the reduction of yield and quality of the crop. Yield losses in okra due to weeds varied from 40 to 80% depending on the type of flora, their intensity and stages (Patel *et al.* 2004). The most critical period of crop weed competition in okra is up to 2 - 6 weeks after sowing.

In spite of enough technologies in mechanization of agriculture, farmers still practice hand weeding to keep weeds down in the field. For avoiding drudgery and expenses on labour, manual, mechanical and chemical weed management practices should be tested for recommendation to the farmers. It was, therefore, considered necessary to undertake a study to find the performance of various pre-emergence as

well as post-emergence herbicides applied with other weed management practices to reduce the farmers extra expenditure incurred on manual weeding.

MATERIALS AND METHODS

The present investigation was conducted at College Farm, N. M. College of Agriculture, Navsari Agricultural University, Navsari during summer 2013 and 2014. The trial was laid out in a randomized block design with ten treatments (**Table 1**) replicated thrice on okra hybrid. The soil was clay in texture, having 0.59% organic C, medium in available nitrogen (224 kg/ha) and phosphorus (40 kg/ha), fairly rich in available potassium (362 kg/ha) and slightly alkaline in reaction (pH 7.6) with normal electrical conductivity.

The field was fertilized with recommended doses of NPK at the rate of 150: 100:100 kg/ha. Common application of well decomposed FYM 10 t/ha was uniformly applied to all the experimental units before transplanting. The basal dose of fertilizers, consisting of full dose of P₂O₅ through SSP and K₂O through MOP, half dose of N through urea as per the treatment was applied manually. The remaining dose of N was supplied at 30 days after sowing. All the recommended package of practices was adopted to raise the crop except weed control. All the herbicides were applied as pre-emergence using a knapsack sprayer fitted with a flat fan nozzle attached with the

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hood of sprayer by mixing in 500 L of water/ha as per treatment. Marketable size green okra fruits were picked up for yield estimation. The data on dry weed weight (g/m²) at 90 DAS were collected from plots of different treatments. Fresh pod yield (t/ha) was recorded by adding the weight of pods at different pickings. The weed control efficiency was calculated as per standard method.

RESULTS AND DISCUSSION

Effect on weeds

Dominant weeds identified in the experimental plots during the course of investigation were *Echinochloa* spp., *Convolvulus arvensis*, *Trianthema portulacastrum*, *Digera arvensis*, *Physalis minima* and *Cynodon dactylon*. The crop experienced severe weed competition during investigation, which might be due to favourable environmental conditions leading to vigorous growth of weeds. All the weed management practices caused a significant reduction in weed density.

Among the treatment, HW at 20, 40 and 60 DAS, two hand weeding at 20 and 40 and among chemical method of weed control, treatment pendimethalin 1.0 kg/ha as pre-emergence + quizalofop-ethyl 0.040 kg/ha at 30 DAS and quizalofop-ethyl 0.040 kg/ha at 20 DAS + one hand weeding at 40 DAS significantly reduced the weed population and dry weight of weeds compared to weedy check. The effective control of weeds under these treatments resulted in the highest weed control efficiency and lower weed index. Effectiveness of various herbicides against different weed species in okra crop has been reported by many workers

including Kumar *et al.* (2009), Singh *et al.* (2010) and Sharma and Patel (2011).

Effect on crop

Various growth parameters, *viz.* plant height, number of leaves/main stem and number of nodes/main stem; yield attributes, *viz.* diameter, weight and length of fruit, number of fruit/plant and fruit yield/plant play a vital role in increasing the productivity of okra crop which were favourably influenced by various weed management treatments. However, significantly higher values of all said parameters were recorded under three HW at 20, 40 and 60 DAS, while lower was recorded with weedy check. In case of diameter, weight and length of okra fruit, found at par with treatments of two HW at 20 and 40 DAS, combination of pre- and post-emergence herbicides and integrated weed management practices. However, in most of growth and yield parameters, *viz.* plant height, numbers of leaves/plant number of nodes/main stem, stem diameter, plant dry matter accumulation; yield attributes, *viz.* diameter, weight, length of fruit, number of fruits/plant, fruit yield/plant, all the weed management practices found significantly superior than weedy check except the stale seedbed technique for weed diameter.

Growth is the function of photosynthetic activity of the okra plant and their capacity to utilize available nutrients. Thus, enhanced availability of nutrients, water, light and space resulted in increase in plant height, number of leaves and dry matter accumulation which reflected in term of higher fruit length, fruit diameter and average fruit weight. These findings were supported by Pandey and Mishra (2013) and Shivalingappa *et al.* (2014).

Table 1. Total weed count, dry weight of weeds, weed control efficiency and weed index as influenced by weed management in summer lady's finger

Treatment	Total weed count/m ²			Dry weed biomass		WCE (%)	WI (%)
	20 DAS	40 DAS	At harvest	(g/m ²)	(kg/ha)		
				20 DAS	40 DAS		
Stale seed bed	7.1(49)	9.0(80)	10.0(98)	30.4	556.0	45.9	51.3
Pendimethalin 1.0 kg/ha (PE)	7.7(59)	8.8(77)	9.5(89)	29.1	502.8	51.2	48.7
Oxyfluorfen 0.24 kg/ha (PE)	8.8(77)	10.2(103)	10.8(116)	39.2	649.9	37.2	49.9
Pendimethalin 1.0 kg/ha (PE) + quizalofop-ethyl 0.040 kg/ha at 30 DAS	8.0(63)	7.1(49)	6.3(39)	24.8	281.5	73.1	16.1
Oxyfluorfen 0.24 kg/ha (PE) + quizalofop-ethyl 0.040 kg/ha at 30 DAS	9.2(84)	8.7(75)	9.7(94)	29.7	537.9	48.1	42.6
Quizalofop-ethyl 0.040 kg/ha at 20 DAS + one hand weeding at 40 DAS	10.6(113)	8.7(74)	7.2(51)	30.1	299.6	70.9	24.8
One hand weeding + straw mulch 3 t/ha at 20 DAS	10.2(104)	8.0(63)	9.0(81)	24.3	470.7	54.2	47.5
Two hand weeding at 20 and 40 DAS	10.6(119)	7.5(55)	5.3(27)	21.6	183.5	82.1	14.1
Weed free check (three hand weeding at 20, 40 and 60 DAS)	10.2(103)	6.7(43)	4.6(20)	17.1	119.4	88.4	0.0
Weedy check (control)	11.3(119)	11.0(121)	11.7(139)	46.1	1047.1	0.0	67.0
LSD (p=0.05)	1.09	0.88	0.97	6.00	85.76	--	--

Data were subjected to transformation. Figures in parentheses are means of original values

Table 2. Growth and yield attributes and yield of summer ladies' fingers at harvest as influenced by weed management

Treatment	Plant height (cm)	No. of leaves/plant	No. of nodes/main stem	Fruit			No. of fruit/plant	Fruit yield/plant (g)	Fruit yield (t/ha)	Net return (₹/ha)
				Diameter (cm)	Weight (g)	Length (cm)				
Stale seed bed	85.7	32.0	12.3	1.47	11.05	11.10	6.6	64.7	8.0	23772
Pendimethalin 1.0 kg/ha (PE)	89.3	33.3	13.3	1.43	11.23	11.89	8.7	91.9	8.5	29346
Oxyfluorfen 0.24 kg/ha (PE)	80.6	31.4	12.8	1.41	10.17	11.07	6.7	67.0	8.3	28611
Pendimethalin 1.0 kg/ha (PE) + quizalofop-ethyl 0.040 kg/ha at 30 DAS	97.1	40.0	16.5	1.69	11.30	12.25	9.4	111.4	13.9	82277
Oxyfluorfen 0.24 kg/ha (PE) + quizalofop-ethyl 0.040 kg/ha at 30 DAS	91.1	34.8	13.2	1.58	10.38	12.10	7.1	79.4	9.6	39421
Quizalofop-ethyl 0.040 kg/ha at 20 DAS + one hand weeding at 40 DAS	96.5	37.7	16.2	1.66	11.23	12.23	9.2	110.1	12.5	66505
One hand weeding + straw mulch 3 t/ha at 20 DAS	92.4	35.5	14.9	1.59	10.87	11.03	7.3	80.5	8.7	23799
Two hand weeding at 20 and 40 DAS	97.6	42.2	16.8	1.67	11.51	12.19	10.3	126.1	14.3	83442
Weed free check (three hand weeding at 20, 40 and 60 DAS)	110.6	48.5	19.0	1.74	12.61	13.63	11.6	144.2	16.8	105233
Weedy check (control)	68.2	26.2	11.1	1.30	8.83	7.31	4.0	44.4	5.5	1303
LSD (p=0.05)	11.81	5.17	2.41	0.21	1.50	1.55	1.22	10.42	2.89	
FYM: ` 1/kg	Quizalofop-ethyl: ` 1600/L	Labour: ` 150/day			Urea: ` 6.38/kg					
Paddy straw: ` 2.25/kg	SSP: ` 7.02/kg	Pendimethalin: ` 500/L			MOP: ` 16.80/kg					
Oxyfluorfen: ` 800 /L	Okra: ` 10.00/kg									

Higher fresh fruit yield (16.8, 14.3 and 13.9 t/ha, respectively) were obtained under treatment three HW at 20, 40 and 60 DAS followed by two HW at 20 and 40 DAS and pendimethalin 1.0 kg/ha as pre-emergence + quizalofop-ethyl 0.040 kg/ha at 30 DAS. This might be due to weed management treatments which controlled weeds effectively, reduced the competition from the weeds to a greater extent leading to lesser nutrient removal by weeds and higher uptake of nutrients thus helped in faster growth and development of okra crop, resulting in obtaining higher values of all yield attributing characters. The findings were in closely vicinity of those reported by Kumar *et al.* (2011) and Sharma and Patel (2011) with respect to okra yield.

Economics

From the economics point of view, the highest net profit of ` 1,05,233/ha was obtained from treatment three HW at 20, 40 and 60 DAS followed by treatments two HW at 20 and 40 DAS (₹ 83442/ha) and pendimethalin 1.0 kg/ha as pre-emergence + quizalofop-ethyl 0.040 kg/ha at 30 DAS (₹ 82277/ha).

Thus for management of weeds in lady's finger, two hand weeding at 20 and 40 DAS found effective for achieving higher and profitable fruit yield. Alternatively, under scare labour situations, application of pendimethalin 1.0 kg/ha as pre-

emergence + quizalofop-ethyl 0.04 kg/ha at 30 DAS was also found remunerative.

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