



EFFECT OF DIFFERENT WEED CONTROL TREATMENTS ON WEED DENSITY, WEED CONTROL EFFICIENCY (%) AND WEED INDEX (%) IN OKRA (*Abelmoschus esculentus* L. Moench) cv. ARKA ANAMIKA

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ABSTRACT

An experiment was conducted in the Model orchard, College of Horticulture, Dr.Y.S.R Horticultural University, Rajendranagar, Hyderabad, during *khariif*, 2011. Twelve different weed control treatments were imposed in Randomized Block Design replicated thrice. Among the treatments least weed density and higher weed control efficiency were registered with Oxyfluorfen as pre emergence @0.15 kg a.i ha⁻¹+ one hand weeding at 30 DAS (T₉) followed by farmers practice (T₁₁) and other integrated weed control treatments (T₅ and T₇).

KEY WORDS: okra, weeds, oxyfluorfen, weed density, weed control efficiency and weed index.

INTRODUCTION

Okra (*Abelmoschus esculentus* L. Moench) belongs to family Malvaceae, known as Bhendi or Lady's finger is one of the most important vegetable grown in tropical and sub tropical parts of the world. India is the largest producer of Okra with an area of 452.5 (000' ha) and production of 4803.3 (000'MT) with the productivity of 10.6 MT (NHB, 2010). 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. Weeds also harbour pests and disease causing organisms; cause adverse allelopathic effects on okra and reduce the yield and quality of the produce. 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; this results in the reduction of yield and quality of the crop (Singh et al., 1968). A yield loss of about 54.1 to 90.6 per cent was reported in okra due to weed competition (Sigh et al., 1982). The most critical period of crop weed competition in okra is upto 2-6 weeks after sowing (Singh et al., 1981). Use of herbicides for weed control is advocated for weed control due to their easy application and effectiveness in early control of weeds (Virender Sardana, 1997). But unfortunately no single herbicide alone provides the desired degree of weed control as degradation and loss in persistence of herbicides in soil results in re-emergence of weeds during the main part of growing season of the crop (Asok Mehta et al., 1979). The present study was, therefore, designed to find out the Effect of different weed control treatments on weed

density, weed control efficiency (%) and weed index (%) in Okra (*Abelmoschus esculentus* L. Moench) cv. Arka anamika.

MATERIAL & METHODS

The preset investigation was conducted in the Model orchard, College of Horticulture, Dr.Y.S.R Horticultural University, Rajendranagar, Hyderabad, during *khariif*, 2011. The trial was laid out in Randomized Block Design replicated thrice. Twelve treatments consisting of Pendimethalin C.S as pre emergence @0.6 kg a.i ha⁻¹, Alachlor as pre emergence @1.0 kg a.i ha⁻¹, Oxyfluorfen as pre emergence @0.15 kg a.i ha⁻¹, Pendimethalin C.S as pre emergence @0.6 kg a.i ha⁻¹ followed by Quizalofop ethyl @ 50 g a.i ha⁻¹ as post emergence at 2-3 leaf stage of weed, Pendimethalin C.S as pre emergence @0.6 kg a.i ha⁻¹+ one hand weeding at 30 DAS, Alachlor as pre emergence @1.0 kg a.i ha⁻¹ followed by Quizalofop ethyl @50 g a.i ha⁻¹ as post emergence at 2-3 leaf stage of weed, Alachlor as pre emergence @1.0 kg a.i ha⁻¹ + one hand weeding at 30 DAS, Oxyfluorfen as pre emergence @0.15 kg a.i ha⁻¹ followed by Quizalofop ethyl @50 g a.i ha⁻¹ as post emergence at 2-3 leaf stage of weed, Oxyfluorfen as pre emergence @0.15 kg a.i ha⁻¹+ one hand weeding at 30 DAS, Application of Quizalofop ethyl @50 g a.i ha⁻¹ as post emergence at 2-3 leaf stage of weed, Farmers practice (2 HWs at 20 and 40 DAS) and Weedy check (Control). The field was fertilized with recommended doses of NPK at the rate of 100: 80:80 kgha⁻¹, respectively. The seeds of Okra cv. Arka anamika were sown on ridges at 50x25 cm spacing. The data was recorded on weed density at 20, 40, 60, 80 DAS and at final harvest stage, weed control efficiency (%) at 20, 40, 60, 80 DAS and at final harvest stage and weed index (%).

RESULTS & DISCUSSION

Weed flora of experimental field consisting of grasses, sedges, and broad leaved. The data indicated that all together there were 17 species of which, 5 species were grasses, 1 sedge, and 11 species of broad leaved weeds (BLWs).

However the predominant weeds were *Cyperus rotundus* L. is the only sedge and among the grasses *Cynodon dactylon* (L.) and *Dactyloctenium aegypticum* (L.) Beauv. were predominant weeds in all the treatments. Among BLWs, *Parthenium hysterophorus*, *Digera arvensis* Forsk and *Euphorbia hirta* L. were the major weeds.

1. Weed population at 20 days after sowing

The data regarding weed count at 20 DAS is presented in Table 1.

Grasses

The data revealed that the significantly least weed density of grasses was found on application of Oxyfluorfen@0.15 kg a.i ha⁻¹ (PE) + one hand weeding at 30 DAS (T₉) (2.00) and it was found to be at par with the treatments, Oxyfluorfen@0.15 kg a.i ha⁻¹ (PE) (2.33) and Oxyfluorfen@0.15 kg a.i ha⁻¹ (PE) + Quizalofop ethyl @ 50 g a.i ha⁻¹ (POE) (2.33). Maximum weed density was recorded in weedy check (14.33). Which is on par with farmers practice (13.33).

Sedges

Significantly minimum number of sedges were recorded in Oxyfluorfen @ 0.15 kg a.i ha⁻¹ (PE) + one hand weeding at 30 DAS (T₉) (15.00) and Oxyfluorfen @ 0.15 kg a.i ha⁻¹ (PE) (15.00) and these were found to be on par with Oxyfluorfen @ 0.15 kg a.i ha⁻¹ (PE) + Quizalofop ethyl @ 50 g a.i ha⁻¹ as post emergence (15.33). Whereas maximum number of sedges were observed in weedy check (50.00) which was on par with farmers practice (49.66).

Broad leaved weeds

Minimum number of broad leaved weeds was significantly recorded in Oxyfluorfen@0.15 kg a.i ha⁻¹ (PE) + one hand weeding at 30 DAS (T₉) (2.00). It was found to be on par with Oxyfluorfen @ 0.15 kg a.i ha⁻¹ (PE) (2.33) and Oxyfluorfen @ 0.15 kg a.i ha⁻¹ (PE) + Quizalofop ethyl @ 50 g a.i ha⁻¹ as post emergence (2.66). The highest number of broad leaved weeds was observed in weedy check (23.66) it was on par with farmers practice (22.66).

Total weed population

Significantly lower weed density was recorded in Oxyfluorfen@0.15 kg a.i ha⁻¹ (PE) + one hand weeding at 30 DAS (T₉) (19.00) and it was on par with Oxyfluorfen @ 0.15 kg a.i ha⁻¹ (PE) (19.33) and Oxyfluorfen@0.15 kg a.i ha⁻¹ (PE) + Quizalofop ethyl @ 50 g a.i ha⁻¹ as post emergence (20.32) followed by Pendimethalin C.S @ 0.6 kg a.i ha⁻¹ (PE)+ one hand weeding at 30 DAS (23.66). Maximum weed count was recorded in weedy check (87.99) it was on par with farmers practice (85.65).

2. Weed population at 40 days after sowing

The data regarding weed density at 40 days after sowing is presented in Table No.1

Grasses

Integrated weed management treatments that received one hand weeding in addition to pre emergence application of herbicides were superior to other herbicidal treatments. Treatment Oxyfluorfen @ 0.15 kg a.i ha⁻¹ (PE) + one hand weeding at 30 DAS (T₉) (1.33) significantly recorded the lowest number of grassy weeds. It was on par with the Pendimethalin C.S @ 0.6kg a.i ha⁻¹ (PE) + one hand weeding at 30 DAS (T₅) (1.66) and Alachlor @1.0 kg a.i ha⁻¹ (PE) + one hand weeding at 30 DAS (T₇) (2.00) where as the highest weed density was recorded in weedy check (24.00).

Sedges

Among all the treatments Oxyfluorfen@ 0.15 kg a.i ha⁻¹ (PE) + one hand weeding at 30 DAS (T₉) (12.00) recorded lowest weed count of sedges and it was on par with Pendimethalin C.S@0.6kg a.i ha⁻¹ (PE)+ one hand weeding at 30 DAS (12.33) and Alachlor @1.0 kg a.i ha⁻¹ (PE)+ one hand weeding at 30 DAS (12.66). Weedy check (73.33) recorded the maximum weed density of sedges.

Broad leaved weeds

Significantly least number of broad leaved weeds were recorded in Oxyfluorfen @ 0.15 kg a.i ha⁻¹ (PE) + one hand weeding at 30 DAS (T₉) (1.66) and it was found to be on par with Pendimethalin C.S @ 0.6 kg a.i ha⁻¹ (PE) + one hand weeding at 30 DAS (2.00) and Alachlor @ 1.0 kg a.i ha⁻¹ (PE) + Hand weeding at 30 DAS (2.00). The highest numbers of broad leaved weeds were recorded in weedy check (30.00).

Total weed population

The lowest weed density was significantly recorded in Oxyfluorfen @ 0.15 kg a.i ha⁻¹ (PE) + one hand weeding at 30 DAS (T₉) (14.99) it is on par with Pendimethalin C.S @ 0.6 kg a.i ha⁻¹ (PE)+ one hand weeding at 30 DAS (15.99) and Alachlor @1.0 kg a.i ha⁻¹ (PE) + one hand weeding at 30 DAS (16.66) followed by farmers practice (20.32). Maximum total weed count was recorded in weedy check (127.33).

3. Weed population at 60 days after sowing

Weed count as influenced by different weed management practices at 60 DAS are given in Table No.1.

Grasses

Significantly minimum number of grassy weeds was recorded in Oxyfluorfen @ 0.15 kg a.i ha⁻¹ (PE) + one hand weeding at 30 DAS (T₉) (2.66) and it was found to be on par with farmers practice (3.33). Weedy check (33.00) recorded maximum number of grassy weeds.

Sedges

The lowest number of sedges were recorded in Oxyfluorfen @ 0.15 kg a.i ha⁻¹ (PE) + Hand weeding at 30 DAS (T₉) (13.66) and it was on par with farmers practice (14.66). Maximum numbers of sedges were recorded in weedy check (91.00).

Broad leaved weeds

The least number of broad leaved weeds were significantly recorded in Oxyfluorfen @ 0.15 kg a.i ha⁻¹ (PE) + one hand weeding at 30 DAS (T₉) (3.66) and it was on par with farmers practice (4.33). Maximum numbers of broad leaved weeds were recorded in weedy check (39.00).

TABLE 1: Effect of different weed control treatments on weed density (number m⁻²) at 20 DAS, 40 DAS, 60 DAS, 80 DAS and At final Harvest

Treatment	20DAS					40 DAS					60 DAS					80 DAS					At Final Harvest								
	Grasses	Sedges	BLW's	Total	SE	Grasses	Sedges	BLW's	Total	SE	Grasses	Sedges	BLW's	Total	SE	Grasses	Sedges	BLW's	Total	SE	Grasses	Sedges	BLW's	Total	SE				
T ₁	3.66 (2.15)	17.00 (4.24)	3.33 (2.08)	23.99 (5.00)	7.33 (2.88)	34.33 (5.94)	12.66 (3.70)	54.32 (7.44)	12.33 (3.65)	49.00 (7.07)	22.66 (4.86)	83.99 (9.22)	14.33 (3.91)	55.66 (7.52)	29.00 (5.47)	98.99 (10.00)	16.66 (4.20)	57.00 (7.61)	30.00 (5.57)	103.66 (10.23)									
T ₂	6.66 (2.77)	18.33 (4.39)	4.66 (2.38)	29.65 (5.54)	8.66 (3.11)	35.33 (6.03)	14.00 (3.87)	57.99 (7.68)	13.33 (3.78)	52.33 (7.30)	25.33 (5.13)	90.99 (9.60)	16.68 (4.20)	58.33 (7.70)	31.00 (5.65)	106.01 (10.34)	18.33 (4.39)	59.33 (7.76)	34.00 (5.92)	111.66 (10.61)									
T ₃	2.33 (1.82)	15.00 (4.00)	2.33 (1.82)	19.33 (4.51)	5.66 (2.58)	32.66 (5.80)	11.33 (3.51)	49.65 (7.12)	8.66 (3.11)	48.00 (7.00)	20.33 (4.62)	76.99 (8.83)	10.00 (3.32)	51.33 (7.23)	28.00 (5.38)	89.33 (9.50)	12.33 (3.65)	54.33 (7.44)	29.66 (5.54)	96.32 (9.86)									
T ₄	4.00 (2.23)	17.33 (4.28)	3.66 (2.15)	25.32 (5.13)	2.66 (1.91)	26.66 (5.26)	8.00 (3.00)	37.32 (6.19)	5.66 (2.58)	40.33 (6.43)	15.66 (4.08)	61.65 (7.91)	6.66 (2.77)	46.66 (6.90)	19.33 (4.50)	72.65 (8.58)	9.66 (3.26)	49.00 (7.07)	23.33 (4.93)	81.99 (9.11)									
T ₅	3.66 (2.15)	17.00 (4.24)	3.00 (2.00)	23.66 (4.96)	1.66 (1.63)	12.33 (3.65)	2.00 (1.73)	15.99 (4.12)	4.00 (2.23)	24.00 (5.00)	6.00 (2.64)	34.00 (5.91)	5.00 (2.45)	21.66 (4.76)	9.00 (3.14)	35.66 (6.05)	6.00 (2.64)	32.00 (5.74)	13.00 (3.74)	51.00 (7.21)									
T ₆	7.00 (2.82)	18.66 (4.43)	5.00 (2.45)	30.66 (5.63)	4.33 (2.31)	30.66 (5.63)	10.66 (3.41)	45.66 (6.83)	6.33 (2.71)	42.00 (6.56)	18.66 (4.43)	66.99 (8.24)	7.33 (2.88)	50.33 (7.16)	25.33 (5.12)	82.99 (9.16)	10.33 (3.36)	52.66 (7.32)	27.66 (5.35)	90.65 (9.57)									
T ₇	5.33 (2.51)	17.66 (4.32)	4.00 (2.23)	26.99 (5.29)	2.00 (1.73)	12.66 (3.69)	2.00 (1.73)	16.66 (4.20)	4.33 (2.31)	32.33 (5.77)	8.00 (3.00)	44.66 (6.75)	5.33 (2.51)	34.66 (6.22)	10.00 (3.31)	49.99 (7.14)	6.33 (2.71)	40.66 (6.45)	14.00 (3.87)	60.99 (7.87)									
T ₈	2.33 (1.82)	15.33 (4.04)	2.66 (1.91)	20.32 (4.61)	2.66 (1.91)	26.33 (5.23)	6.33 (2.71)	35.32 (6.03)	4.66 (2.37)	34.66 (5.97)	11.00 (3.46)	50.32 (7.16)	5.66 (2.58)	37.66 (6.22)	14.66 (3.96)	57.98 (7.68)	8.66 (3.10)	43.00 (6.63)	16.33 (4.16)	67.99 (8.30)									
T ₉	2.00 (1.73)	15.00 (4.00)	2.00 (1.73)	19.00 (4.47)	1.33 (1.52)	12.00 (3.60)	1.66 (1.63)	14.99 (4.00)	2.66 (1.91)	13.66 (3.83)	3.66 (2.16)	19.98 (4.57)	3.66 (2.15)	16.66 (4.20)	4.33 (2.31)	24.65 (5.06)	4.00 (2.23)	20.33 (4.62)	6.33 (2.71)	30.66 (5.62)									
T ₁₀	8.66 (3.11)	32.33 (5.77)	13.33 (3.78)	54.32 (7.44)	5.66 (2.57)	46.66 (6.90)	18.33 (4.39)	70.65 (8.46)	9.33 (3.21)	56.00 (7.55)	27.33 (5.32)	92.66 (9.68)	12.00 (3.60)	63.66 (8.04)	33.00 (5.83)	108.66 (10.47)	15.33 (4.04)	65.33 (8.14)	36.00 (6.08)	116.66 (10.85)									
T ₁₁	13.33 (3.78)	49.66 (7.12)	22.66 (4.86)	85.65 (9.31)	2.33 (1.81)	15.66 (4.08)	2.33 (1.82)	20.32 (4.62)	3.33 (2.08)	14.66 (3.96)	4.33 (2.31)	22.32 (4.83)	4.33 (2.31)	19.66 (4.54)	7.33 (2.88)	31.32 (5.68)	5.33 (2.51)	22.33 (4.83)	9.33 (3.21)	36.99 (6.16)									
T ₁₂	14.33 (3.91)	50.00 (7.14)	23.66 (4.97)	87.99 (9.43)	24.00 (5.00)	73.33 (8.62)	30.00 (5.57)	127.33 (11.3)	33.00 (5.83)	91.00 (9.59)	39.00 (6.32)	163.00 (12.81)	41.33 (6.51)	98.66 (9.98)	41.66 (6.53)	181.65 (13.51)	42.33 (6.58)	100.66 (10.08)	45.33 (6.81)	188.32 (13.76)									
SE (m)±	0.09	0.08	0.08	0.05	0.09	0.05	0.05	0.08	0.08	0.05	0.05	0.10	0.06	0.10	0.15	0.13	0.09	0.07	0.12										
CD at 5%	0.28	0.23	0.25	0.14	0.26	0.15	0.16	0.23	0.23	0.15	0.15	0.31	0.18	0.29	0.45	0.37	0.27	0.19	0.17	0.36									

TABLE 2: Effect of different weed control treatments on weed control efficiency (%) and Weed index (%)

Treatment	Weed control efficiency (%)					Weed index (%)
	20 DAS	40 DAS	60 DAS	80 DAS	At final harvest	
T ₁	86.18	72.21	62.80	57.15	58.49	32.05
T ₂	78.14	63.54	60.12	50.44	53.00	38.23
T ₃	92.50	80.25	64.14	61.75	61.55	31.05
T ₄	85.46	88.71	72.48	68.98	70.01	23.10
T ₅	87.89	97.82	92.14	84.32	84.18	5.69
T ₆	76.15	85.78	65.37	64.19	63.74	25.20
T ₇	79.67	97.62	91.12	82.91	79.88	8.67
T ₈	91.60	90.01	78.04	77.49	75.66	19.95
T ₉	92.67	98.02	93.73	93.91	91.56	-
T ₁₀	27.10	55.22	51.00	48.65	47.02	43.05
T ₁₁	2.26	96.33	93.25	92.98	87.70	3.76
T ₁₂	-	-	-	-	-	69.38
SE (m)±	-	-	-	-	-	38.23
CD at 5%	-	-	-	-	-	31.05

T₁:Pendimethalin C.S as pre emergence @0.6 kg a.i ha⁻¹

T₂: Alachlor as pre emergence @1.0 kg a.i ha⁻¹

T₃:Oxyfluorfen as pre emergence @0.15 kg a.i ha⁻¹.

T₄: Pendimethalin C.S as pre emergence @0.6 kg a.i ha⁻¹followed by Quizalofop ethyl @ 50 g a.i ha⁻¹ as post emergence at 2-3 leaf stage of weed.

T₅: Pendimethalin C.S as pre emergence @0.6 kg a.i ha⁻¹+ one hand weeding at 30 DAS.

T₆:Alachlor as pre emergence @1.0 kg a.i ha⁻¹ followed by Quizalofop ethyl @50 g a.i ha⁻¹ as post emergence at 2-3 leaf stage of weed.

T₇:Alachlor as pre emergence @1.0 kg a.i ha⁻¹ + one hand weeding at 30 DAS.

T₈:Oxyfluorfen as pre emergence @0.15 kg a.i ha⁻¹ followed by Quizalofop ethyl @50 g a.i ha⁻¹ as post emergence at 2-3 leaf stage of weed.

T₉:Oxyfluorfen as pre emergence @0.15 kg a.i ha⁻¹+ one hand weeding at 30 DAS.

T₁₀: Application of Quizalofop ethyl @50 g a.i ha⁻¹ as post emergence at 2-3 leaf stage of weed.

T₁₁: Farmers practice (2 Hand weedings at 20 and 40 DAS).

T₁₂: Weedy check (Control).

Total weed population

Significantly minimum number of weeds were found in Oxyfluorfen @ 0.15 kg a.i ha⁻¹ (PE) + one hand weeding at 30 DAS (T₉) (19.98) and it was on par with farmers practice (22.32) followed by Pendimethalin C.S @ 0.6 kg a.i ha⁻¹ (PE) + one hand weeding at 30 DAS (34.00). Maximum weed density was observed in weedy check (163.00).

4. Weed population at 80 days after sowing

The data of weed density as influenced by different weed control practices at 80 DAS is presented in Table No.1.

Grasses

Significantly the least number of weeds were found in Oxyfluorfen @ 0.15 kg a.i ha⁻¹ (PE) + one hand weeding at 30 DAS (T₉) (3.66) it is followed by farmers practice (4.33). The highest numbers of grassy weeds were recorded in weedy check (41.33).

Sedges

Maximum number of sedges was recorded in weedy check (98.66). The lowest number of sedges were recorded in Oxyfluorfen @ 0.15 kg a.i ha⁻¹ (PE) + one hand weeding at 30 DAS (16.66) followed by farmers practice (19.66).

Broad leaved weeds

Minimum number of broad leaved weeds were significantly recorded in Oxyfluorfen @ 0.15 kg a.i ha⁻¹ (PE) + one hand weeding at 30 DAS (T₉) (4.33) and it was followed by farmers practice (7.33). Maximum numbers of broad leaved weeds were recorded in weedy check (41.66).

Total weed population

The lowest weed count was recorded in Oxyfluorfen @ 0.15 kg a.i ha⁻¹ (PE) + one hand weeding at 30 DAS (T₉) (24.65) followed by farmer's practice (31.32) which was on par with Pendimethalin C.S @ 0.6 kg a.i ha⁻¹ (PE) + one hand weeding at 30 DAS (35.66). Remaining treatments also decreased the weed population to different levels and was significantly superior over weedy check (181.65).

5. Weed population at final harvest stage

Weed density prevailed in the crop in different treatments at final harvest stage is presented in table No.1.

Grasses

Significantly the least number of grasses were recorded in Oxyfluorfen @ 0.15 kg a.i ha⁻¹ (PE) + one hand weeding at 30 DAS (T₉) (4.00) it was followed by farmer's practice (5.33). Maximum number of grasses was recorded in weedy check (42.33).

Sedges

Significantly the lowest number of sedges were observed in Oxyfluorfen @0.15 kg a.i ha⁻¹ (PE) + one hand weeding at 30 DAS (T₉) (20.33) and it followed by farmer's practice (22.33). Maximum number of sedges were found in weedy check (100.66).

Broad leaved weeds

Lower number of broad leaved weeds were significantly recorded in Oxyfluorfen @ 0.15 kg a.i ha⁻¹ (PE) + one hand weeding at 30 DAS (T₉) (6.33) and it is followed by farmer's practice (9.33), where as maximum number of broad leaved weeds were recorded in weedy check (45.33).

Total weed population

Significantly minimum weed population recorded in Oxyfluorfen @ 0.15 kg a.i ha⁻¹ (PE) + one hand weeding at 30 DAS (T₉) (30.66) followed by farmer's Practice (36.99), and these two were significantly superior over rest of the treatments. Maximum weed density was found in weedy check (188.32).

The weed population was effectively controlled from 20 DAS to final harvest by application of different integrated herbicidal combinations than the control. Minimum weed population was recorded when Oxyfluorfen was applied as pre emergence with one hand weeding from 30 DAS to final harvest. This might be due to reason that, pre emergence application of various herbicides, the weed emergence was checked in the pre emergence herbicide treated plots and later on the emergence of weeds was not controlled due to loss of residual effect of herbicides in the field. Thereby, good control of weed was achieved whenever pre emergence herbicides are followed by hand weeding. The results were in line with the earlier workers Bhowmik and Mcglew (1986), Siczka *et al.* (1986), Munroe and Nishimoto (1988), Kolhe (2001), Ravinder *et al.* (2001), Bhatia *et al.* (2005) and Anuradha *et al.* (2006).

6. Weed Control Efficiency (WCE)

Weed control efficiency was calculated on the basis of dry weight of weeds recorded in different treatments at different stages of crop growth in comparison to weedy check and the data calculated is presented in Table No.2 however the data was not analyzed statistically.

Significantly the maximum weed control efficiency was noted at the stage of 20 DAS with the treatment Oxyfluorfen@0.15 kg a.i ha⁻¹ (PE) + one hand weeding at 30 DAS (T₉) (92.67%) and it was closely followed by Oxyfluorfen @ 0.15 kg a.i ha⁻¹ (PE) (92.50%) and Oxyfluorfen@0.15 kg a.i ha⁻¹(PE) + Quizalofop ethyl @ 50 g a.i ha⁻¹ as post emergence (91.60%). However minimum WCE was in the treatment farmers practice (T₁₁) (2.26) than all the treatments.

At 40DAS, application of Oxyfluorfen @ 0.15 kg a.i ha⁻¹ (PE) + one hand weeding at 30 DAS (T₉) (98.02%) recorded the maximum WCE and it was closely followed by Pendimethalin C.S @ 0.6 kg a.i ha⁻¹ (PE) + one hand weeding at 30 DAS (97.82%) and Alachlor @1.0 kg a.i ha⁻¹ (PE) + Hand weeding at 30 DAS (97.62%). The treatment Quizalofop ethyl @50 g a.i ha⁻¹ as post emergence (55.22%) recorded the minimum weed control efficiency.

At 60DAS, significantly the maximum weed control efficiency was observed in the treatment Oxyfluorfen @0.15 kg a.i ha⁻¹ (PE) + one hand weeding at 30 DAS (T₉)

(93.73%) and it was closely followed by farmers practice (93.25). The treatment Quizalofop ethyl @50 g a.i ha⁻¹ as post emergence (51%) recorded the minimum weed control efficiency.

At 80DAS, the maximum weed control efficiency was significantly recorded in Oxyfluorfen@0.15 kg a.i ha⁻¹ (PE) + one hand weeding at 30 DAS (T₉) (93.91%) and it was closely followed by farmers practice (92.98%). Minimum WCE recorded in treatment Quizalofop ethyl @ 50 g a.i ha⁻¹ as post emergence (48.65).

At final harvest stage maximum weed control efficiency was recorded in Oxyfluorfen@0.15 kg a.i ha⁻¹ (PE) + one hand weeding at 30 DAS (T₉) (91.56%) and it was closely followed by farmers practice (T₁₁) (87.70%). However the minimum WCE recorded in Quizalofop ethyl @ 50 g a.i ha⁻¹ as post emergence (47.02).

Higher weed control efficiency was achieved in Oxyfluorfen was applied as pre emergence and hand weeding was done at 30 DAS, might be due to effective control of weeds up to the critical stage of crop weed competition. This may be also due to lower weed density and weed dry weight. Next best treatment with higher weed control efficiency was observed in farmer's practice wherein; two hand weeding were carried out at 20 and 40 DAS. Similar results were obtained by Kohle (2001), Anuradha *et al.* (2006), Basavaraj *et al.* (2009) and Sharma *et al.* (2009).

7. Weed Index (WI)

Regarding weed index minimum value recorded in the treatment farmers practice (T₁₁)(3.76) than all the treatments and it was closely followed by Pendimethalin C.S@0.6kg a.i ha⁻¹ (PE)+ one hand weeding at 30 DAS (5.69) and Alachlor @1.0 kg a.i ha⁻¹ (PE) + one hand weeding at 30 DAS (8.67). However maximum weed index recorded in weedy check (69.38). The lower dry weight and lesser weed density resulted in better weed index with the treatments of Oxyfluorfen and hand weeding at 30 DAS. This might be due to minimum weed population; there by less competition for nutrients, space and light with the okra crop and this resulted into minimum loss in yield. These findings are similar to previous Anuradha *et al.* (2006) and Basavaraj *et al.* (2009).

Among the treatments least weed density and higher weed control efficiency were registered with Oxyfluorfen as pre emergence @0.15 kg a.i ha⁻¹+ one hand weeding at 30 DAS (T₉) followed by farmers practice (T₁₁) and other integrated weed control treatments (T₅ and T₇).

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