



P-ISSN: 2349-8528

E-ISSN: 2321-4902

IJCS 2019; SP6: 333-335

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(Special Issue -6)  
3<sup>rd</sup> National Conference  
On

**PROMOTING & REINVIGORATING AGRI-HORTI,  
TECHNOLOGICAL INNOVATIONS  
[PRAGATI-2019]  
(14-15 December, 2019)**

## **Economic feasibility of weed management in okra [*abelmoschus esculentus* (L.) moench]**

**Sheela Barla and RR Upasani**

### **Abstract**

A field experiment was conducted to study the effect of weed control methods on weed dynamics and productivity of okra during kharif season of 2016 and 2017 in a randomized block design. The treatments comprised of nine weed control methods, consisting plastic mulch, available weeds mulch, straw mulch, cover crop: *Sesbania aculeata* (Dhaincha), oxyfluorfen 0.20 kg/ha PE, pendimethalin 1.0 kg /ha PE, mechanical weeding by Dutch hoe, hand weeding at 20, 40, 60 days after sowing (DAS) and weedy check. Plastic mulch being similar to hand weeding recorded significantly reduced weed density of grassy, broad leaved and sedges as well as total weeds. The reduction was to the extent of 99.27, 90.28, 95.52 and 94.50 percent respectively compared to weedy check. Similarly, the reduction in total weed dry weight was 93.87 percent compared to weedy check. The corresponding reduction in weed density compared to common practice of weed control i.e. hand weeding were 94.11, 50.29, 51.16, and 62.54 percent while the reduction in total weed dry matter was 85.00 percent. Application of plastic mulch recorded 714.90 and 107.68 percent higher okra yield compared to weedy check and hand weeding respectively. However maximum net return and B:C ratio was observed by application of straw mulch and was similar to available weed mulch compared to other treatments.

**Keywords:** Okra, weed density, weed dry weight, net return

### **Introduction**

Okra [*Abelmoschus esculentus* (L.) Moench] is a widely cultivated fruit vegetable found in almost every market. India is the leading country in okra production having an area of 0.053 million ha with production 63.46 MT and productivity 11.9 MT/ha. In Jharkhand, the area of okra is 32.52 thousand ha and production is 447 thousand ton. It being principally grown as rainy season crop suffers badly due to excessive weed pressure thus suffers heavy loss of yield and economic return. The extent of damage due to weeds varies depending on crop and nature of weeds. In vegetables yield loss due to weeds has been reported to be 70-80 percent by Rana *et al.* (2011) [3]. According to Rasheed *et al.* (2009) [4], weeds that interfered with okra from 2 WAP (weeks after planting) resulted in 79.8% and 72.5% fresh fruit yield reduction in 2006 and 2007, respectively and weed interference with okra from 8 WAP (weeks after planting) resulted in 19.8% and 19.6% yield losses in 2006 and 2007 (Rasheed *et al.*, 2009) [4]. If weeding is not done at proper time the growth and yield of okra is affected. Because of high cost and drudgery involved in traditional method specially hand weeding are in decline. Mulching is a non-chemical method of covering the land surface with organic or inorganic materials. Mulches can lower the germination and development of weeds through mechanical suppression and allelopathy effects. Mulches are used to cover the surface of the soil nearby crop plants to develop eco-friendly and favorable conditions for crop growth and development (Debar *et al.*, 2014) [2]. Mulches affect the micro-environment, modifying the energy balance

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of the plant environment and decreasing the soil water loss (Tarara, 2000)<sup>[5]</sup>. Hence, present investigation was carried out to identify most appropriate method of weed control method for higher productivity and profitability of okra cultivation under Jharkhand region.

### Material and Methods

A field experiment was conducted during rainy season of 2016 and 2017 at agronomical research farm of Birsa Agricultural University situated at 23°17' N latitude and longitude of 85°10' E with an altitude of 625 m above mean sea level, to find out the effect of weed control methods on productivity and economics of okra. The experimental soil was poor in nitrogen (243 kg/ha), medium in phosphorus (19.15 kg/ha), potassium (188.16 kg/ha) and organic carbon (4.2 g/kg soil). The pH of soil was 5.9. The experiment was laid out in a randomized block design with three replications. The treatments comprised of nine weed control methods consisting plastic mulch, available weeds mulch, straw mulch, cover crops: *Sesbania aculeata* (Dhaincha), oxyfluorfen 0.20 kg/ha PE, pendimethalin 1.0 Kg /ha PE, mechanical weeding by Dutch hoe, hand weeding at 20, 40, 60 days after sowing (DAS) and weedy check. The okra variety "Basanti" (hybrid) was sown on 30.06.16 and 24.06.17 at spacing 50 x 20 cm. with FYM 10 t/ha, *Karanj* (*Derris indica*) cake 2.5 t/ha. The crop was harvested green in 4 pickings. The fresh weight of okra was recorded after every picking. The herbicides as per treatment were applied by knapsack sprayer using 500 liter/ha water. Weed count was expressed as number/m<sup>2</sup>. The mean data were subjected to square root transformation  $\sqrt{(x+0.5)}$  to normalize their distribution. These samples were dried at 70° C till a constant weight was obtained. The dry matter was then

computed in terms of g/m<sup>2</sup>. Economics was calculated on the basis of prevailing market prices of inputs and produce.

### Results and Discussion

#### Weed flora observed in okra

The experimental field was infested with different type of weeds among narrow leaved weeds like *Echinochloa colona*, *Echinochloa crusgalli*, *Digitaria sanguinalis*, *Dactyloctenium aegyptium*, *Cynodon dactylon*, *Elusine indica*, among broad leaved weeds, *Commelina benghalensis*, *Commelina nudiflora*, *Stellaria media*, *Ageratum conyzoides*, *Celosia argentea*, *Phyllanthus niruri* and among sedges *Cyperus rotundus*.

#### Effect on weeds

**Weed density and dry weight:** Plastic mulch being similar to hand weeding recorded significantly reduced weed density of grassy, broad leaved and sedges as well as total weeds. The reduction was to the extent of 99.27, 90.28, 95.52 and 94.50 percent respectively compared to weedy check. Similarly the reduction in total weed dry weight was 93.87 percent compared to weedy check. The corresponding reduction in weed density compared to common practice of weed control i.e. hand weeding were 94.11, 50.29, 51.16, and 62.54 percent while the reduction in weed dry weight was 85.00 percent.

**Yield and economics:** Application of plastic mulch recorded maximum okra yield to the extent of 714.90 and 107.68 percent higher compared to weedy check and hand weeding. However maximum net return and B:C ratio was observed by application of straw mulch and was similar to available weed mulch compared to other treatments.

**Table 1:** Effect of weed control methods on weed density (no./m<sup>2</sup>) and weed dry weight (g/m<sup>2</sup>) at 50 DAS in okra (pool of 2016 and 2017)

Treatments	Weed density (No./m <sup>2</sup> )				Weed dry weight (g/m <sup>2</sup> )
	Grassy	Broad leaved weed	Sedges	Total weed	
Plastic mulch	1.83 (5)	9.09 (85)	4.04 (21)	10.59 (112)	4.90 (24)
Available weeds mulch	13.83 (219)	13.85 (197)	6.12 (37)	20.71 (453)	14.45 (211)
Straw mulch	12.71 (165)	25.87 (672)	10.78 (176)	31.60 (1013)	14.77 (219)
Cover crops ( <i>Sesbania</i> )	11.10 (139)	23.51 (560)	11.84 (144)	28.80 (843)	9.65 (93)
Oxyfluorfen 0.5 kg/ha PE	12.57 (160)	20.98 (443)	12.19 (171)	27.63 (773)	15.58 (247)
Pendimethalin 1.0 kg/ha PE	7.34 (59)	29.58 (933)	13.48 (181)	33.66 (1173)	10.97 (120)
Mechanical weeding (Dutch hoe)	15.50 (240)	23.75 (576)	13.17 (192)	31.54 (1008)	11.59 (137)
Hand weeding (20, 40, 60 DAS)	8.30 (85)	12.49 (171)	5.41 (43)	16.61 (299)	12.65 (160)
Weedy	26.04 (693)	28.25 (875)	21.39 (469)	44.54 (2037)	19.80 (392)
SEm±	2.32	3.05	2.50		3.35
LSD (P=0.05)	6.96	9.15	7.49		10.04
CV%	33.12	25.39	39.59	21.25	12.62

**Table 2:** Effect of weed control methods on fresh weight (kg) /ha and economics of okra (2016, 2017 and pooled)

Treatments	Fresh wt (t/ha)			Cost of cultivation (₹/ha)	Gross return (₹/ha)			Net return (₹/ha)			B:C		
	2016	2017	Pooled		2016	2017	Pooled	2016	2017	Pooled	2016	2017	Pooled
Plastic mulch	20.71	18.00	19354	243624	414167	360000	387083	170543	116376	143459	0.70	1.48	0.59
Available weeds mulch	18.57	13.44	16007	147373	371389	268889	320139	224016	121516	172766	1.52	1.82	1.17
Straw mulch	17.69	15.44	16569	156435	353889	308889	331389	197453	152453	174953	1.26	1.97	1.12
Cover crops ( <i>Sesbania</i> )	6.61	7.78	7194	147749	132222	155556	143889	-15527	7807	-3860	-0.11	1.05	-0.03
Oxyfluorfen 0.5 kg/ha PE	2.92	3.00	2958	146615	58333	60000	59167	-88282	-86615	-87448	-0.60	0.41	-0.60
Pendimethalin 1.0 kg/ha PE	8.56	7.78	8167	150166	171111	155556	163333	20946	5390	13168	0.14	1.04	0.09
Mechanical weeding (Dutch hoe)	8.94	7.22	8083	145498	178889	144444	161667	33391	-1054	16168	0.23	0.99	0.11
Hand weeding (20,40, 60 DAS)	8.75	9.89	9319	152996	175000	197778	186389	22004	44782	33393	0.14	1.29	0.22
Weedy	0.58	4.17	2375	143624	11667	83333	47500	131957	-60291	-96124	-0.92	0.58	-0.67
SEm±	0.734	0.45	430		14675	8911	8593	14675	8911	8593	0.10	0.06	0.06
LSD (P=0.05)	2.20	1.34	1288		43991	26712	25760	43991	26712	25760	0.29	0.17	0.17

## Conclusion

Application of plastic mulch as well as straw mulch in okra recorded maximum ginger rhizome yield however, straw mulch proved most economical practice owing to reduced mulch cost as well as suppressing weeds.

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