



Effect of weed management practices on finger millet under rainfed conditions

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ABSTRACT

A field experiment with 11 weed management practices including herbicide and hand weeding was conducted at Jagdalpur during 2006 and 2007. *Digitaria sanguinalis*, *Eleusine indica* and *Echinochloa colona* among monocots, and *Celosia argentea* and *Spilanthes acmella* among dicots were the major weeds. Dry weight of weeds and weed control efficiency were the lowest under weed-free condition throughout crop growth period *fb* weed-free up to 40 and 50 DAS, and hand weeding at 20 and 40 DAS. These treatments also led to higher yield attributes and yields of finger millet. The highest B:C ratio (3.79) was obtained when isoproturon 0.5 kg/ha was applied as pre-emergence followed by its lower dose (0.05 kg/ha).

Keyword: Economics, Fingermillet, Grain yield, Weed-free

Finger millet is grown in a wide range of climatic regions. The crop is quite important in dryland regions and mountain or hill agriculture systems. It is grown under upland situation where weeds infestation coincide with occurrence of rain during rainy season. Initial growth period of finger millet is subjected to infestation of weeds causing higher competition, leading to drastic reduction in yield (Kushwaha *et al.* 2002). There is urgent need to find out an effective and economic method of weed control under rainfed situations. As information available is meager, the present investigation was carried out to find out critical period of weed completion and suitable method of weed control in finger millet.

MATERIALS AND METHODS

An experiment was carried out at S.G. College of Agriculture and Research Station, Jagdalpur during rainy season 2006 and 2007. The soil was medium in available N (260 kg/ha) and P (15 kg/ha), high in available K (290 kg/ha) with pH 6.5. Finger millet cv. 'VR 708' was sown in the end of June in 30 cm wide rows. Half dose of N (30 kg/ha) along with full dose of P and K (40 and 20 kg/ha) were applied as basal, and remaining N (30 kg/ha) was applied as top dressing after 25 days after sowing. Eleven treatments involving weed free at 20, 30, 40, 50 and 60 days after sowing were taken. Isoproturon 0.05 and 0.50 kg/ha was applied as pre-emergence through incorporation into soil. Dry weight was recorded by putting a quadrat (0.25 m²) at three random spots in each plot at harvest. Weed control efficiency was also calculated on the basis of dry matter production of weeds. Data on growth,

yield attributes and economics were recorded and analysed statistically. Weed density data were analysed after square root transformation.

RESULTS AND DISCUSSION

Weed growth

All weed management practices significantly reduced dry weight of weeds, viz., *Echinochloa colona*, *Eleusine indica*, *Digitaria sanguinalis*, *Celosia argentea* and *Spilanthes acmella* compared to weedy check. Weedy check registered the highest dry matter of weeds, which was reduced to varying magnitude under different weed management practices. The dry weight of *Echinochloa colona*, *Eleusine indica*, *Digitaria sanguinalis*, *Celosia argentea* and *Spilanthes acmella* was identical under all weed management practices. Weed-free at 60 DAS significantly was superior than weed-free at 20, 30, and 40 DAS, as well as isoproturon 0.05 kg/ha and 0.5 kg/ha (Table 1). Hand weeding at 20 DAS and weed-free upto 20 DAS were similar in terms of dry weight of these weeds. Similar results were reported by Pradhan and Sonboir (2009) and Pradhan *et al.* (2010). Weed control efficiency with weed-free throughout crop period was 89.6–92.6%, which was at par with two hand weeding and weed-free at 20 and 40 DAS. The lowest WCE was recorded under weedy check.

Crop growth and yield

Plant height was maximum when weeds were uprooted completely throughout growing period of finger millet, which was at par with hand weeding twice (20 and 40 DAS) including weed-free condition up to 50 and 60 DAS (Table 2). However, weed free condition at 20, 30

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Table 1. Effect of weed management on dry weight (g/m²) of different weed species

Treatment	<i>Echinochloa colona</i>		<i>Eleusine indica</i>		<i>Digitaria sanguinalis</i>		<i>Celosia argentia</i>		<i>Spilanthes acmella</i>		WCE (%)	
	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007
Weed free for 20 DAS	4.6 (21.1)	4.4 (19.0)	4.9 (23.7)	4.7 (21.5)	5.1 (26.2)	2.5 (6.0)	5.4 (28.7)	3.0 (8.5)	5.6 (31.2)	3.4 (11.0)	51.8	43.2
Weed free for 30 DAS	3.8 (14.1)	3.5 (12.0)	3.9 (15.1)	3.6 (13.0)	4.0 (16.1)	2.1 (3.9)	4.2 (17.1)	2.3 (4.9)	4.3 (18.1)	2.5 (5.9)	77.8	65.2
Weed free for 40 DAS	3.1 (9.1)	2.7 (7.0)	2.9 (7.9)	2.5 (5.7)	2.6 (6.6)	2.7 (6.9)	2.4 (5.4)	2.6 (6.7)	2.1 (4.1)	2.3 (5.2)	88.7	82.4
Weed free for 50 DAS	2.5 (6.1)	2.1 (4.0)	2.3 (4.9)	2.0 (3.5)	2.1 (4.2)	1.7 (2.4)	2.6 (6.5)	2.5 (5.9)	2.7 (7.0)	2.8 (7.5)	90.3	86.8
Weed free for 60 DAS	2.2 (4.6)	1.4 (1.6)	1.9 (3.3)	2.2 (4.4)	2.3 (5.1)	1.5 (2.0)	2.7 (6.9)	2.7 (6.9)	2.6 (6.6)	2.8 (7.5)	89.6	85.6
Weed free throughout	2.0 (3.7)	1.4 (1.6)	1.7 (2.5)	1.8 (2.7)	2.0 (3.6)	1.7 (2.4)	1.7 (2.4)	1.8 (3.0)	1.2 (1.1)	2.0 (3.7)	92.5	89.8
Isoproturon 0.05 kg/ha	3.0 (9.0)	2.7 (6.8)	2.8 (7.7)	3.0 (8.7)	3.1 (9.4)	2.8 (7.6)	3.5 (11.7)	3.5 (11.9)	3.5 (12.2)	3.6 (12.8)	83.0	71.6
Isoproturon 0.5 kg/ha	2.5 (5.7)	2.0 (3.6)	2.2 (4.5)	2.4 (5.5)	2.5 (6.2)	2.2 (4.4)	3.0 (8.5)	3.0 (8.7)	3.0 (9.0)	3.1 (9.5)	76.9	81.0
Hand weeding at 20 DAS	2.2 (4.5)	1.7 (2.4)	1.7 (2.5)	2.0 (3.5)	2.1 (4.2)	1.8 (3.0)	2.6 (6.5)	2.6 (6.7)	2.7 (7.0)	2.8 (7.6)	70.6	86.7
Hand weeding at 20 and 40 DAS	2.0 (3.7)	0.8 (1.1)	1.5 (1.7)	1.8 (2.8)	2.0 (3.5)	1.4 (1.6)	2.5 (5.7)	1.9 (3.3)	2.6 (6.2)	2.7 (6.8)	83.1	88.4
Weedy check	6.0 (36.1)	5.8 (34.0)	6.2 (38.7)	6.0 (36.5)	6.4 (41.2)	4.6 (21.0)	6.6 (43.7)	4.9 (23.5)	6.8 (46.2)	5.1 (26.0)	-	-
LSD (P=0.05)	1.3	0.8	0.8	0.9	0.9	0.8	0.7	1.0	1.0	0.9	9.5	3.0

*Figures in parentheses are original values and transformed to square root $\sqrt{(x + 0.5)}$

Table 2. Effect of weed management practices on yield and economics of finger millet

Treatment	Plant height at maturity (cm)		Tillers/plant		Fingers/plant		Grain yield (t/ha)		B:C ratio	
	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007
Weed free for 20 DAS	97.0	99.4	2.99	2.74	2.37	2.82	1.76	1.89	2.86	3.07
Weed free for 30 DAS	95.6	98.0	2.26	3.01	3.43	3.88	1.86	1.99	2.42	2.60
Weed free for 40 DAS	105.0	107.7	2.19	2.94	4.40	4.85	1.96	2.12	2.37	2.60
Weed free for 50 DAS	110.7	113.1	4.06	4.81	4.43	4.88	2.06	2.02	2.36	2.62
Weed free for 60 DAS	110.9	113.3	4.96	5.71	4.52	4.97	2.10	2.29	1.75	1.90
Weed free throughout	121.2	123.6	5.49	6.24	4.06	4.51	2.33	2.58	1.52	1.68
Isoproturon 0.05 kg/ha	106.8	109.2	4.05	3.10	3.82	4.27	1.54	1.69	3.55	3.87
Isoproturon 0.5 kg/ha	98.1	100.2	4.36	5.11	4.99	5.44	2.04	2.23	3.79	4.21
Hand weeding at 20 DAS	109.7	112.0	3.63	4.38	2.15	2.60	1.61	1.42	3.42	3.75
Hand weeding at 20 and 40 DAS	110.8	113.2	4.19	4.94	3.98	4.43	2.08	2.28	2.97	3.25
Weedy check	114.1	116.5	2.63	3.38	2.05	2.50	0.56	0.72	1.04	1.35
LSD (P=0.05)	7.2	7.2	0.53	0.55	0.48	0.49	0.25	0.33	-	-

and 40 DAS, and isoproturon 0.05 and 0.5 kg/ha were found comparable with each other due to smothering of weeds, which led to vertical growth rather than horizontal growth of finger millet. Tillers/plant, racemes/plant and 1000-grain weight showed higher values under weed-free throughout crop period, followed by weed condition up to 60 DAS. Pandey *et al.* (2001) found that isoproturon was more effective against grassy and broad-leaved weeds but inferior to hand weeding twice.

Critical period of crop-weed competition in cereals up to 30 days after sowing was advocated by Chandha (1999) and Badgular *et al.* (2003). Maximum grain yield was recorded when weed-free condition was maintained throughout crop period, which was significantly superior to other treatments except weed-free up to 60 DAS and hand weeding twice. Weed free up to 40 and 50 DAS were found statistically similar but superior to weed free up to 20 and 30 DAS. Suppression of weeds at critical period exerted positive influence on crop growth but later weed flushes hampered the yield attributes and lowered the grain yield. Hence, weed free condition up to harvest gave higher yield than hand weeding at 20 and 40 DAS as well as weed-free up to 60 DAS. Application of isoproturon 0.50 kg/ha resulted in higher grain yield than its lower dose (0.05 kg/ha). The lowest yield was recorded under weedy check. Weed free condition from 20 to 40 DAS did not exert remarkable yield difference and showed equal effect on weed flora.

The highest B:C ratio was obtained when isoproturon was applied 0.50 kg/ha followed by its lower dose (0.05 kg/ha). One hand weeding at 20 DAS also resulted in higher B:C ratio, which was similar to weed free up to 20 DAS. The lowest B:C ratio was recorded under two weeding at 20 and 40 DAS.

REFERENCES

- Badgular CD, Dusane SM and Desmukh SS. 2003. Comparative efficiency of weed control methods on "Basrai". *Ifomusa* **12**(2):12-13.
- Chandha KL. 1999. An overview on banana production in India. In: *Proceeding of Natural Eeminar on Banana Production, Post Harvest Technology and Export 15-16th Oct, 1999*. Organized by APEDA, Delhi and National Institute of post harvest technology, Maharashtra State.
- Kushwaha HS, Tripathi ML and Singh VB. 2002. Weed management in coriander (*Coriandrumsativum*), pp. 985-987. In: *Proceeding Second International Agronomy Congress on Balancing Food and Environment Security: A Continuing Challenge*, (Eds. Singh Panjab. Ahlawat IPS and Gautam RC). Indian Society of Agronomy, IARI, New Delhi.
- Pandey IB, Sharma SL, Tiwari S and Bharati V. 2001. Effect of tillage and weed management on grain yield and nutrient removal by wheat (*Triticumaestivum*) and weeds. *Indian Journal of Weed Science* **33**:107-111.
- Pradhan Adikant and Soinboir HL. 2009. Weed management in kodo millet under rainfed condition. *Indian Journal of Weed Science* **41**(3&4):174-178.
- Pradhan Adikant, Rajput AS and Thakur A. 2010. Effect of weed management on growth and yield of finger millet. *Indian Journal of Weed Science* **42**(1&2): 53-56.