

Herbicidal-cum-Integrated Approach to Weed Management in Urdbean

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ABSTRACT

A field experiment was conducted during two consecutive *kharif* seasons to identify an effective weed management practice in urdbean. *Cynodon dactylon*, *Dactyloctenium aegyptium*, *Cyperus rotundus*, *Cleome viscosa* and *Physalis minima* were the dominant weeds. Integration of pendimethalin 30 EC at 0.75 kg/ha as pre-emergence with one hand weeding at 40 DAS showed superiority with regard to weed management and yield improvement over the other weed management treatments. Sole application of pendimethalin 30 EC at 1.0 kg/ha also proved to be effective. Though normal seed rate outyielded any increase in seed rate (mean of two years), it remained at par with 30% higher seed rate. Season-long weed competition caused an average yield reduction of 35.82% as compared to integrated weed management.

Key words : Integrated weed control, Urdbean

Weeds pose a serious problem in rainy (*kharif*) season. Losses even upto 50-60% have been recorded due to weeds in urdbean (Yadav, 1992). Weeds may mechanically be controlled by one hand weeding at 20 days after sowing (DAS) followed by another weeding at about 20 days after first weeding. But non-availability and high wages of labour during critical period warrant an effective and economical weed control practice. Chemical measures though become cost-effective, their efficiencies are greatly reduced during *kharif* due to uncertain rainfall. Under such situation, Integrated Weed Management (IWM) involving both chemical (herbicidal) and other agronomic manipulation may be an efficient tool. Hence, evolving a suitable weed management strategy is felt to avoid yield loss.

MATERIALS AND METHODS

A two-year field experiment was conducted at the Pulses and Oilseeds Research Station, Berhampore, West Bengal during *kharif*, 2003 and 2004. The soil of the experimental field was sandy loam in texture and slightly alkaline in reaction (pH 7.5) besides having a content of 0.35% organic carbon, 72 kg available P₂O₅/ha and 110 kg available K₂O/ha. Treatments comprised of five levels of weed management (weedy check, one hand weeding at 20 DAS, one hand weeding at 40 DAS, pendimethalin 30EC as pre-emergence at 1.0 kg/ha alone and at 0.75 kg/ha in combination with one hand weeding at 40 DAS) and three different seed rates (normal i.e. 22 kg/ha, 30% and 50% higher than normal). A set of fifteen treatment combinations was replicated three

times in a factorial randomized block design. Urdbean variety WBU-108 (Sarada) was sown on August 27, 2003 & September 02, 2004 in rows 30cm apart, and harvested on November 17, 2003 & November 30, 2004, respectively. A uniform basal dose of 20 kg N, 40 kg P₂O₅ and 20 kg K₂O/ha was applied in all the plots. A knapsack sprayer fitted with flat-fan nozzle was used to apply the herbicide on the first day after sowing with a spray volume of 600 l/ha. Endosulfan 35 EC at 1.5 ml/ litre of water was sprayed at 30 DAS in all the plots. Weed data were recorded at 30 and 60 DAS by placing a quadrat of 50cm x 50cm area randomly at four spots in each plot. Observations on height of crop plants were also recorded at 30 and 60 DAS. Data on seed yield (kg/ha) and its attributes were recorded at harvest.

RESULTS AND DISCUSSION

Weed Flora

The weeds found infesting the crop in the experimental field have been cited in Table 1. The field was, however, mainly colonized by *Cynodon dactylon*, *Dactyloctenium aegyptium*, *Cyperus rotundus*, *Cleome viscosa* and *Physalis minima*.

Effect of Weed Management

During both the years of study, all the weed management treatments significantly reduced the density and biomass of weeds at 60 DAS as compared to weedy check. Shweta and Singh (2005) reported in the same way. Integration of reduced dose of pendimethalin 30 EC at 0.75 kg/ha as pre-emergence (PE) with one hand weeding at 40 DAS caused remarkable reduction in weed growth at 60 DAS over remaining treatments (Table 2) and resulted

in the highest mean seed yield of 1100.74 kg/ha (Table 3). The increase in crop yield was due to increase in productive pods /plant (30.41), number of seeds/pod(6.37) and 1000- seed weight (45.83 g) owing to decrease in crop-weed competition due to better control of weeds (mean of two years). Rathi *et al.* (2004) were of the same opinion. Excellent performance of pendimethalin 0.75 kg/ha (PE) + one hand weeding (40 DAS) might be due to initial control of weeds through the chemical followed by hand weeding at 40 DAS which prevented further regeneration of weeds. This finding is also substantiated with the results of Pazahanivelan and Kandasamy(1996) who reported that pre-emergence application of pendimethalin 1.0 kg/ha followed by either fluazifop-p-butyl 0.25 kg/ha as post-emergence or late hand weeding at 40 DAS gave effective weed control and recorded higher seed yield in rainfed pigeonpea.

The sole application of pendimethalin 30 EC at higher dose (1.0 kg/ha) as PE was also found effective in both the years. Bhandari *et al.* (2004) also reported significant reduction in weed growth with the higher doses of alachlor, pendimethalin or fluchloralin. Compared with the plots receiving IWM treatment, the yield data in Table 3 indicated that seed yield losses amounted to an average of 35.82% due to uncontrolled weed growth.

Effect of Seed Rate

Increasing seed rate from normal to 50% higher resulted in gradual decrease in seed yield during first year, whereas in the second year, the yield level could not be significantly increased with the use of 30% higher seed rate (1025.47 kg/ha), rather it

declined at 50% higher seed rate (917.13 kg/ha). Similar results as in the first year have been reported from Ranchi in Jharkhand (Anon., 2002 and 2003) and Vamban in Tamil Nadu (Anon., 2003 and 2004). No significant yield differences among varying seed rate have also been recorded at Pantnagar in Uttaranchal (Anon., 2002). The finding of the second year was almost similar as reported from Faizabad of Uttar Pradesh (Anon., 2003 and 2004). Yield attributes did not differ significantly under normal and 30% higher seed rates, and were found poor under 50% higher seed rate in both the years. Comparatively higher yield with its attributes under normal as well as 30% increased seed rate (Table 3) was due to better growth of crop plants at 60 DAS and suppression of weed growth both at 30 and 60 DAS (Table 2).

Effect of Interaction

The results showed a non-significant interaction between weed management and seed rate in both the years, indicating that the different seed rates were not significantly affected by weed management practices and that the effect of weed management did not differ significantly with the differential rates of seeding.

Based on the results of present investigation, it can be suggested to the growers that pre-emergence application of pendimethalin 30 EC either at the lower dosage of 0.75 kg/ha along with one hand weeding at 40 DAS or at the higher dosage (1.0 kg/ha) alone besides using normal or 30% higher seed rate may be a good weed management practice in urdbean during kharif.

Table 1 Common weed flora prevalent in the urdbean field of West Bengal.

Scientific name	Family	Common name	Local name
A. Grass :			
<i>Cynodon dactylon</i> (L.) Pers.	Poaceae	Bermuda grass	Durba
<i>Dactyloctenium aegyptium</i> (L.) Richter	Poaceae	Star grass	Makra
<i>Digitaria sanguinalis</i> (L.) Scop.	Poaceae	Large crabgrass	Keoai
<i>Echinochloa colonum</i> (L.) Link.	Poaceae	Barnyard grass	Shyama
B. Sedge :			
<i>Cyperus rotundus</i> L.	Cyperaceae	Purple nut sedge	Motha
C. Broadleaved :			
<i>Cleome viscosa</i> L.	Capparidaceae	Spider flower	Jungli hurhur
<i>Commelina benghalensis</i> L.	Commelinaceae	Day flower	Kansira
<i>Euphorbia hirta</i> L.	Euphorbiaceae	Garden spurge	Bandudhi
<i>Parthenium hysterophorus</i> L.	Compositae	Wild carrot weed	Parthenium
<i>Physalis minima</i>	Solanaceae	Ground cherry, Hogweed	Bantepari

Table 2 Effect of treatments on the growth of weeds and crop plants.

Treatment	Weed biomass (g/m ²)				Weed density (No./m ²)				Plant height (cm)			
	30 DAS		60 DAS		30 DAS		60 DAS		30 DAS		60DAS	
	2003	2004	2003	2004	2003	2004	2003	2004	2003	2004	2003	2004
Weed mgmt.												
Weedy check	132.50	164.27	1466.77	484.69	720.44	629.33	1280.11	732.89	23.14	23.01	39.48	33.64
HW(20DAS)	43.48	67.07	571.00	319.97	286.11	233.33	508.33	341.33	25.55	24.09	43.29	34.56
HW(40DAS)	137.73	91.91	548.44	269.24	693.88	304.89	382.88	306.67	23.73	23.41	42.59	35.56
Pendimethalin 30 EC 1.0 kg/ha (PE)	72.98	70.30	543.77	239.51	515.00	244.00	304.77	240.89	26.96	25.58	43.81	36.27
Pendimethalin 30 EC 0.75 kg/ha (PE) + HW (40DAS)	107.84	75.91	388.66	208.07	538.66	267.11	212.66	223.56	24.59	24.59	44.24	38.33
C.D.(P=0.05)	13.66	13.38	61.55	23.77	58.05	40.29	54.38	32.16	2.05	1.33	NS	1.56
Seed rate												
Normal(22kg/ha)	84.09	83.69	696.33	304.71	522.53	313.87	539.33	359.73	24.59	23.26	41.61	35.28
30% higher	102.59	92.23	681.33	283.85	550.00	334.40	502.06	345.33	24.88	25.07	45.19	37.09
50% higher	110.03	105.74	733.53	324.32	579.93	358.93	571.86	402.13	24.90	24.08	41.24	34.64
C.D.(P=0.05)	10.58	4.45	NS	19.63	44.96	24.58	42.12	15.67	NS	1.20	2.94	1.14
(%)	14.3	9.0	9.1	12.2	10.9	13.9	10.5	8.1	8.6	9.5	9.2	6.1

DAS : Days after sowing ; HW : Hand weeding ; NS : Not significant ; PE : Pre-emergence.

Table 3 Effect of treatments on yield attributes and seed yield of urdbean.

Treatment	Productive pods/ plant		Seeds/pod		1000-seed weight (g)		Seed yield (Kg/ha)	
	2003	2004	2003	2004	2003	2004	2003	2004
Weed mgmt.								
Weedy check	26.66	21.82	4.94	5.96	41.72	40.77	595.10	824.00
HW(20DAS)	29.44	22.86	5.40	6.17	43.50	41.58	807.60	926.78
HW(40DAS)	31.66	23.24	5.93	6.30	43.86	43.08	885.00	972.22
Pendimethalin 30 EC 1.0 kg/ha (PE)	33.66	23.80	6.08	6.33	44.96	44.28	949.80	1074.89
Pendimethalin 30 EC 0.75 kg/ha (PE) + HW (40DAS)	36.88	23.93	6.37	6.36	46.56	45.10	1062.70	1138.78
C.D.(P=0.05)	3.86	NS	0.37	0.18	NS	2.12	80.00	79.67
Seed rate								
Normal(22kg/ha)	32.53	23.77	5.81	6.20	44.51	42.98	910.70	1019.40
30% higher	31.86	24.11	5.73	6.37	44.20	43.58	851.90	1025.47
50% higher	30.59	21.52	5.69	6.09	43.65	42.34	817.50	917.13
C.D.(P=0.05)	NS	1.03	NS	0.16	NS	NS	62.00	52.49
(%)	12.7	8.5	6.7	4.9	8.6	4.7	9.7	7.1

DAS : Days after sowing ; HW : Hand weeding ; NS : Not significant ; PE : Pre-emergence.

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