

rostrata accumulated 247, 86 and 162 kg N ha⁻¹ in Kharif, rabi and summer season respectively. The results established the superiority of *S. rostrata* over other two green manures. Higher biomass production and more plant nitrogen content in *S. rostrata* leads to more N accumulation in all the seasons.

The lower nitrogen accumulation in rabi season might be due to poor vegetative growth. The vegetative growth was cut short due to shorter day light period forcing the plant to early flowering and lower plant N content. The biomass production also reduced considerably. The results are in line with the earlier findings of Becker *et al.* (1990) who stated that with the onset of flowering the growth and biological nitrogen fixation were reduced in green manures.

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STUDIES ON THE TIME OF HERBICIDE APPLICATION UNDER DIFFERENT MOISTURE REGIMES IN UPLAND RICE

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ABSTRACT

Field experiments conducted at National Pulses Research Centre, Vamban during the monsoon season of 1996 and 1997 showed that the pre-emergence application of pendimethalin at 1 kg a.i/ha on 3rd DAS followed by hand weeding on 25 DAS recorded significantly higher yield attributes and yield in ADT-36 rice under upland condition. The different moisture regimes did not influence the yield significantly during monsoon season.

KEY WORDS: Moisture regimes, Pendimethalin, Yield attributes, Weed count, Weed DMP, Yield

In upland rice, weeds germinate immediately after sowing and continue to compete with rice plants till harvest. The slow growth and poor vegetative coverage of upland rice pave the way for the dominance of weeds. The absence of submergence limits the success of the pre-emergence herbicides applied. Hence an alternate and viable method suitable for upland condition was felt necessary to suppress the weed flora. In

addition, the efficacy of the applied herbicides depends upon the availability of soil moisture. Moody (1989) reported that the herbicide is dependent on soil moisture for activation. Similarly Sankaran and De Datta (1989) observed reduced efficacy of applied herbicides with decline in soil moisture content. Schiller and Indhaphun (1979) observed that effectiveness of herbicide was reduced significantly under dry condition. Hence

Table 1. Effect of method of herbicide application under different moisture regimes in upland rice on yield and yield attributes

Treatments	Plant height (cm)		Total tillers per plant		Productive tillers/plant		Panicle length (cm)		Grains/panicle		Weed No./M ²		Weed DMP (kg/ha)		Yield (kg/ha)	
	1996	1997	1996	1997	1996	1997	1996	1997	1996	1997	1996	1997	1996	1997	1996	1997
T1	67.8	71.5	16.0	17.8	14.1	15.6	19.6	18.5	177	177	3.7	8.8	6.9	4.6	1029	981
T2	72.8	75.0	17.3	17.7	16.8	15.8	16.8	18.8	184	180	3.7	9.2	7.0	4.6	957	972
T3	70.3	-	18.8	-	15.1	-	17.2	-	170	-	4.1	-	7.1	-	975	-
Mean	70.3	73.5	17.4	17.8	15.3	15.7	17.2	18.7	177	179	3.8	9.0	7.0	4.6	981	977
M1	67.9	66.0	18.2	15.9	16.6	13.9	16.9	18.2	173	179	2.8	2.8	4.2	4.6	536	641
M2	71.0	65.1	17.5	17.2	13.9	14.9	17.0	18.7	174	185	2.4	2.4	4.4	4.6	531	574
M3	71.5	80.5	18.4	20.0	17.9	18.2	17.4	20.5	199	220	3.4	3.4	5.5	17.2	1823	1739
M4	78.5	77.5	17.9	18.7	14.9	15.9	16.9	18.7	174	165	4.8	4.8	7.4	29.0	126	1020
M5	78.9	77.8	14.9	17.0	12.3	15.6	17.7	17.5	165	145	5.7	5.7	11.6	34.8	918	887
Mean	78.4	73.5	14.2	17.8	15.1	15.7	17.2	18.7	177	179	3.8	3.8	6.6	18.0	987	972
CD	CD	CD	CD	CD	CD	CD	CD	CD	CD	CD	CD	CD	CD	CD	CD	CD
T	9.2	13.2	1.6	2.2	0.8	0.9	0.6	0.3	5.1	18.7	0.3	2.6	0.3	0.7	48.4	49.0
M	6.2	3.2	0.9	0.8	0.8	0.6	0.5	1.3	4.8	7.8	0.2	2.1	0.3	0.5	66.8	61.2
TXM	13.6	13.4	2.1	2.3	1.4	1.2	1.0	1.6	9.0	20.0	0.4	3.6	0.5	0.9	113.6	87.0
MXT	11.5	4.5	1.0	1.2	1.3	0.9	0.9	1.8	8.4	11.0	0.3	3.1	0.5	0.7	115.7	86.6

fixing optimum irrigation regimes will have an added advantage in increasing the herbicidal activity.

MATERIALS AND METHODS

Field experiments were conducted during monsoon seasons (August - December) of 1996 and 1997 at National Pulses Research Centre, Vamban, Pudukkottai District of Tamil Nadu. The experiment was laid out in split-plot design with three replications. The soil was sandy loam (alfisol) with a PH of 6.0, available N, P₂O and K₂O being 134, 85 and 285 kg/ha respectively. The main plot treatments comprised of 0.8 IW/CPE ratio, 1.0 IW/CPE ratio and 1.2 IW/CPE ratio in the first year and only two regimes (0.8 IW/CPE, 1.0 IW/CPE ratio) were tried in the second year. The five methods of herbicide application viz., pre-plant incorporation of pendimethaline at 1 kg ai/ha followed by hand weeding (HW) on 25 DAS (M1), Herbicide application at 1 kg ai/ha sand mixed and applied along the seed row at sowing followed by HW on 25 DAS (M2), pre emergence application (1 kg ai/ha) on 3rd DAS followed by HW on 25 DAS (M3),

pre emergence application (1 kg ai/ha) on 6 DAS followed by hand weeding on 25 DAS (M4) and pre emergence application (1 kg ai/ha) on 9 DAS followed by hand weeding on 25 DAS (M5) were assigned to sub plots. The recommended fertilizer schedule of 120:50:50 N, P₂O₅ and K₂O kg/ha was followed. Half N and K₂O and full dose of P₂O₅ were applied as basal. The remaining N and K₂O were top dressed in 2 equal splits at maximum tillering and panicle initiation stages. The data on weed density and weed dry matter were recorded on 25 DAS.

RESULTS AND DISCUSSION

The data on yield and yield attributes revealed that pre-emergence application of pendimethalin at 1 kg ai/ha on 3rd day after sowing followed by hand weeding on 25 DAS significantly increased the yield of rice (Table 1). Similarly decrease in weed flora and weed dry weight favoured the yield attributes and yield of rice. Panwar *et al.* (1989) reported that pendimethalin as pre-plant incorporation at 1 kg ai/ha followed by hand weeding on 30 DAS recorded higher pod yield in

Table 2. Weather data during the cropping period

Month	Year 1996					Year 1997			
	Standard weeks	RII (%)	EVP (mm)	Rainfall (mm)	Rainy days	RII (%)	EVP (mm)	Rainfall (mm)	Rainy days
September	37	88	2.2	35.6	6	-	-	-	-
	38	87	1.9	105.5	4	-	-	-	-
	39	86	2.5	48.0	3	84.0	6.3	17.0	1
October	40	80	5.6	-	-	81.8	7.1	-	-
	41	90.7	1.8	26.2	4	88.4	5.3	29.1	2
	42	93	1.8	72.6	6	88.0	4.8	5.8	1
	43	85	3.1	-	-	91.1	2.9	27.2	3
November	44	87.0	3.6	17.0	2	94.8	-	101.4	5
	45	85	3.0	3.0	1	94.1	1.9	107.7	5
	46	87.6	2.5	13.4	2	88.4	2.1	2.6	1
	47	89	1.8	12.6	2	94.4	1.6	175.0	4
	48	85	2.4	15.6	2	89.8	1.8	9.7	1
December	49	89	3.7	32.8	3	92.0	1.8	40.7	4
	50	95	-	190.4	7	91.8	2.7	24.8	2
	51	88	1.9	6.0	1	91.1	2.6	30.4	5
	52	85	2.7	-	-	85.5	2.6	-	-
January	1	-	-	-	-	84.7	2.8	5.8	1
Total		1400.3	40.5	578.7	43	1339.9	45.7	576.8	35
Mean		87.5	2.53	36.2		89.3	3.05	38.45	

groundnut. Pre-emergence application on 6 DAS and 9 DAS followed by hand weeding on 25 DAS was not effective in controlling weeds under upland condition. Whilst pre plant incorporation of pendimethalin (1 kg a.i./ha) and application along the seed row (1 kg a.i./ha) at sowing were found to be detrimental to both the rice seedling and weeds leading to poor establishment of paddy seedlings and poor yield.

The impact of moisture regimes on yield and yield attributes of rice was not significant in both the years. The crop received a total rainfall of 578.7 mm and 576.8 mm in 43 and 35 rainy days respectively for first and second years (Table 2). This high amount of rainfall was fully utilized by the crop due to very low weekly evaporation of 2.53 mm and 3.05 mm during the cropping period. Further high relative humidity (87.5 and 89.3 per cent) in both years might have nullified the impact

of different IW/CPE ratios. Hence, during heavy rainy periods provision of 0.8 IW/CPE ratio is sufficient for obtaining higher rice yield under upland situation.

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