

## INVESTIGATIONS ON THE COMPETING ABILITY OF RICE WITH WEEDS IN THE RAINFED UPLANDS

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Crop-weed competition is one of the critical factors in the growing of rice crop in the rainfed uplands. According to Mukhopadhyay *et al.* (1972), weeds removed as high as 37.1 kg of N/ha from upland rice fields, the resultant yield loss being 74 to 98 per cent under unchecked weed growth. The degree of competition between rice plants and weeds depends, however, on the growth characteristics, time of weed emergence and density of weeds. The present investigation was undertaken with the twin objects of finding out the period of weed competition that an upland rice crop can tolerate without adverse effect on yield and the period for which rice crop should be kept free of weeds for maximum profitable returns.

### Materials and Methods

The experiment was conducted during the early kharif (May-August) seasons of 1972 and 1973 at the Rice Research Station, Pattambi. The soil of the experimental plot was a lateritic sandy loam of moderate fertility. The design of the experiment was randomized block with 12 treatments and 3 replications (Table 2). The test variety was Triveni, an early duration (100 days) dwarf *indica* rice. Seeds were dibbled immediately after a pre-monsoon shower at a spacing of 15 cm x 15 cm adopting a seed rate of 80 kg/ha. At seeding N,  $P_2O_5$  and  $K_2O$  were applied at 30, 40, 40 kg, respectively, per ha. Nitrogen was topdressed at tillering and panicle initiation stages of the crop at 25 kg per ha, each time. Along with the basal dose of fertilizers weed seeds comprising of *Echinochloa crusgally* and *Cleome sp.* were also sown broadcast at 5 kg/ha in order to ensure uniform weed densities in all the plots. The gross and net sizes of the plots were 5.0 m x 3.0 m and 4.7 m x 2.7 m, respectively.

### Results and Discussion

The total rainfall received was 1843 mm during 1972 and 1683 mm during 1973 crop seasons (Table 1). The pattern of distribution of rainfall in 1972 was not as favourable as in 1973. Severe moisture stress during the vegetative phase of the crop affected tillering and this promoted luxuriant growth of weeds with consequent decline in the general yield level in 1972.

Table 1

Distribution of rainfall (cm) in the early kharif season of 1972 and 1973

Weekly distribution		Year	
		1972	1973
May	1—7	5.47	1.30
	8—14	19.10	0.24
	15—21	13.03	5.48
	22-28	0.18	4.74
	29—June, 4	0.30	1.34
June	5—11	24.4	22.74
	12—18	Nii	34.29
	19 25	11.72	9.80
	26—July, 2	40.53	8.21
July	3—9	20.47	29.47
	10—16	20.38	7.39
	17—23	16.97	9.71
	24—30	3.36	Nil
	31—August, 6	8.08	6.06
August	7—13	6.16	3.09
	14- 20	6.70	12.70
	21—27	9.08	9.31
	28—August, 31	0.36	2.40
		184.33	168.27

The rates of germination of rice as well as weeds were excellent during both the seasons. The weed species which appeared included the following in the order of their predominance in the population: *Echinochloa crusgally*, *Brachiaria sp*; *Cleome sp*; *Cyperus rotundus*; *Ameranthus viridis*, *Fimbristilis miliacea*, *Eclipta alba* and *Commelina benghalensis*. The grass cotegory of weeds (Graminae) was more prominent in number and dry weight at harvest.

'Weed free' conditions maintained by frequent manual labour, favoured early and vigorous growth of rice seedlings and produced significantly higher yields over weedy conditions. The highest yields were obtained when the crop was kept

weed free up to 75 days in 1972 and up to 90 days in 1973 (Table 3). Keeping the crop weed free up to such long periods, however, did not bring about significant yield increases over the weed free periods maintained up to 30, 45 and 60 days after sowing. The reduction in grain yield observed in the treatment which was kept free of weeds for a shorter period of 15 days only, was due to severe competition from weeds that emerged later. It was also observed that not all the weed seeds did germinate by the 15th day after sowing. The weeds which emerged later were mostly *Brachiaria sp* and *Cleome sp*,

The time of weed removal was also observed to effect significant differences in yield. Removal of weeds once on the 30th day after sowing gave higher yields over the other times of weed removal i.e. 15th, 45th, 60th and 70th day after sowing. The effect due to the maintenance of weed free conditions up to the 30th day after sowing and one weed removal on the 30th day after sowing were statistically at par during both the seasons. The difference between these treatments on an average was only 264 kg/ha. There was progressive decline in yield as the time of weed removal was delayed beyond 30 days after seeding. This might be due to the fact that the crop suffered very heavy competition from weeds during the early stages of growth and it could not recover its usual vigour and growth rate later.

The yield attributing characters which were adversely affected by the delay in weeding was productive ears per hill and panicle weight (Table 2). Panicle weight tended to decline as the pressure of weed competition increased. Earlier removal of weeds or keeping the crop weed free by frequent weedings in the earlier stages of crop growth increased the number of tillers per hill and the panicle weight, indicating that the degree of competition during the early vegetative growth stages was more critical for a shy tillering variety like Triveni. Once the weed competition was suppressed during the early vegetative phase of the crop, rice plants could successfully compete with the late emerging weeds. The data shows that the upland rice crop should be kept weed free for at least 30 days from seeding or the weeds should be removed one month after sowing. The longest period of weed competition that the rice crop can tolerate without significant reduction in yield is 30 days from the date of sowing.

Maintenance of weed free conditions up to the 30th day after sowing required, on an average of 2 seasons, 1380 women hours per ha, at a total cost of Rs. 680.00 at Rs, 4.00 per 8 hour period. On the other hand, it took only 1152 women hours per ha to weed the crop on the 30th day, the expenditure incurred being Rs. 576.00 per hectare. The extra gain in grain yield registered by the former practice did compensate for the additional expenditure incurred for keeping the crop weed free. The practice of giving one weeding on the 30th day after sowing, however, seemed to be more practical since the net gain or loss on account of either of the two practices was only marginal.

Table 2

Productive tillers/hill, panicle weight and dry matter of weeds at harvest as affected by the period of 'weed-free' condition and time of weed removal

Treatment	Productive tillers/hill		Panicle weight (g)		Dry matter of weeds kg/ha	
	1972	1973	1972	1973	1972	1973
1. No weeding	3.7	5.8	0.83	1.52	9771	5414
2. Weed free up to 15 days after sowing	5.5	7.3	1.97	1.99	1891	2624
3. -do- 30 "	6.1	7.2	1.67	2.07	1103	1103
4. -do- 45 "	6.6	8.4	1.76	2.21	418	449
5. -do- 60 "	6.1	7.9	1.65	2.24	472	473
6. -do- 75 "	6.1	8.9	1.65	2.27	315	355
7. -do- 90 "	6.0	8.2	1.70	2.23	236	331
8. One weeding on the 15th day after sowing	5.0	7.1	1.55	2.22	1340	3254
9. -do- 30 "	4.5	8.1	1.73	2.24	1376	1237
10. -do- 45 "	4.5	8.1	1.60	1.93	630	788
11. -do- 60 "	4.5	6.4	1.60	1.79	315	473
12. -do- 75 "	3.3	6.2	1.39	1.67	158	370
F (0.05)	Sig	Sig	Sig	Sig	Sig	Sig
C D (0.05)	0.8	1.7	0.33	0.44	1324	717

Sig = Significant

N. S. = Not Significant

Table 3

Grain yield, and cost of weeding as affected by different treatments

Treatment	Grain yield (kg/ha)			Increase or decrease in yield (kg/ha) over				Cost of weeding per ha (Rs)	
	1972	1973	Mean	Treatment 3		Treatment 9		1972	1973
				1972	1973	1972	1973		
1. No weeding	173	2206	1190	-1521	-1632	-1230	-1395	—	—
2. Weed free up to 15 days after sowing	1474	3467	2471	- 210	- 371	+ 71	- 134	616.00	588.00
3. -do- 30 "	1694	3838	2766	—	—	+ 291	+ 237	700.00	660.00
4. -do- 45 "	1907	3964	2936	+ 213	+ 126	+ 504	+ 363	780.00	732.00
5. -do- 60 "	1915	3885	2900	+ 221	+ 47	+ 512	+ 284	884.00	792.00
6. -do- 75 "	1868	4176	3022	+ 174	+ 338	+ 465	+ 575	1032.00	964.00
7. -do- 90 "	1868	4176	3022	+ 174	+ 338	+ 465	+ 575	1032.00	964.00
8. Weed removal on the 15th day after sowing	1324	3097	2221	+ 370	- 74!	- 79	- 504	416.00	356.00
9. -do- 30 "	1403	3601	2502	- 291	- 237	—	—	628.00	524.00
10. -do- 45 "	1064	3310	2187	- 630	- 528	- 339	- 291	1000.00	968.00
11. -do- 60 "	875	3152	2014	- 819	- 686	- 528	- 449	1332.00	1224.00
12. -do- 75 "	536	2758	1647	-1158	-1080	- 867	- 843	1534.00	1488.00

F (0.05)

Sig Sig Sig

CD (0.05)

327 410 430

Summary

An investigation was conducted at the Rice Research Station Pattambi during the early kharif seasons of 1972 and 1973 to find out the period of weed competition that an upland rice crop could stand without adverse effect on yield. The results revealed that the weed competition was more critical during the early vegetative phase of the crop and that weed free conditions favoured higher grain production. The longest period of weed competition that the upland rice could tolerate was 30 days from sowing without adverse effect on, yield.

സംഗ്രഹം

നെൽ പാടങ്ങളിൽ കളകളും നെൽച്ചെടികളും തമ്മിലുള്ള മത്സരം അരിയുത്പാദനത്തെ എങ്ങനെ ബാധിക്കുന്നു എന്നും പഠിക്കുവാൻ 1972 ലെയും 1973 ലെയും 'വിരിപ്പ്' വിളകാലത്ത് പട്ടാമ്പിയിലെ നെല്ലു ഗവേഷണ കേന്ദ്രത്തിൽ 'ത്രിവേണി' എന്ന ഹൃസ്വകാല ദിനസ്സപയോഗിച്ച് ഒരു പഠനം നടത്തുകയുണ്ടായി. കളകൾ തീരെയില്ലാത്ത അവസ്ഥയിൽ അരിയുത്പാദനം കൂടുന്നതായും കളശല്യം അധികരിക്കുന്നതിനനുസരണമായി ഉത്പാദനം കുറയുന്നതായും ഈ പഠനത്തിൽ അനുഭവപ്പെട്ടു. കായിക ദശ നെല്ലിനെ സംബന്ധിച്ചിടത്തോളം പരമപ്രധാനമാണെന്നുള്ളതാണ് മറ്റൊരു നിഗമനം. ഈ കാലത്ത് കളശല്യമുണ്ടായാൽ അത് വിളവിനെ സാരമായി ബാധിക്കും. വിളവിൽ കാര്യമായ കുറവുണ്ടാകാതെ, നെൽച്ചെടികൾക്ക് കളശല്യം താങ്ങുവാൻ പര്യാപ്തമായ കാലയളവ് ആദ്യത്തെ 30 ദിവസമാണ്. വയലിൽ കളകൾ തീരെ ഇല്ലാത്ത അവസ്ഥ ഉത്പാദനത്തിന് തികച്ചും സഹായകമാണെങ്കിലും വിതച്ച് 30-ാം ദിവസം ഒരു തവണ കളപറിക്കുന്നതാണ് ഏറ്റവും ലാഭകരമായ കളനിയന്ത്രണ ക്രമമെന്നും ഈ പരീക്ഷണം വെളിപ്പെടുത്തി.

REFERENCES

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