

Integrated Weed Management in Rainfed Upland Rice

ABSTRACT

Four field experiments were carried out during the wet seasons over a span of four year (2002-2005) at the research farm of Central Rainfed Upland Rice Research Station, Hazaribag, Jharkhand, India, with the objective to develop integrated weed management technology for upland rice. Different agronomic practices adopted to achieve it included seed treatment, fertilizer scheduling and intercropping along with weed management practices for avoidance of weed occurrence, suppression of weed growth and enhancement of crop-competitive ability against weed.

Studies on seed treatment revealed that thermal hardening with alternate temperatures (43°C/28°C), seed priming, and hormonal priming with 100 ppm GA₃ proved better in weed suppression and produced higher grain yield than untreated seeds. Integration of application of hormonal priming by GA₃@100 ppm with thermal hardening using alternate temperatures of 43/28°C improved rice productivity by influencing growth and yield attributes of rice and reducing the weed pressure by improving crop-competitive ability.

Manipulation of fertilizer scheduling may reduce weed infestation and avoid crop weed competition. Controlled-release urea (CRU) produced average grain yields of 1.57 and 1.87 Mg ha⁻¹ compared to 1.32 and 1.30 Mg ha⁻¹ with prilled urea (3 splits) in first and second year, respectively. The highest agronomic N use efficiency of 15-20 kg grain kg N⁻¹ and the highest apparent N recovery of 39% - 45% with CRU demonstrated its benefits under weed free and variable rainfall conditions. Influence of weeds on fertilizer scheduling was well evident from a grain yield increase of only 0.24 Mg ha⁻¹ with 60 kg N ha⁻¹ above the unfertilized control in un-weeded treatments, whereas increase of 1.07 Mg ha⁻¹ was registered with butachlor + single hand weeding(B+1HW) and by 1.28 Mg ha⁻¹ with two hand weedings.

Integration of fertilizer scheduling (N and P) with weed control practices resulted in grain yield increase of 0.85 Mg ha⁻¹ with 1.5 kg butachlor supplemented with single mechanical weeding and modified N and P schedule (B1.5+MHW+MNS+MPS) and 0.33 Mg ha⁻¹ with 1.5 kg B+1HW over farmer's practice. Reduction in nutrient depletion by weeds in the former treatment was 28.2 kg N ha⁻¹, and 2.4 kg P ha⁻¹ compared with the weedy control. The mean value/cost ratios ranged between 1.36 and 4.72 for different treatments.

Cowpea and pigeonpea intercropping with rice minimized the weed infestation. Least density and biomass of weeds was noted in rice + cowpea (5:1) intercrop system. All the intercropping treatments yielded higher than sole rice in terms of rice equivalent yield. Rice intercropped with pigeonpea (4:1) produced highest rice equivalent yield and maximum land equivalent ratio.

Key words: *Controlled release urea, urea super granules, seed priming, intercropping, weed control, agronomic N use efficiency, apparent N recovery, rice equivalent yield, upland rice*