

ABSTRACT

Rice fields suffer from colonies of diverse weed flora. Severity of weed problem in crop fields in a rice-based cropping system depends on the type of the rice culture, cultural practices followed and methodology adopted for control of weeds. An investigation was undertaken to study distribution pattern of weeds in direct seeded rice-blackgram cropping sequence under rainfed condition and transplanted rice-wheat cropping sequence under irrigated condition and to assess the combined effect of indirect weed management practices involving tillage, fertilizer and water management as well as direct methods of weed control.

Three field and two pot experiments were conducted during 1993 to 1995. In the first experiment, four tillage treatments including improved tillage with tractor drawn mould board plough and harrowing and conventional tillage with bullock drawn country plough and harrowing and four weed control treatments *viz* hand weeding, mechanical weeding, chemical weeding and unweeded check were practiced in both rice and blackgram grown in sequence. In the second experiment, four fertilizer treatments including Inorganic and combined inorganic and organic source were applied at two doses and four weed management practices (the same as in the first experiment) were practised in a direct seeded rice-blackgram cropping sequence. In the third experiment three water management practices *viz* continuous saturation, cyclic submergence and continuous submergence in transplanted rice and three moisture regimes *viz* 0.6, 0.8 and 1.0 IW/CPE ratio in wheat and four weed control treatments were adopted in transplanted rice-wheat cropping sequence. One improved variety each of rice, IR-36, wheat, Sonalika and blackgram, T-9 were used as the test crops.

It has been observed that improved tillage by mould board plough and harrowing reduced the crop-weed competition substantially and improved the grain yield as compared to conventional tillage practice with country plough and harrowing. The population of broad leaf weeds was less under improved tillage practices than conventional tillage practice. Under high degree of tillage *Enhydra fluctuans* was effectively controlled in rice field, while *Physalis minima*, *Cyperus iria* and *Eleusine indica* was greatly reduced in case of blackgram.

The yield of direct seeded rice and blackgram at high level of fertilizer treatment (irrespective of their sources) showed significant increase in grain yield only when weeds were controlled. In case of rice, the yield was considerably low in the unweeded check plot when high level of fertilizer from inorganic source was used. Application of FYM in combination with inorganic fertilizer significantly increased the weed population compared with plots with only inorganic fertilizer added.

In both rice and blackgram, N, P and K uptake by weeds was significantly higher under higher levels of fertilizer than under lower level. All the weed management practices significantly reduced nutrient removal by the weeds compared with that in the unweeded checks. and a saving of 21 to 45 N, 26 to 60 P and 22 to 46 per cent K was achieved.

The weed density was much less in transplanted rice-wheat as compared to that in the direct seeded rice-blackgram cropping sequence. Water management practices in transplanted rice field brought about variation in the distribution of weed species. The SDR value showed that *Enhydra fluctuans* was a dominant species under saturated condition in rice field, while *Ludwigia perennis* and *Monochoria vaginalis* were predominant under submerged condition. Submerged condition of field reduced the crop-weed competition and increased the grain yield by 14.5 per cent over that under saturated condition.

Higher infestation of weeds was observed in wheat which was about three fold in the form of dry matter production as compared to that in transplanted rice. However, diversity of the weed flora differed with moisture status of the soil. Both population and dry matter of weeds increased with increase in irrigation level from 0.6 to 0.8 and 1.0 IW/CPE ratio. Significant increase in grain yield of wheat was noticed with increase in irrigation level from 0.6 to 0.8 IW/CPE ratio with no significantly additional effect with further increase in irrigation level.

Of the different weed management practices, hand weeding was found to be the best followed by chemical and mechanical weeding in reducing the crop-weed competition, thereby improving the grain yield of rice, wheat and blackgram. Weed control efficiency showed variation from 59 to 99 per cent in hand weeding, 30 to 40 per cent in mechanical weeding and 32 to 70 per cent in chemical weed control treatments.

The composition of weed flora varied between crops and seasons. In direct seeded rice-blackgram cropping sequence during the autumn, broad leaf weeds dominated over grasses and sedges, while during the summer season, grasses dominated over broad leaf weeds. Repeated application of herbicides or removal of weeds by hand weeding tended to reduce the number of weed species and thereby weed community became less complex in rice-blackgram cropping sequence. In a study of two-year crop cycle, the coefficient of similarity between two dissimilar crops i.e. direct seeded rice vs blackgram and transplanted rice vs wheat was found to be low. On the other hand, between two similar crops viz transplanted rice vs transplanted rice, wheat vs wheat or blackgram vs blackgram, the coefficient of similarity was high.