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# Effects of Methods of Rice Transplanting and Herbicides on *Echinochloa crusgalli* and Rice

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Puddling, most common practice of establishing rice in South Asia, helps in reducing water losses through percolation and controlling weeds in rice fields (Adachi, 1992; Singh *et al.*, 1995). But besides being costly, cumbersome and time consuming, it results in degradation of soil and other natural resources and subsequently poses difficulties in seedbed preparation for succeeding wheat crop in rotation. Therefore, alternate methods are needed to overcome the associated problems encountered in transplanting after puddling. In order to introduce tillage reforms in rice, efficient management of weeds most commonly through suitable herbicides also needs attention. Keeping these points in view, field studies were carried out during **kharif** season of 2002 at farmers' fields in village Laloda and Pirthala, Fatehabad (Haryana). The soil of the experimental fields at both sites was sandy clay loam in texture, low in available nitrogen, medium in phosphorus and high in potash with slightly alkaline reaction (pH 8.0). Both the villages are adjacent to each other with almost similar soil and climatic conditions and therefore out of four replicates, two were arranged in each village with larger plot size (500 $m^2$).

Four rice establishment techniques [puddled-transplant, unpuddled (dry field preparation)-transplant, furrow irrigated raised bed system (FIRBS)-transplant and zero-till-transplant] and four pre-emergence herbicides (butachlor 1500 g, pretilachlor 1000 g, oxadiargyl 70 g and fentrazamide at 120 g $ha^{-1}$) making 16 treatment combinations were arranged in two factorial randomized block design with four replications (Table 1). Glyphosate at 1.5 kg $ha^{-1}$ (Round up, 41% SL) at spray volume of 250 l $ha^{-1}$ was applied 10 days before transplanting in zero-till (after wheat harvest) plots to control already emerged weeds. The 27 days old seedlings of rice variety PR-106 were transplanted on June 27, 2002 keeping around 28 plants $m^{-2}$. However, in FIRBS on raised beds with 67.5 cm width (37.5 cm wide at top of the bed, and 30 cm wide and 15 cm deep furrow), the seedlings were planted 7-8 cm apart in two rows at the top of the bed. Herbicides were mixed in dry soil (150 $kg^{-1}$) and broadcast in

Table 1. Effect of resource conservation techniques and herbicides on *E. crusgalli* at harvest and transplanted rice

| Treatment | *E. crusgalli* (No. $m^{-2}$) | Dry weight of *E. crusgalli* (g $m^{-2}$) | Panicles (No. $m^{-2}$) | 1000-grain weight (g) | Grain yield (kg $ha^{-1}$) |
|---|---|---|---|---|---|
| **Resource conservation techniques** | | | | | |
| Unpuddled-transplant | 4.4 (19) | 2.9 | 384 | 22.0 | 7583 |
| FIRBS-transplant | 5.1 (25) | 5.1 | 342 | 19.4 | 7435 |
| Zero-till-transplant | 4.3 (18) | 2.2 | 390 | 22.6 | 7730 |
| Puddled-transplant | 3.9 (15) | 0.7 | 384 | 22.0 | 7572 |
| LSD (P=0.05) | 0.3 | 0.3 | 42 | 1.5 | 225 |
| **Herbicides** | | | | | |
| Butachlor 1500 g $ha^{-1}$ | 5.3 (28) | 3.5 | 340 | 20.1 | 7430 |
| Oxadiargyl 70 g $ha^{-1}$ | 3.4 (11) | 2.7 | 386 | 22.1 | 7664 |
| Pretilachlor 1000 g $ha^{-1}$ | 4.1 (16) | 3.3 | 378 | 21.2 | 7650 |
| Fentrazamide 120 g $ha^{-1}$ | 3.9 (15) | 1.4 | 396 | 22.7 | 7647 |
| LSD (P=0.05) | 0.3 | 0.3 | 42 | 1.5 | 225 |

Original data given in parentheses were subjected to square root transformation ($\sqrt{x+0.5}$) before analysis.

standing water (3-5 cm) three days after transplanting (DAT). The plots were kept flooded for initial 15 DAT.

*Echinochloa crusgalli* was the most predominant weed (95%) at both the experimental sites. The population of *E. crusgalli* was similar under puddled-transplant, unpuddled-transplant and zero-till-transplant but it was significantly higher under FIRBS-transplant (Table 1). Among different establishment methods, the dry weight of *E. crusgalli* was significantly lower under puddled-transplant and higher under FIRBS-transplant at crop harvest (Table 1). Higher density and dry weight under FIRBS-transplant could be due to poor water management (raised beds could not be submerged continuously for long period), thereby leading to reduced efficacy of herbicides particularly during initial 15 DAT. Unpuddled-transplant and zero-till-transplant were similar in these respects.

Among herbicidal treatments, fentrazamide and oxadiargyl each being at par with pretilachlor reduced the density and dry weight of *E. crusgalli* significantly more than butachlor.

The number of rice panicles and 1000-grain weight were highest under zero-till-transplant, however, it was at par with unpuddled-transplant and puddled-transplant (Table 1). FIRBS-transplant produced significantly lower number of panicles and 1000-grain weight than zero-till-transplant and all other transplanting methods, respectively. The grain yield of rice was significantly higher under zero-till-transplant compared to FIRBS-transplant; however, other treatments were at par.

Oxadiargyl at 70 g $ha^{-1}$ and fentrazamide at 120 g $ha^{-1}$ being at par with pretilachlor 1000 g $ha^{-1}$ resulted in higher number of panicles, 1000-grain weight and grain yield of rice compared to butachlor (Table 1).

## REFERENCES


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