BIO-EFFICACY OF POST-EMERGENCE HERBICIDES IN TRANSPLANTED RICE OF CHHATTISGARH PLAINS

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INTRODUCTION
Rice is the most important staple food crop of millions of mankind from down of civilization (Chakravarti et al., 2012). Among the cereal crops, it serves as the principal source of nourishment for over half of the global population (Davla et al., 2013). In Indian agriculture, rice is the main source of livelihood for more than 150 million rural households. The total area of rice crop in India is 43.97 m ha, production is 100.00 m t and average productivity is 2.37 t/ha (Anonymous, 2013a). Chhattisgarh state is popularly known as "Rice bowl of India" because maximum area is covered under rice during kharif and contribute major share in national rice production. It has geographical area of 13.51 m ha of which 5.90 m ha area is under cultivation. Rice occupies an area of 3.77 m ha with the production of 8.53 m t and productivity of 1.60 t/ha (Anonymous, 2013b). One major problem in rice cultivation for productivity is weed management. The various crop stand establishment practices and land type influence the intensity and nature of weed problem. Infestation of weeds in transplanted rice not only results in yield reduction but quality of produce is also impaired. Uncontrolled weeds cause reduction in grain yield up to 76% under transplanted conditions (Singh et al., 2004). The final choice of any weed control measures will depend largely on its effectiveness and economics. Use of herbicides to keep the crop weed free at critical crop weed competition stages will help in minimizing the cost of weeding as well as managing the weeds below the damaging level. Hand weeding is very easy and environment-friendly but tedious and highly labour intensive. Farmers very often fail to remove weeds due to unavailability of labour at peak periods.

Therefore, makes hand weeding difficult at early stages of growth due to morphological similarity between grassy weeds and rice seedlings (Rahman et al., 2012). Most of the herbicides have dryer effective options for selective weed control but a single herbicide cannot control all weeds of the community (Corbett et al., 2004). Bispyribac-sodium is effective for control many annual and perennial grasses, sedges, and broad leaved weeds in rice (Rawat et al., 2012) and Bentazon controlled effectively both broad and narrow leaved weeds and increased rice grain yield (Zhang et al., 2005). The combined application of different herbicides with different mode of action is required for most effective weed management and avoiding development of herbicide resistance. Therefore, it is necessary for high efficacy herbicides and sequential application of herbicides to control mixed weed flora in transplanted rice (Gnanavel and Anbhazhagan, 2010). Keeping these in view, a field experiment was carried out to evaluate the performance of post-emergence of herbicides in transplanted rice.

MATERIALS AND METHODS
Field experiment was conducted at the Instructional cum Research Farm, IGKV, Raipur during kharif season of 2011. The soil was sandy loam in texture having low organic carbon (0.44%) and available N, P, K content in the soil was 211.4, 18.4 and 325 kg/ha respectively, slightly alkaline in reaction (pH 7.3) and EC (0.43 dSm⁻¹). The treatments consisted of ten different weed management treatments viz, T₁ - Bentazone 48% SL W/V @ 720 ml a.i./ha, T₂ - Bentazone 48% SL W/V @ 960 ml a.i./ha, T₃ - Ethoxysulfuron 15% WDG @ 13 g a.i./ha, T₄ - Oxadiargyl 80%
WP @ 80 g a.i./ha, T2-Pretilachlor 50% EC @ 500 g a.i./ha, T3-Bispyribac Na 10% SC @ 20 g a.i./ha, T4-CME + MSM 20% WP @ 4 g a.i./ha, T5-Two Hand Weeding and T6-Control. Rice cv. MTU-1010 was transplanted on July 14, 2011 with a spacing of 20 cm x 10 cm and harvesting was done on November 1st, 2011. Recommended dose of nutrient was 100 kg N + 60 kg P2O5 + 40 kg K2O/ha, which was applied through urea, Di-ammonium phosphate and muriate of potash, respectively. The whole quantity of P and K was applied as basal dressing, while nitrogen was applied in three splits viz. 50 kg N/ha as basal and remaining 50 kg in two equal splits at active tillering and panicle initiation stages.

The herbicides were applied by Knapsack sprayer fitted with flat-fan nozzle using 500 litres water/ha. Weed density of major weeds and other associated weeds were recorded at 60, 80 DAT and at harvest by quadrate count method. The data thus obtained, were transformed and expressed in number per square metre. The percentage composition of weed flora was estimated from weedy check plot. The weed biomass from different plots under all the treatment was recorded at 60, 80 DAT and at harvest. The data obtained on various observations were tabulated and subjected to their analysis by using analysis of variance (ANOVA) and the treatment was tested by F test (Gomez and Gomez, 1984). The data on weed count and weed biomass were subjected to square root transformation, i.e. \( \sqrt{x + 0.5} \) before carrying out analysis of variance and comparisons were made on transformed values.

**RESULTS AND DISCUSSION**

**Effect on weeds**

The major weed species observed in the experiment field were *Alternanthera triandra*, *Spilanthes acmella*, *Ludwigia octovalis*, *Ischaemum rugosum*, *Echinochloa colona* and *Cyperus rotundus*. At 60, 80 DAT and at harvest, significantly lowest weed density and weed dry matter was recorded two hand weeding while highest was noted under control (Table 1). Treatment Bispyribac Na 10% SC @ 20 g a.i./ha also recorded comparable total dry matter to two hand weeding. All the weed control treatments caused significant reduction in total weed density and weed dry matter when compared to control. Kiran et al. (2010); Gnanavel and Anbhazhagan (2010); Viraputhirun and Balasubramanian (2013) also reported similar findings.

The data given in Table 2 showed that at 40-60 DAT, maximum WGR was noted under control and minimum was noted under two hand weeding. At 60-80 DAT and 80 DAT-at harvest, maximum WGR was registered under control, whereas, minimum was observed under two hand weeding. At 60, 80 DAT and at harvest, highest weed control efficiency was recorded under two hand weeding followed by Bispyribac Na 10% SC @ 20 g a.i./ha and Chlorimuron ethyl + Metsulfuron
The treatment two hand weeding registered highest number of effective tillers/hill. The lowest number of effective tillers/hill was noted under control. Two hand weeding recorded maximum number of filled and minimum number of unfilled grains/panicle. As regards to filled grains/panicle, the best performance treatment two hand weeding was at par to Bentazone 48% SL W/V @ 1200 ml/ha, Bispyribac Na 10% SC @ 20 g a.i./ha and Chlorimuron ethyl + Metsulfuron-methyl 20% WP @ 4 g a.i./ha recorded at par effective tillers/hill. The lowest number of effective tillers/hill was noted under control. Two hand weeding recorded maximum number of filled and minimum number of unfilled grains/panicle. As regards to filled grains/panicle, the best performance treatment two hand weeding was at par to Bentazone 48% SL W/V @ 1200 ml/ha, Bispyribac Na 10% SC @ 20 g a.i./ha and Chlorimuron ethyl + Metsulfuron-methyl 20% WP @ 4 g a.i./ha whereas, for unfilled grains/panicle it was at par to Bispyribac Na 10% SC @ 20 g a.i./ha and Chlorimuron-ethyl + Metsulfuron-methyl 20% WP @ 4 g a.i./ha. The lowest number of filled grains/panicle was noted in control, whereas this treatment also recorded the highest number of unfilled grains/panicle. The perusal of data given in Table 3 reveal that treatment two hand weeding registered significantly highest grain yield (5.54 t/ha), however, it was found at par with the application of Bentazone 48% SL W/V @1200 ml/ha (4.81 t/ha), Bispyribac Na 10% SC @ 20 g a.i./ha (5.25 t/ha) and Chlorimuron ethyl + Metsulfuron-methyl 20% WP @ 4 g a.i./ha (4.95 t/ha). The minimum seed yield was observed under control (2.44 t/ha). Similar results were also reported by Narwal et al. (2002), Yadav et al. (2009), Halder and Patra (2007) and Gnanavel and Anbhazhagan (2010). This is due to suppression of weed competition by integrated weed control treatments offering efficient and prolonged weed control leading to higher grain yield. The straw yield was significantly influenced by different treatments. Two hand weeding (6.74 t/ha) produced the highest straw yield and it was significantly superior to others but it was at par to application of Bentazone 48% SL W/V @ 1200 ml ha⁻¹ (6.07 t/ha), Ethoxysulfuron 15% WDG @ 15 g a.i./ha (5.85 t/ha), Bispyribac Na 10% SC @ 20 g a.i./ha (6.53 t/ha) and Chlorimuron ethyl + Metsulfuron-methyl 20% WP @ 20 g a.i./ha (6.27 t/ha). The minimum straw yield (4.33 t/ha) was noted under control. Similar results were noted by Rawat et al. (2012). Different post emergence herbicides influenced harvest index (%) significantly. Two HW at 20 and 40 DAT recorded significantly highest (45.03%) harvest index, but it was found at par to Bentazone 48% SL W/V @960 ml/ha, Bentazone 48% SL W/V @1200 ml/ha, Ethoxysulfuron 15% WDG @15 g a.i./ha, Oxadiargyl 80% WP @ 80 g a.i./ha, Bispyribac Na 10% SC @ 20 g a.i./ha and Chlorimuron ethyl + Metsulfuron-methyl 20% WP @ 20 g a.i./ha.
(36.13%) was obtained under control.

REFERENCES


