



## Effect of Herbicides Combination on Growth and Yield of Drilled Rice (*Oryza sativa* L.) under Coastal Region of Maharashtra

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An experiment was conducted to study the effect of herbicides combination on growth and yield of drilled rice (*Oryza sativa* L.) under coastal region of Maharashtra. The experiment was laid out in a randomized block design with ten treatments which were replicated thrice. The treatments mainly comprised of Post Emergence application (PoE) of Bispyribac-Na ( $T_1$ ), Pre Emergence application (PE) of Pendimethalin followed by Bispyribac-Na PoE ( $T_2$ ), Oxadiargyl PE followed by Bispyribac-Na PoE ( $T_3$ ), Pyrazosulfuron PE followed by Bispyribac-Na PoE ( $T_4$ ), Pendimethalin PE followed by Bispyribac-Na PoE followed by manual weeding ( $T_5$ ), Pendimethalin PE followed by manual weeding ( $T_6$ ), Bispyribac-Na + (Chlorimuron + Metasulfuron) PoE ( $T_7$ ), three mechanical weedings (Cono/rotary weeder at 20, 40 and 60 DAS) ( $T_8$ ), weed free check (Hand weeding at 20, 40 and 60 DAS) ( $T_9$ ) and weedy check ( $T_{10}$ ). Results revealed that treatments weed free check, Pendimethalin PE followed by Manual weeding and Pendimethalin PE followed by Bispyribac-Na PoE followed by Manual weeding produced significantly higher growth and yield attributes as compared to rest of the treatments under study. Treatment weed free check recorded highest grain and straw yield of rice.

(**Key words:** Growth, Herbicides, Rice and Yield)

Rice (*Oryza sativa* L.) is the most important staple food grain crop of the world which constitutes the principle food for about 60 per cent of the world's population. In Konkan, rice is mostly grown by transplanting method. However, there are some pockets, where drilled and dibbled rice is also practiced. However, the weed infestation is the main problem there. Weed and crop seeds germinate at the same time resulting in greater competition for space, light, moisture and nutrients from early stage of crop growth which brings down the yield drastically. In transplanted rice, where land is puddled and 3 to 4 weeks old seedlings are transplanted with the elimination of initial competition and withstanding the competition effectively during the later stage.

Weed control methods such as hand pulling or pulling by sickle are laborious, tedious, drudgery causing and expensive process. The labour requirement for such operations may be 60 to 70 man days during peak season demand. Thus, manual weeding is time consuming and uneconomical to control weeds. Therefore, it warrants the use of herbicides to get timely as well as effective weed control. For direct seeded rice, it is important to keep field weed free for first 30 days. The pre-emergence or early post-emergence herbicide either prevents weed seeds or

inhibits the growth of seedlings. Use of these herbicides along with post-emergence herbicides or cultural, mechanical and agronomic methods of weed control gives effective control of weeds. In view of above points a field experiment was conducted to study the effect of herbicide combinations on growth and yield of drilled rice.

### MATERIALS AND METHODS

The experiment was conducted at the Agronomy Farm, College of Agriculture, Dapoli during *Kharif* season of 2014. The experiment was laid out in a randomized block design with ten treatments which were replicated thrice. The treatments comprised Post Emergence application (PoE) of Bispyribac-Na ( $T_1$ ), Pre Emergence application (PE) of Pendimethalin followed by Bispyribac-Na PoE ( $T_2$ ), Oxadiargyl PE followed by Bispyribac-Na PoE ( $T_3$ ), Pyrazosulfuron PE followed by Bispyribac-Na PoE ( $T_4$ ), Pendimethalin PE followed by Bispyribac-Na PoE followed by Manual weeding ( $T_5$ ), Pendimethalin PE followed by Manual weeding ( $T_6$ ), Bispyribac-Na + (Chlorimuron + Metasulfuron) PoE ( $T_7$ ), Three mechanical weedings (cono/rotary weeder at 20, 40 and 60 DAS) ( $T_8$ ), Weed free check (Hand weeding at 20, 40 and 60 DAS) ( $T_9$ ) and Weedy check

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(T<sub>10</sub>). The gross and net plot sizes were 5.00 m x 3.00 m and 4.60 m x 2.70 m, respectively.

The seed of short duration rice variety *Ratnagiri-1* was treated with thirum at the rate of 3 g kg<sup>-1</sup> of seed used for sowing. The duration of the variety is 110-115 days which yields about 3.5-4.0 t ha<sup>-1</sup>. Sowing of rice was done in the experimental plot on 7th June 2014 by drilling method at a distance of 20 cm in between the rows. The crop was fertilized with 100 kg N, 50 kg P<sub>2</sub>O<sub>5</sub> and 50 kg K<sub>2</sub>O ha<sup>-1</sup>. At the time of sowing 40 kg N ha<sup>-1</sup> with full dose of P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O was applied as a basal dose. The remaining 40 kg N ha<sup>-1</sup> was applied at 30 DAS and 20 kg at panicle initiation stage. The other common package of practices was followed time to time and periodical growth observations were recorded.

## RESULTS AND DISCUSSIONS

### Effect of different weed management practices on growth of rice

It is observed from the data presented in Table 1 that the growth and development parameters of rice viz., plant height, number of leaves running meter<sup>-1</sup>, number of tillers running meter<sup>-1</sup> and dry matter accumulation running meter<sup>-1</sup> were significantly affected by weed management treatments. Weed free check (T<sub>9</sub>) recorded maximum growth characters over remaining treatments. Treatments T<sub>1</sub>, T<sub>2</sub> and T<sub>4</sub> were at par with each other with respect to dry matter. Weedy check (T<sub>10</sub>) recorded significantly the lowest growth characters over all the

weed control treatments. These results are in agreement with those reported by Chauhan and Yadav (2013) who observed that, Pendimethalin is superior over Oxadiargyl by avoiding the possibilities of its phytotoxicity on germination, having excess moisture content in the soil and exposed seeds at site.

### Effect of different weed management practices on yield of rice

The yield attributing characters viz., total number of panicles running meter<sup>-1</sup>, length of panicle (cm), weight panicle<sup>-1</sup> (g), grain and straw yield (t ha<sup>-1</sup>) as influenced by different treatments are presented in Table 2. The data revealed that, the total number of panicles running meter<sup>-1</sup>, length of panicle (cm), weight panicle<sup>-1</sup>, grain and straw yield (t ha<sup>-1</sup>) were observed maximum under weed free check (T<sub>9</sub>) followed by Pendimethalin followed by Manual weeding (T<sub>6</sub>) and Pendimethalin followed by Bispyribac-Na followed by Manual weeding (T<sub>5</sub>) which were significantly superior over all the remaining treatments but at par with each other. Dixit *et al.* (2008) concluded that, the Pendimethalin effectively controlled weeds till the advanced growth stages of rice, which reduced weed competition favouring better utilization of available resources and it increases the yield attributing characters of crop. Rawat *et al.* (2012) reported in his findings that, the crop under weed free plots attained lush growth due to elimination of weeds from inter and intra row spaces besides better aeration due to manipulation of surface soil and thus

**Table 1.** Effect of different weed management practices on growth of rice

| Treatments                                                                     | Plant height (cm) | No. of leaves running m <sup>-1</sup> | No. of tillers running m <sup>-1</sup> | Dry matter (g) running m <sup>-1</sup> |
|--------------------------------------------------------------------------------|-------------------|---------------------------------------|----------------------------------------|----------------------------------------|
| T <sub>1</sub> : Bispyribac-Na                                                 | 86.10             | 87.67                                 | 60.33                                  | 147.84                                 |
| T <sub>2</sub> : Pendimethalin fb Bispyribac-Na                                | 91.50             | 86.33                                 | 59.00                                  | 146.11                                 |
| T <sub>3</sub> : Oxadiargyl fb Bispyribac-Na                                   | 92.66             | 90.00                                 | 60.00                                  | 143.99                                 |
| T <sub>4</sub> : Pyrazosulfuron fb Bispyribac-Na                               | 90.47             | 87.67                                 | 60.33                                  | 146.84                                 |
| T <sub>5</sub> : Pendimethalin fb Bispyribac-Na fb Manual weeding              | 94.47             | 92.67                                 | 63.00                                  | 170.80                                 |
| T <sub>6</sub> : Pendimethalin fb Manual weeding                               | 94.40             | 96.33                                 | 65.00                                  | 179.76                                 |
| T <sub>7</sub> : Bispyribac-Na + (Chlorimuron+Metasulfuron)                    | 87.10             | 81.67                                 | 57.67                                  | 141.87                                 |
| T <sub>8</sub> : Three mechanical weedings (cono/rotary weeder) (20,40,60 DAS) | 91.63             | 85.00                                 | 58.00                                  | 161.72                                 |
| T <sub>9</sub> : Weed free check (HW at 20,40,60 DAS)                          | 95.37             | 98.00                                 | 65.67                                  | 180.39                                 |
| T <sub>10</sub> : Weedy check                                                  | 82.88             | 70.33                                 | 54.33                                  | 134.91                                 |
| S.E.±                                                                          | 0.33              | 0.46                                  | 0.24                                   | 0.66                                   |
| C.D. at 5%                                                                     | 0.91              | 1.27                                  | 0.67                                   | 1.83                                   |

**Table 2.** Effect of different weed management practices on yield attributes and yield of rice

| Treatments                                                                     | No. of panicles running m <sup>-1</sup> | Length of panicle (cm) | Wt. panicle <sup>-1</sup> (g) | Grain yield (t ha <sup>-1</sup> ) | Straw yield (t ha <sup>-1</sup> ) |
|--------------------------------------------------------------------------------|-----------------------------------------|------------------------|-------------------------------|-----------------------------------|-----------------------------------|
| T <sub>1</sub> : Bispyribac-Na                                                 | 53.33                                   | 19.27                  | 1.98                          | 2.87                              | 4.91                              |
| T <sub>2</sub> : Pendimethalin fb Bispyribac-Na                                | 53.33                                   | 20.17                  | 2.52                          | 3.52                              | 5.48                              |
| T <sub>3</sub> : Oxadiargyl fb Bispyribac-Na                                   | 55.33                                   | 20.26                  | 2.40                          | 3.68                              | 5.29                              |
| T <sub>4</sub> : Pyrazosulfuron fb Bispyribac-Na                               | 53.33                                   | 18.43                  | 2.00                          | 2.92                              | 4.19                              |
| T <sub>5</sub> : Pendimethalin fb Bispyribac-Na fb Manual weeding              | 57.67                                   | 21.37                  | 2.76                          | 3.91                              | 5.85                              |
| T <sub>6</sub> : Pendimethalin fb Manual weeding                               | 61.67                                   | 21.54                  | 2.93                          | 3.95                              | 5.56                              |
| T <sub>7</sub> : Bispyribac-Na + (Chlorimuron + Metasulfuron)                  | 52.00                                   | 19.03                  | 2.48                          | 2.77                              | 4.67                              |
| T <sub>8</sub> : Three mechanical weedings (cono/rotary weeder) (20,40,60 DAS) | 51.33                                   | 20.42                  | 2.48                          | 3.56                              | 5.29                              |
| T <sub>9</sub> : Weed free check (HW at 20,40,60 DAS)                          | 62.00                                   | 21.88                  | 2.96                          | 3.96                              | 5.96                              |
| T <sub>10</sub> : Weedy check                                                  | 47.67                                   | 16.80                  | 1.88                          | 2.00                              | 3.43                              |
| S.E. <sub>±</sub>                                                              | 0.29                                    | 0.19                   | 0.20                          | 0.03                              | 0.05                              |
| C.D. at 5%                                                                     | 0.81                                    | 0.52                   | 0.55                          | 0.07                              | 0.15                              |

more spaces, water, light and nutrients were available for the better growth and development, which resulted in to superior growth and yield attributes and consequently the highest yield of crop. These results are in confirmation with those obtained by Veeraputhiran and Balasubramanian (2013) and Verma *et al.* (2013).

Weedy check (T<sub>10</sub>) recorded the lowest values of yield attributing characters. This was due to severe weed competition exerted by grasses, sedges and broad leaved weeds for space, light, moisture and nutrients throughout the growth period. Similar results were reported by Hussain *et al.* (2008). Data pertaining to the grain yield and straw yield (t ha<sup>-1</sup>) as influenced by various treatments are presented in Table 2 indicated that, the weed free check (T<sub>9</sub>) produced the highest grain and straw yield and was found significantly superior over all the treatments, except treatments T<sub>5</sub> and T<sub>6</sub> which were at par with treatment T<sub>9</sub>.

#### CONCLUSION

From the results of the present investigation, it can be concluded that the combination of chemical and cultural/physical control measures (Pendimethalin followed by Manual weeding and Pendimethalin followed by Bispyribac-Na followed by Manual weeding) has proved better for obtaining higher growth

and yield from drilled rice than the application of chemical herbicides, cultural and mechanical control alone.

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