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**Abstract:** To study the 'effect of zinc fertilization on productivity of direct-seeded upland rice varieties', a field experiment was conducted during kharif 2017 in Shankarpura farm, ICAR- CRURRS, Hazaribag, Jharkhand. The textural class of soil of experimental site was clay loam, medium in organic carbon (0.62%), low in available N (153 kg/ha) and available P (12.5 kg/ha) and high in available K (360 kg/ha). The experiment was laid out in split plot design with three main plot treatments of Zn including control, four sub plot treatments and was replicated thrice. Main plot treatments were control (no Zn), 2.5 kg Zn/ha through ZnSO<sub>4</sub>.H<sub>2</sub>O with foliar spray of 0.5% of ZnSO<sub>4</sub>.H<sub>2</sub>O at 30 & 60 DAS and 5 kg Zn/ha through ZnSO<sub>4</sub>.H<sub>2</sub>O. Four sub plot varieties were 'Sahbhagi Dhan', 'CR Dhan 202', 'CR Dhan 203' and 'CR Dhan 204'. From the experiment, the results obtained showed that soil+ foliar application of Zn proved to be better in growth parameters of crop, yield attributes and yield over soil application of Zn alone. Zn fertilization (soil+ foliar) increased filled number of grains/panicle (97.1) when compared to control (69.9) which ultimately reduced chaffy spikelets/panicle in rice varieties. Zn content in grains was significantly increased with soil+ foliar spray of Zn from 19.9ppm (control) to 24.2 ppm which in turn increased Zn recovery efficiency over soil application of Zn alone. Zn uptake also influenced N content which in turn increased crude protein content of grain of 'CR Dhan 202' (7.56%) over control in 'CR Dhan 203' (7.01%). Among the varieties, 'CR Dhan 202' was recorded with highest growth parameters when compared to other varieties. 'CR Dhan 202' was observed with highest grain yield (3.42 t/ha) and straw yield (5.91 t/ha). In the similar line, Zn content in grain was found highest in 'CR Dhan 202' (22.9 mg/kg) which increased uptake of Zn as well. Highest head recovery was recorded with 'CR Dhan 202' (52.69%) and 'Sahbhagi Dhan' (52.37%). Highest cost of cultivation (26.9 ₹ X 103 ha<sup>1</sup>) was observed with Zn fertilization (soil+foliar application) and lowest cost of cultivation was estimated in control. Highest gross, net return and B:C ratio (1.55) was estimated in soil+ foliar application as compared to soil application alone. Amidst varieties, highest gross, net return and B:C ratio (1.53) was obtained in 'CR Dhan 202'. From the experimental findings, it may be concluded that 2.5 kg Zn/ha through ZnSO<sub>4</sub>.H<sub>2</sub>O with foliar spray of 0.5% of ZnSO<sub>4</sub>.H<sub>2</sub>O at 30 & 60 DAS is better approach for higher productivity, profitability and nutritional quality of rice varieties. 'CR Dhan 202' proved to better variety among selected varieties for eastern India. Zinc fertilization through foliar application is better for direct-seeded rice under rainfed conditions.

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