

Performance of tractor operated horizontal rotor plate planter

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■ **ABSTRACT** : In rainfed conditions the success of crop production depends on timely seeding. The seed rate for various dryland crops varies from 4 to 140 kg/ha. Availability of a multi crop planter with replaceable metering plate is crucial to meet the seed rate requirements and to reduce the cost involved in machinery management. Though different types of planters having different seed metering mechanisms were evolved, their performance is not up to the mark. Hence, a horizontal rotor seed metering plate mechanism was developed and tested both under laboratory (2.5, 3.5 and 5 km/h speeds) and field conditions. The mean number of seeds metered at different forward speeds for maize and castor crop varied from 184.8 to 192.6; 185.8 to 187.6, respectively when compared to theoretical metered seeds of 180. The quality of feed index of the planter ranged from 85 to 90.5 per cent and 82.7 to 97 per cent, clearly indicated the frequency distribution of seeds with in space intervals > 10 to < 30 cm. The horizontal rotor metered 85 – 93 frequency percentile seeds within 15 – 30 cm spacing intervals at operation speeds of 2.5 to 3.5 km/h. At average field speeds of 2 and 3.5 km/h, 70 and 65 per cent of the seeds were sown, respectively in a spacing interval of 15 – 30 cm, which also indicated the higher quality of feed index for the developed planter.

■ **KEY WORDS** : Horizontal rotor plate, Planter, Quality of feed index, Field testing

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Agriculture is one of the most important sectors of Indian economy both in terms of gross national product and number of productive workers employed. Out of 142.6 million hectares of net cultivated area in the country, 55 per cent is under rainfed agriculture, which contributes 30 per cent of the food grains. Mechanization of agriculture necessitates use of appropriate machinery to increase the inputs use efficiency. In rainfed farming conditions numerous crops being grown and the success of crop production depends on timely seeding of crops with reduced in drudgery of farm labour. The seed rate for various rainfed crops varies from 4 to 140 kg/ha. Until recent past, the crops are generally sown manually by drilling behind the plough or dibbling and later thinning is performed to maintain optimum plant population, which is quite labour intensive operation.

In crop production for higher productivity, it is essential for seeds to be placed at equal intervals within rows. In manual sowing practice, the higher and non-uniform plant population adversely affected grain yield in pearl millet, cluster bean, moth bean and green gram crops (Singh *et al.*, 2007). Effect of plant spacing uniformity on sunflower yield in Minnesota was determined by Robinson *et al.* (1982). Uniformly spaced single plants lodged the least, gave the greatest seed yield and contained greatest oil content. The ultimate objective of seed

planting using improved planting equipment is to achieve precise seed distribution within the row. Jasa and Dickey (1982) concluded that tillage system has minimal effect on seed spacing uniformity of corn planted using seed planter.

The fluted roller type seed metering device is very popular in India. However, this mechanism is very much suitable for small seeds which are drilled at low plant to plant spacing in a row. Although many planters having different seed metering mechanisms *i.e.* inclined plate, cup feed type and roller with cells on periphery for the application of single seed at a time has been developed, their performance is not up to the mark due to non performance in obtaining required spacing for crops like sunflower, okra, maize, groundnut and green gram (Chauhan *et al.*, 1999; Sahoo and Srivastava, 2000; Dhalin *et al.*, 2004 and Singh *et al.*, 2006). Never the less, demand for the single seed metered planters is increasing rapidly due to the fact that, it saves cost on seed to be applied and there after labour cost to carry thinning operation to obtain optimum plant stand. At the same time, the same planter mechanism could be utilized for various rainfed crops just by changing seed rotor only with minor modifications. The achievement of the set seed rate and spacing majorly depends on the machine technical variables such as the type of seed rotor mechanism, the machine operating speed, overall gear