

## Performance evaluation of pneumatic planter using pigeonpea seeds

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**ABSTRACT :** The performance of a pneumatic planter was carried out in laboratory with an objective of selecting the required gear ratio for obtaining recommended seed rate of pigeonpea. Based on the results of laboratory tests the performance of the pneumatic planter was carried out in field. Pneumatic planter consisted of frame, aspirator blower, seed hopper, metering unit, multi groove metering plate, vacuum retaining plate, furrow opener, pair of ground wheel with transmission system. For picking single seed, the multi groove metering plate having seed hole of diameter 3 mm and vacuum pressure of 2 kPa were used throughout the experiments. Performance of the pneumatic planter was evaluated in the field and the average values of plant to plant spacings, mean miss index and multiple index, actual field capacity and field efficiency were found to be 101.1 mm, 1.5 per cent, 3.5 per cent, 0.953 ha/h, 88 per cent, respectively.

**KEY WORDS :** Pneumatic planter, Pigeonpea, Seed rate, Performance indices

**Article Chronicle :** Received : 25.06.2012; Revised : 22.09.2012; Accepted : 14.10.2012

**How to cite this Article :** Kumar, Ranjeet, Nandede, B.M., Padhee, D. and Singh, Harsh Vardhan (2012). Performance evaluation of pneumatic planter using pigeonpea seeds. *Engg. & Tech. in India*, 3(2) : 120-123.

### INTRODUCTION

Horizontal plate planters with cells on the periphery, as a seed metering devices for precision planting of seeds were the first precision planters developed in India (Datta, 1974). Horizontal seed metering devices were popular and widely accepted but the problems occurred with higher seed damage, missing and multiple drops. To reduce these losses, inclined and vertical plates planters were developed, moreover the pneumatic seed-metering device and used (Shafii and Holmes, 1990; Guarella *et al.*, 1996). Pneumatic metering device has the advantage of metering irregular shaped seeds, besides spherical seeds. Such devices could be suitable for planting of groundnut, cotton, pigeonpea, maize, soybean, sorghum, mustard, okra and radish but its use has to be justified by conducting the field experiments.

Use of conventional seeding devices have higher seed rate application which leads to wastage of costly seeds and adds the cost of thinning results in increases the production cost. Using pneumatic planter, seed germination efficiency has increased many folds at reduced seed rate compared with conventional planters. Inter row and intra row spacing for pigeonpea is an important factor in order to achieve optimum crop yield. The parameters for the evaluation of performance of the planter include spacing between seeds or plants (Hollewell, 1992; Parish *et al.*, 1991), per cent multiples and misses (Brooks and Church, 1987) and precision in spacing index (Hofman, 1988; Jasa and Dickey, 1982). Important factor of the pneumatic seed-metering device is its uniformity of seed spacing. Besides the design of the metering devices, field and operational parameters affect the precision distribution of seeds. Karayel and Ozmerzi (2001) stated that variability in the seed spacing with a precision vacuum seeder increased with increasing forward speed. Use of conventional planting machines does not maintain precise plant spacing and seed rate. Therefore, an attempt was made to evaluate the pneumatic planter developed at CIAE (Central Institute of Agricultural Engineering), Bhopal in laboratory and field conditions to justify its use in planting of pigeon pea seeds.

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