

ABSTRACT

The present investigation deals with the development of a tractor drawn 3-row multi-stack semiautomatic vegetable transplanter (MSVT) for paper pot seedlings. A device was developed to make cylindrical shaped paper pots. Four layered 82 cm³ volume cylindrical pots made of newspaper, filled with farmyard manure, soil and sand in the proportion of 80:10:10 by volume was found to be the best combination of pot size and pot mix for raising vegetable seedlings. Considering the final dimensions and weight of the pot together with its ability to sustain multi-droppings, one multi-stack planting unit was developed to carry more number of pot seedlings in limited space and was evaluated in the soil bin. For forward speed up to 2.2 km/h, all efficiencies were found to be above 98% with soil coverage of 100%, variations in seedling spacing as ± 2 cm from desired seedling spacing and angle of inclination of seedling below 24°. Based on laboratory findings, a tractor drawn 3-row MSVT was developed and evaluated in the field. It consisted of three sets of multi-stack planting unit arranged on a frame with three point hitch attachment and supported by a pair of ground wheels. Each multi-stack planting unit comprised three sets of metering wheel and slotted plate, a seedling delivery tube, a furrow opener and closer. The three metering wheels were arranged one above the other on a common rotating shaft with a slotted plate at the bottom of each metering wheel. The pot seedlings were placed in upright orientation in the top metering wheels, which conveyed the seedlings in sequence towards the slot, through which pot seedlings were dropped in upright orientation into the lower metering wheels. The seedlings in the bottom metering wheel were dropped into the furrow opened by a shovel type furrow opener through a seedling delivery tube attached below its slot. Finally, the pot was covered by a disc type furrow closer. The average field capacity of the machine was found to be 0.112 ha/h at a forward speed of 2 km/h for transplanting tomato, brinjal and chili seedlings at 60 × 45 cm spacing resulting in a saving of 89% labor and 92% of operating time over the conventional method of manual transplanting of pot seedlings and bare root seedlings. The transplanter was found to plant 72 pot seedlings per min per row with 3-5% missed planting, 6-9% tilted planting and 81-85% soil covering efficiency. The quality of transplanting was found to be satisfactory.

Key words: multi-stack, semiautomatic vegetable transplanter, paper pot seedlings, pot making device.