

## Abstract

The present research deals with the identification of the best combination of potting mix and pot size for raising good quality paper pot vegetable seedlings and the development of a hand tractor operated automatic vegetable transplanter for these seedlings. The best combination of potting mix and pot size was identified by considering seedling quality, cost and weight of pots. Quality of seedlings was evaluated using a novel fuzzy logic based biomass growth index (BGI). Double layered 50 cm<sup>3</sup> volume cubical pots made of newspaper and filled with 25% vermicompost and 75% mixture of soil and sand in equal proportion was found to be the best combination of pot size and potting mix for raising seedlings of tomato, brinjal and chili. Taking into consideration the dimensions and weight of the pots, a 2-row array type vegetable transplanter was designed and developed for a 9.75 kW hand tractor. It consisted of two sets of feeding conveyor, metering conveyor, seedling drop tube, furrow opener and soil covering device, an automatic feeding mechanism, hitch, and a depth adjustment wheel. The pot seedlings were placed in upright orientation on the feeding conveyor in the form of a rectangular array, which were automatically fed to the metering conveyor. The metering conveyor conveyed the seedlings in sequence to the seedling drop tube, through which pot seedlings were dropped in upright orientation into the furrow. The optimum seedling and operational parameters of the array type vegetable transplanter were identified in the laboratory for its efficient operation. On evaluation in the field at a forward speed of 0.9 km/h, field capacity of the machine was found to be 0.026 ha/h for transplanting tomato at 45 × 45 cm spacing. It resulted in saving of labor and operating time to the tune of 74% over the conventional method of manual transplanting. The planting rate of the developed transplanter was found to be 32 pot seedlings/min with 4% missed planting and 5% tilted planting. The soil covering efficiency of the developed vegetable transplanter was found to be about 81%. The quality of transplanting was found to be satisfactory.

**Key words:** automatic vegetable transplanter, hand tractor, paper pot seedlings, vermicompost, biomass growth