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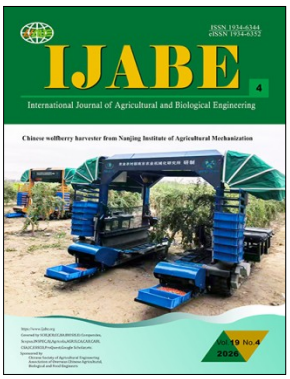
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Title: Comparative analysis of a novel onion transplanter for bare-root seedlings against traditional cultivation techniques

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Abstract: The demand for onion is increasing day by day across the world because of its medicinal properties and population pressure. The main concern is the availability of sufficient onion throughout the year. Productivity is negatively affected by poor mechanization in seed sowing and handling of onion seedlings due to untimely sowing and poor bulb growth. In order to improve mechanization in handling bare-root onion seedlings, a single-row prototype mechanical onion transplanter (TMch) was developed. The performance of the developed unit was compared with existing onion cultivation techniques. The TMch method offered superior and uniform plant spacing compared to existing methods such as mechanical planting (SSP) and manual seed sowing (SSM), facilitating the conservation of expensive onion seed and vegetative propagation growth of onion bulbs through enhanced nutrient availability and soil space utilization. This study also exhibited that the developed transplanter offered a better onion seedling survival rate (92%) with an above-average onion weight as compared to SSP and SSM methods, but recorded lower than that of the manual transplanting (TM). The TMch method also provided more reliable results with respect to onion size distribution. Findings concluded that the prototype onion transplanter has sufficient potential to increase onion productivity by improving the level of mechanization in dealing with bare-root onion seedlings. The main issue found in this study was the separation of bare-root onion seedlings, which required substantial time and the need for a more automated approach to onion seedling separation.



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