Mechanical garlic weeder for sustainable agriculture: a greener alternative

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Weed management in garlic cultivation is resource-intensive, with chemical herbicides posing environmental risks. To address this problem, a tractor-drawn 19-row garlic weeder has been developed, offering an eco-friendly alternative. Rigorous testing revealed its efficacy through various treatments. Single weeding achieved 57.4% weed control, while double weeding reached 91.1%, and combining double weeding with manual methods peaked at 96.1%. Notably, this matched the 97.5% efficiency of three manual weedings. The weeder's operating cost was Rs 2019/ha for single weeding, presenting a 49.8% cost-saving compared to three manual weedings. This innovation emerges as a cost-effective and sustainable solution for garlic cultivation in organic farming.

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herbicides have been a popular weed control method in garlic crop production. However, the hazardous effects of herbicide and weedicide use on human health and the environment have raised serious concerns[6,7]. To promote organic farming and ensure sustainable agricultural practices, it is crucial to adopt a safer alternative to chemical methods. Mechanical weeding is an effective and eco-friendly method that eliminates the use of toxic chemicals for weed control[8]. Additionally, mechanical weeders significantly reduce the physical workload of labourers by replacing manual weeding, which is labour-intensive and time-consuming. Various types of mechanical weeders are used in different crops depending on the spacing and weed types. Cultivators, finger weeders, brush weeders and torsion weeders are ideal for wide-spaced crops, whereas spring-tine harrows are primarily used in narrow-row high-density crops[9]. Shovel or sweep weeders effectively control weeds between crop rows, but require frequent