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Design and fabrication of self–propelled agricultural spraying machine for small scale farmers

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Abstract

Farmers can control pests and diseases with agricultural spraying machines, which is a big benefit. Even though the spraying machine is very important, farmers who use regular spraying machines get very tired because they have to carry the machine on their backs. Moreover, the advanced existing spraying machines including drones are very expensive for farmers in under developing and developing countries to purchase and use to control pests on their crops. The goal of the study was to create, build, and test a self-propelled spraying machine for small-scale farmers that would help to address the challenges small scale farmers goes through when spraying their crops, including, operator fatigue, chemical spillage, stability during operations, and safety. The self-propelled machine was tested on a 0.5-hectare maize farm and a 0.5-hectare pepper farm. The average time spent using the new machine on the farms was 0.84 hours, which shows that it works well.

During the operation, 8 L out of 16 L of chemical solution loaded in the tank was discharged, showing that the developed machine used chemicals well. The operator fatigue test showed a low average hand-arm and strain score of 1.20, which clearly shows that small-scale farmers are less tired. Ten farmers who were part of the safety evaluation indicated that the mean score for chemical exposure was low at 1.40, and the mean score for instability during operation was low at 1.70.

The results showed that the machine that was made is safe, stable, and comfortable to use. The self-propelled spraying machine that was developed worked well in terms of operator fatigue, chemical use, and safety.

Keywords: Agricultural spraying machine, fatigue, operator fatigue, self-propelled sprayer, small scale farming

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