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EFFECT OF MACHINE AND OPERATIONAL PARAMETERS ON PICKING AND CONVEYING EFFICIENCY IN AN EXPERIMENTAL TEST RIG FOR THE DEVELOPMENT OF A PNEUMATIC SUCTION- TYPE GROUND COLLECTION SYSTEM FOR NEEM (*Azadirachta indica*) FRUIT

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Abstract

The conventional manual method of neem fruit collection is laborious, uneconomical, and time-consuming. The cost of collecting neem fruits from the ground exceeds the selling price of neem fruits. There is no mechanical system available for collecting neem fruits from the ground. To address the above problems, a pneumatic suction collection system was explored, necessitating optimization of key variables influencing neem fruit collection and picking efficiency. The study investigated impeller diameter (I1: 152 mm, I2: 204 mm, I3: 250 mm), impeller mount height (H1: 30 cm, H2: 45 cm, H3: 60 cm), suction hose diameter (D1: 80 mm, D2: 110 mm) and impeller speed (S1: 3500 rpm, S2: 4000 rpm, and S3: 4500 rpm). Experiments were conducted using various combinations of these variables on an experimental test rig. The maximum picking efficiency of 100 per cent and maximum collection efficiency of 99.67 per cent were observed for the combination of 250 mm impeller diameter (I3) with 80 mm suction hose diameter (D1), impeller speed 4500 rpm (S3) and 45 cm height of impeller (H2). The optimized combination levels of the variables were recommended for the development of prototype unit of ground collection system for neem fruit. This developed system promises to revolutionize neem fruit collection through mechanical means, offering a more efficient and economical alternative to manual methods.

Key words: fluorescence in situ hybridization, image analysis, next-generation sequencing, Proteobacteria, Wilcoxon signed rank test

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