

Design, Fabrication and Preliminary Testing of a Thresher-Cleaner for Grain Legume

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Abstract

The medium scale thresher-cleaner had a conveyor, thresher, fan and cleaning units. The machine required 3 kW power and floor area of 1.16 m². The inclined flight conveyor has a maximum capacity of 350 kg/h and moves the material through a height of 2.2 m. It requires a maximum of 650 W for its operation. The threshing unit is axial flow type. It requires a power of 1.25 kW and a concave clearance of 28.2 mm, concave diameter of 46 cm and concave length of 99.8 cm. The threshing drum has a diameter of 18 cm with a thickness of 3 mm and length of 99.5 cm. The centrifugal fan requires a maximum of 787 W to clean threshed product discharged into it at 3.69 kg/sec. Fan pressure and air flow rate are 843.30 N/m² and 3.25 m³/s, respectively. The machine was fabricated and subjected to preliminary test using cowpea ('Ife Bimpe' variety) with pod moisture content of 14.0 to 22.0%, conveyor speed of 400 rpm, threshing speed of 600 rpm, fan angle inclination of 900 to 1200, fan speeds of 900 and 1500 rpm and a concave clearance of 20 mm. The conveyor efficiency ranged from 56.9 to 74.0%, 53.2 to 73.9% and 60.1 to 79.1%, for pod moisture content of 14.0, 18.0 and 22.0%, respectively with mean values of 64.6, 67.2 and 70.3%, respectively. The threshing efficiency was 67.5 - 97.7%, 77.1 - 94.4% and 83.1 - 97.0% with mean values of 83.4, 86.7 and 84.4%, respectively for same moisture content. The cleaning unit has an effectiveness of 98 to 100%.