

Title Physical characteristics of compressed cotton stalks
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Abstract

A study was carried out to evaluate the physical characteristics of chopped cotton stalks and to establish correlations of physical characteristics with moisture content and compression pressure. Chopped cotton stalks having a moisture content varying from 8.5% to 21.45% (w.b.) were densified into square blocks (80 mm by 80 mm) at compression pressures ranging between 13.79 and 34.47 MPa and a dwell time of 1 min, using a vertical compaction machine. Physical characteristics of blocks, namely bulk density, compression ratio, resiliency and hardness, were evaluated. The bulk density of blocks varied from 542 to 794 kg m⁻³, resiliency from 11% to 47%, hardness from 15 to 134 kg and compression ratio from 5.2 to 8.6. Analysis of variance indicated significant effects of moisture content and compression pressure on bulk density, resiliency and hardness of compressed cotton stalk blocks. A second-order polynomial was found to be adequate to correlate the physical characteristics of blocks with moisture content and compression pressure. A compression pressure of 34 MPa and a moisture content of 15% (w.b.) were found to be the most appropriate for high stability compressed blocks. Savings in transportation costs in block form could be up to 76% whereas maximum savings in storage cost of blocks could be as much as 88%.