

Soil Stress State under Tractive Tire and Compaction Model

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Abstract : Soil compaction induced by a tractor towing trailer becomes a major problem associated to sugarcane productivity. Soil beneath the tractor's tire is not only under compressing stress but also shearing stress. Therefore, in order to help to understand such effects on soil, this research aimed to determine stress state in soil and predict compaction of soil under a tractive tire. The octahedral stress ratios under the tires were higher than one and much higher under higher draft forces. Moreover, the ratio was increasing with increase of number of tire's passage. Soil compaction model was developed using data acquired from triaxial tests. The model was then used to predict soil bulk density under tractive tire. The maximum error was about 4% at 15 cm depth under lower draft force and tended to increase with depth and draft force. At depth of 30 cm and under higher draft force, the maximum error was about 16%.

Keywords : draft force, soil compaction model, stress state, tractive tire

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