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Soil stress state determination under static load

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abstract Intensification of crop production by uncontrolled increasing use of agricultural machinery negatively affects soil physical properties. Heavy machinery traffic causes soil compaction, erosion and physical degradation. In this study soil stress state under static vertical loading was predicted as a function of increasing load, soil tillage variants (plough and rototiller) as well as soil structure. Monolith samples were investigated using a SST transducer and a deformation measure device. The investigations were carried out in an Ap horizon of sandy loam Luvisol derived from glacial till (site Hohenschulen, nearby Kiel, Germany), for two tillage and structure variants. The three major stresses, octahedral shear stress and its angle, mean normal stress as the complete stress state were determined using the SST transducer system. Soil deformations and bulk density changes were also investigated. Effects of soil structure and tillage on stress state were predicted.

keywords wheel-soil interaction, soil compaction, soil stress state