ELONGATION RATES OF ROOT AND SHOOT OF WHEAT DURING EMERGENCE AS AFFECTED BY MECHANICAL IMPEDANCE AND MATRIC POTENTIAL OF THE GROWTH MEDIUM

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ABSTRACT

A laboratory study was conducted on a sandy loam soil to determine the effect of soil matric potential and soil mechanical impedance on wheat growth during emergence. Experiment was conducted in growth cabinet in which an unimpeded treatment was compared against an impeded treatment at three matric potentials, i.e. -10, -100 and -500 kPa. The soil was packed in 300 mm long cylinders at dry bulk density of 0.88 Mg m^{-3} and 1.25 Mg m^{-3}. Five mm long seedlings of wheat variety Inqlab, were grown as a test plant. The results indicated that mechanical impedance and matric potential of the root medium significantly ($P < 0.05$) affected fresh and dry root weights. The weights were reduced with decreased soil matric potential and increased soil mechanical impedance. In unimpeded treatment, about double the amount of fresh weight and dry weights of shoot were recorded than in impeded treatment at -10 and -100 kPa matric potential. The highest dry shoot weight of 23.5 mg was recorded when grown at -10 kPa in unimpeded soil. It was almost 2 times higher than that of impeded treatment. Root and shoot elongation in unimpeded treatments were reduced by 37 and 29 percent respectively at -100 kPa and 11 and 58 percent at -500 kPa matric potential. Similarly these reductions were of 64 percent in root length in impeded soil at -100 and -500 kPa. In unimpeded treatments, the roots at the three matric potential were almost 2 times longer than those of the impeded treatments. While shoots were 4 and 6 times longer at -10 and -100 kPa matric potential respectively. The results highlight serious consequences of soil compaction and matric potential on wheat growth in soil particularly during early growth stage.