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Effect of oxygen deficiency on soil dehydrogenase activity (pot experiment with barley)

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abstract Changes of dehydrogenase activity in Orthic Luvisol developed from loess (Ap horizon) under different aeration conditions were observed in a greenhouse pot experiment with barley *Hordeum vulgare* L. cv. Aramir vegetation. The aeration status was modified by the use of combinations of three soil bulk densities (1.20, 1.35 and 1.50 Mg m⁻³) and three levels of soil water status (i the suction range of 15-80 kPa as the control level; ii the suction range of 2-5 kPa and iii water saturation). All the combinations of water conditions and bulk density were replicated in four pots. The plants were grown in soil with a controlled water level, except during 14-days of oxygen stresses which were applied at three plant physiological stages by reducing the water suction to 2-5 kPa or to 0 kPa (water saturation). Oxygen stresses were imposed as follows: stress I at tillering; stress II - at shooting, and stress III at the beginning of plant flowering. The aeration parameters (oxygen diffusion rate - ODR, redox potential - Eh, concentration of Fe⁺²) as well as soil dehydrogenase activity were measured four times during each stress. The dynamic of dehydrogenase activity is shown together with natural changes of temperature. Significant correlations between dehydrogenase activity and aeration indexes (Eg, ODR, Eh, Fe⁺²) were observed.

keywords dehydrogenase activity, soil aeration parameters, barley, oxygen diffusion rate, redox potential