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Effect of Field Drainage on Root Lodging Tolerance in Direct-Sown Rice in Flooded Paddy Field

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Abstract: To elucidate the effect of drainage of paddy fields on root lodging tolerance in direct-sown rice, we measured the pushing resistance (R), diameter of hill at the base (Dm), shoot dry weight (Ws) and root dry weight (Wr), in rice varieties grown using several irrigation management schemes that differed in the frequency and length of field drainage during the growing season. Soil hardness was also monitored to investigate the relationship between the variance of soil physical properties caused by different irrigation treatments and root lodging tolerance. Pushing resistance moment (Rh), i.e., product of pushing resistance (R) and height of pushed part of hill (h), showed higher values in rice grown in fields drained more frequently or for longer periods. A similar pattern was found in rice grown in field plots where root penetration to the subsoil layers was prevented by laying an unwoven cloth between the topsoil and subsoil layers. Higher values for pushing resistance efficiency based on root dry weight ($K_r : Rh/W_r/D_m$) were also found in plots subjected to more frequent or prolonged drainage, irrespective of rice variety. Soil hardness was progressively increased by each field drainage during the growing season, and showed a highly significant relationship with K_r . The above results suggest that field drainage increases the root lodging tolerance in direct-sown rice through improvement of anchoring ability caused by increased soil hardness.

Keywords: [Direct-sown rice cultivation](#), [Field drainage](#), [Irrigation management](#), [Pushing resistance](#), [Rice](#), [Root](#), [Root-lodging tolerance](#)

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