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Relationship between Deep Root Distribution and Root Penetration Capacity Estimated by Pot Experiments with a Paraffin and Vaseline Layer for Landraces and Recent Cultivars of Wheat

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Abstract: Root growth into deep soil is an important factor for stable production in wheat under drought conditions. Root penetrating capacity (RP) shown by pot experiments with a paraffin-Vaseline layer (PV layer) may be a useful indicator estimating deep rooting ability of wheat genotypes. Previously, we identified genotypes of durum wheat (*Triticum turgidum* L. var. *durum*) and bread wheat (*T. aestivum* L.) with diverse RP by the pot experiments. In this study, we investigated the root distribution of three Ethiopian landraces of durum wheat with high RP, three recent cultivars of durum wheat with low RP and one Japanese cultivar of bread wheat 'Haruyutaka' with low RP using: (1) pots with a PV layer, (2) root boxes, (3) artificial field and (4) a normal field to analyze the relationship between RP estimated by pot experiment and root development in the field. In the pot experiments, RP was evaluated by the number of roots penetrating through the PV layer (NRP). In the root-box and field experiments, the root distribution was evaluated by the number of roots on the vertical surface of soil as the root frequency (RF: root number cm⁻¹ soil surface). Ethiopian landraces had a significantly larger NRP than recent cultivars in the pot experiment. The root box and field experiments showed that Ethiopian landraces tended to have a higher RF than recent cultivars in deep soil layer. We concluded that RP estimated by pot experiments with a PV layer is a useful indicator of deep rooting ability under field conditions.

Keywords: [Compacted soil](#), [Deep rooting](#), [Genotypic difference](#), [Hard soil](#), [Root](#)



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