Root Length and Root Diameter as a Predictor of Drought Tolerance in Common Bean (Phaseolus vulgaris L.). (C02-foster164106-Poster)

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Abstract:

Root diameter (RD), root length (RL), and rooting depth were studied in 9 common bean (Phaseolus vulgaris L.) genotypes differing in drought tolerance (included non-nodulated isolines of two genotypes). Field, greenhouse, and growth chamber studies identified XAN 176, DOR 364 (nod), and PR9603-22 as the most drought tolerant and 8-42-M-2 as drought susceptible. For root analysis, plants were grown in PVC tubes (0.30 m x 0.92 m) plus or minus moisture deficits in the greenhouse for 40 days and hydroponically in growth pouches (25.4 cm x 35.6 cm) plus or minus ABA in the growth chamber for 14, 21, or 28 days after transplanting (DAT). Roots were separated into 10 diameter classes and RL was quantified for each class. Moisture stress significantly decreased RL and RD and ABA significantly increased them. At 28 DAT, ABA significantly increased RL in 8-42-M-2; XAN 176 and PR9603-22 had low to moderate increases; and DOR 364 (nod) had reduced RL. At 46 to 61 cm depth, XAN 176 maintained a high RL under moisture stress, DOR 364 (nod) had a low RL that increased under stress, PR9603-22 had an intermediate response, and 8-42-M-2 had high RL that was greatly reduced by stress. ABA-induced root growth appeared to correspond with decreased root growth under moisture deficits.

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