

Author:  [ADVANCED](#)Volume  Page Keyword:    
[TOP](#) > [Available Issues](#) > [Table of Contents](#) > [Abstract](#)

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## Effects of Soil Moisture Conditions before Heading on Growth of Wheat Plants under Drought Conditions in the Ripening Stage: Insufficient Soil Moisture Conditions before Heading Render Wheat Plants More Resistant to Drought during Ripening

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**Abstract:** Plants growing on soil with insufficient moisture need deep and dense roots to avoid water stress. In crop plants, the production of dry matter during ripening of grains is critically important for grain yield. We postulated that shoot growth would be suppressed but root growth would continue under an insufficient soil moisture condition before heading, while shoot growth would be more vigorous than root growth under a sufficient soil moisture condition. We anticipated that the plants growing under an insufficient soil moisture condition before heading would produce more dry matter and grain under an insufficient soil moisture condition during ripening. In order to examine our hypotheses and to determine the fundamental conditions for improving grain yield and efficient use of irrigated water under limited irrigation, we grew wheat plants (*Triticum aestivum* L., cv. Ayahikari) in pots (30 cm in diameter, 150 cm in height) with insufficient soil moisture (PD-D pots) or sufficient soil moisture (PW-D pots) for six weeks before heading followed by full irrigation, and then insufficient soil moisture condition during ripening. The growth of shoots was suppressed significantly but that of roots was not before heading in PD-D plants, with a higher resultant ratio of root to shoot than in PW-D plants. The former retained a high leaf water potential and, therefore, were able to produce more dry matter and grain during soil moisture depletion during ripening as compared with the latter plants. We also obtained similar results with field-grown plants.

**Keywords:** [Drought avoidance](#), [Dry matter production](#), [Grain yield](#), [Irrigation efficiency](#), [Leaf water potential](#), [Root](#), [Soil water potential](#), [Wheat](#)



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