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Effects of Soil Moisture Depletion for One Month before Flowering on Dry Matter Production and Ecophysiological Characteristics of Wheat Plants in Wet Soil during Grain Filling

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Abstract: The period from mid-March to April in the wheat-growing season in Japan corresponds to a wet period known as “Natanezuyu”. After this wet period, the weather remains rather dry until June. Fluctuations in soil moisture conditions during the growing season might be expected to affect the growth of wheat. Therefore, we compared the grain yield, dry matter production and ecophysiological characteristics of wheat grown with adequate moisture during the ripening stage after it had been grown under adequate (W-plot) or deficient (D-plot) soil moisture conditions for about one month before heading. The grain yield in the D-plot was higher by about 15 to 40% than that in the W-plot, with greater dry matter production. The larger dry weight in the D-plot resulted from a higher rate of crop growth before and after heading, which was due to a larger leaf area and higher net assimilation rate. During the ripening stage, leaf senescence of plants was delayed and the rate of photosynthesis fell more slowly in the D-plot than in the W-plot. Root systems developed better, resistance to water transport from root to leaves was lower, the exudation rate of roots was higher, and the cytokinin activity in xylem exudates from roots was higher in the D-plot. These characteristics of roots might have caused the significant difference in the growth and physiology of the aboveground parts of the plants. Our results indicate that encouragement of the development of the root systems, for example, by drainage during the wet period might be important for improving the grain yield of wheat in Japan.

Keywords: [Cytokinin](#), [Dry matter production](#), [Photosynthesis](#), [Resistance to water transport](#), [Root system development](#), [Senescence](#), [Soil moisture](#), [Wheat](#)



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