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## Japanese journal of crop science

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#### Contributions of Capacity for Soil Water Extraction and Water Use Efficiency to Maintenance of Dry Matter Production in Rice subjected to Drought

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#### Abstract:

Dry matter production rate in plants is indicated by transpiration rate (Tr) multiplied by water use efficiency (WUE). Our objectives were to establish which of WUE or Tr is dominant in contributing to maintenance of dry matter production of rice cultivars in drought conditions. Four rice cultivars with different drought resistance rankings (from susceptible to resistant) were grown in upland field conditions and suffered soil desiccation during the reproductive stage. Dry matter production of the shoot (SDP) when irrigation was withheld was different for each cultivar; SDP was higher in drought resistant cultivars and lower in sensitive cultivars. There was a close relationship between SDP and the consumption of soil water between 0 and 40 cm below the soil surface during the soil drying period. Water consumption showed a high correlation with root density in deep soil layers. There were not, however, large cultivar differences in WUE, calculated from the transpiration rate which was estimated from the soil water consumption minus the soil evaporation rate. When three cultivars selected from these field tested cultivars were grown in pots and suffered different degrees of soil desiccation during the early reproductive stage, there were also scarcely any differences in WUE between the three cultivars. We suggested that the high dry matter production of those rice cultivars known to be drought resistant under field conditions is caused not by high WUE, but by high ability to maintain Tr, which is supported by deep root systems.

#### Keywords:

Drought, Dry matter production, Rice, Transpiration, Water use efficiency

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