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Seasonal Changes in Efficiency of Solar Energy Utilization and Solar Energy Conversion in Two-rowed Barley of Warm Regions in Japan

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Abstract:
Efficiency of solar energy utilizatiion (Eu, %), efficiency of solar energy conversion (Ec, %) and conversion efficiency were determined for two-rowed barley (cv. Nishinochikara) plant grown in warm regions in Japan. Absorbed solar radiation during the stage from internode elongation to heading was about 56% of the total supplied solar radiation, and that in the ripening stage was about 70%. Absorbed solar radiation (SR_a) in the growing period was 865.02 MJ m^{-2}, equivalent to about 40% of the total solar radiation. Ec at the internode elongation to heading stage was 3.94%. Eu and Ec were 1.47% and 2.13% in the ripening period, both of which accounted for 1.09% and 2.71% in the whole growing period, respectively. These values were equal to those of rice grown in the same regions in Japan. Top dry weight was variable in proportion to SR_a, and Cs (Conversion efficiency) was 2.32g MJ^{-1}, The value of Cs determined in the early and middle ripening stages were 1.79g MJ^{-1} and 1.17g MJ^{-1}, respectively.

Keywords:
Conversion efficiency, Dry matter production, Efficiency of solar energy conversion, Efficiency of solar energy utilization, Grain production, Two-rowed barley

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