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Diurnal Changes in Dark Respiration of Rice Plant Grown under Natural Light Conditions

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Abstract:

Three experiments were conducted to clarify the factors affecting the diurnal changes in the dark respiration rate of rice plants.The time courses of dark respiratory CO_2 evolution per unit dry weight(Rr)at 25°C were measured continuously for 24 h after 6 p.m.Rr decreased rapidly after the onset of darkness.followed by a steady state for 6 h.The next morning, Rr decreased at the earlier growth stage, but increased at the later stage.To confirm the effect of light intensity during the daytime, the nighttime Rr was measured under the different shade treatments.Rr decreased with an increase in shading intensity.Rr in 100% shading was higher than that in 80% shading.Potted plants, grown under outdoor conditions, were incubated in a dark chamber at 3 h intervals from 6 a.m.to 6 p.m., and the time courses of Rr were investigated.The typical time-course changes of Rr were observed to be characterized as rapid decreases after the onset of darkness followed by temporary increases before a continuous decrease.The maximum rates of Rr were observed between 9 and 12 a.m., and were 1.3-2.0 times as greater than that measured in the nighttime.Although it was expected that Rr became higher with the passage of time from morning to evening, Rr peaked in the morning.This pattern of diurnal change in Rr was consistent with that of time-course changes in Rr under continuous darkness.These results suggest that diurnal changes in Rr were mainly regulated by the endogenous rhythm of respiration.

Keywords:

Dark respiration, Diurnal change, Rice plant

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