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Trial Manufacture of Simple Integrated Tube-Type Pyranometer by Phycoerythrin and Measurements of Transmittance of Solar Radiation in Crop Canopies

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Abstract:

We tried to construct a simple integrated tube-type pyranometer using phycoerythrin from seaweed pigment. The maximum sensitive waveband of phycoerythrin was 550nm ~ 560nm, and this waveband was in the photosynthetically active radiation range. The acrylic tubes (outside diameter, 22mm.length, 100cm) were spread with white paints except for a strip 15mm in width, and phycoerythrin was put into the acrylic tube. In the results from the outdoor measurements, the tube-type pyranometer showed a positive correlation between the transmittance of phycoerythrin (%) and the measured accumulated solar radiation (MJm^{-2}), but the slope of the linear equation was different in summer and winter. In an artificial climate room, the relationship between the transmittance of phycoerythrin and the accumulated solar radiation could be approximated by a quadratic equation at every temperature. In the measurements made outdoors, the accumulated solar radiation could be estimated using the transmittance of phycoerythrin and the mean air temperature during measurements.

Keywords:

Phycoerythrin, Rice, Simple integrated tube-type pyranometer, Soybean, Transmittance solar radiation

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