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The Effects of Reflected Light on the Photosynthetic Rate of Middle and Lower Leaves and Seed Yield in Soybean Plants

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Abstract:

The effects of supplying reflected light on the photosynthetic rate of middle and lower leaves and on the seed yield of soybean were investigated. Soybean cultivar Suzukari was grown in Wagner pots and in an upland field. Reflected light was supplied by covering the surface of the pots with aluminum foil in 1994 and with reflected sheets between rows in the field in 1995. Light reflection treatment was carried out from the flower bud differentiation stage to maturity in both years. Photosynthetic rate, transpiration rate and stomatal conductance of the middle and lower leaves (4th to 6th leaves) were measured under natural light. The higher the leaf position was, the higher the photosynthetic rate of the pot-cultured plants at high light intensity (over $1000\mu\text{mol m}^{-2} \text{s}^{-1}$). The photosynthetic rate reached its maximum in the flowering stage. This was followed by a gradual decrease with plant age. The photosynthetic rate of middle and lower leaves appeared to be correlated to light intensity at low light intensity and the rate of CO_2 diffusion through stomata at high light intensity. Reflected light caused an increase in the photosynthetic rate of middle and lower leaves. In the field, reflected light intensity was increased between rows in fine weather and between plants within a row in cloudy weather. The photosynthetic rate and seed yield in the field were little affected by reflected light.

Keywords:

Light intensity, Middle and lower leaves, Photosynthetic rate, Reflected light, Seed yield, Stomatal conductance

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