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Evaluation of the Effect of Shading on Soybean Photochemical Characteristics

Jeong-Won Kim[1], Hyeon-Soo Jang[1], Bo-kyeong Kim[1], Dea-uk-Kim[1], Jong-Tak Youn[1], Yun-Ho Lee[1]*

[1]Crop Production & Physiology Div., NICS, Wanju 55365, Korea

[Introduction]
Shading reduces the light intensity received by the crop and changes the light quality. The limited light intensity and the changed light quality under shading condition affect the morphological and physiological characteristics of crops. The reaction is because the photoreceptor protein recognizes the light change in the leaf and the metabolism that transmits the signal through the hormone occurs. Characteristics related to photosynthetic capacity inside the leaf are also affected. This study aims to compare the light environments on control and shading; to investigate the change in leaf photochemical characteristics in the response to shading.

[Materials and Methods]
In this study, “Daewon”, “Haepum” and “Cheong ja No. 5” soybeans were grown in paddy fields of the National Institute of Crop Science on June 13, 2022. For the shading net, commercial 35% and 75% were made into a shading chamber (1.2m in width × 2m in length) and processed from the V3-V4 to harvest. Measurements were made by installing a thermo-hygrometer and a leaf thermometer in the shading chamber during the cultivation period. The vegetation index(PolyPen), chlorophyll fluorescence (FluorPen), and chlorophyll content(MC-100) were measured for each stage.

[Results and Discussion]
The actual average shading rates of the 35% and 75% shading chambers during the experiment period were 47% and 78%, respectively. The Red to Far Red transmittance ratio between the control and the shade treatments in post-flowering stage was significantly, while later period was not significantly changed. The lowest stomatal conductivity was observed in the 75% shading in all varieties. The chlorophyll content under the shading were higher than the control. On the post flowering stage, the chlorophyll content was increased in all group of the three cultivars. The F_V/F_M of chlorophyll fluorescence under the shading was higher than the control. The F_V/F_M difference became smaller in the post R4. The non-photochemical fluorescence quenching (NPQ) of R4 was the highest in the control and the lowest in the 75% treatment in all cultivars. These results suggested that soybeans recognized the changed light environments in different shading conditions and regulated the photochemical characteristics.

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*Corresponding author: E-mail. zooz9005@korea.kr Tel. +063-238-5269