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Characterization of “purple-discoloration” in the Uppermost Leaves of Soybean Via Digital PhenotypingJeongsun Lee^{1†}, Hee Jin You^{1†}, Seongha Kwon^{1†}, Hyun Ju Kim¹, Sungwoo Lee^{1*}¹Department of Crop Science, College of Agriculture and Life Sciences, Chungnam National University, Daejeon, 34134, Republic of Korea**[Introduction]**

Climate change or severe weather often causes unusual, unexpected phenotypes in plants. In recent years, purple-discoloration of the uppermost leaves has been observed in some soybean cultivars. It was assumed that the symptom would be caused by light stress during summer. This study aimed to characterize this phenomenon using digital imaging technologies.

[Materials and Methods]

Several recombinant inbred lines (RILs) were selected from two bi-parental populations, Daepung x PI 96983 and Daepung x Wooram, which segregated in discoloration of uppermost leaves last two years with high consistency. Changes occurring in uppermost and middle leaves of the selected RILs were weekly monitored by a hyperspectral camera and a chlorophyll fluorescence spectrometer from mid-August to the beginning of October. Hyperspectral images were analyzed to identify wavelength bands that can differentiate presence or absence of the discoloration using the software ENVI. To access plant photosynthesis, the maximum photochemical yield of photosystem II (F_v/F_m) were measured by the chlorophyll fluorometer, which indicates levels of “stress” on plants.

[Results and Discussion]

The selected RILs showed in the color of the uppermost leaves in this year. From the measured hyperspectral reflectance showed a larger discriminative pattern at 500–550 nm wavelength between discolored vs. normal leaves. The wavelength range corresponds to green light and it is known that green photons are well absorbed by anthocyanins, while poorly absorbed by chlorophylls. Comparison of F_v/F_m between the uppermost and middle leaves did not exhibit significant difference in both discolored and normal-leaf RILs, indicating that photosynthesis levels were similar and both leaves were healthy. This result strongly support that the purple-discoloration would be due to accumulation of anthocyanins in the uppermost leaves. More details will be addressed in the presentation.

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