

**PB-2**

## Characterization of Purple-discolored, Uppermost Leaves of Soybean: QTL Mapping, Hyperspectral Imaging, and TEM Observation

JaeJin Lee<sup>1</sup>, Jeongsun Lee<sup>1</sup>, Seongha Kwon<sup>1</sup>, Heejin You<sup>1</sup>, Sungwoo Lee<sup>1\*</sup>

<sup>1</sup>Department of Crop Science, College of Agriculture and Life Sciences, Chungnam National University

### [Abstract]

Purple-discoloration of the uppermost leaves has been observed in some soybean cultivars in recent years. The purpose of this study was to characterize the novel phenotypic changes between the uppermost and middle leaves via multiple approaches. First, quantitative trait loci mapping was conducted to detect loci associated with the novel phenotype using 85 recombinant inbred lines (RILs) of the 'Daepung' x PI 96983 population. 180K SNP data, a major quantitative trait locus (QTL) was identified at around 60 cM of chromosome 6, which accounts for 56% of total phenotypic variance. The genomic interval is about ~700kb, and a list of annotated genes includes the *T*-gene which is known to control pubescence and seed coat color and is presumed to encode flavonoid 3'-hydroxylase (F3'H). Based on Hyperspectral imaging, the reflectance at 528~554 nm wavelength band was extremely reduced in the uppermost leaves compared to the middle (green leaves), which is presumed due to the accumulation of anthocyanins. In addition, purple-discolored leaf tissues were observed and compared to normal leaves using a transmission electronic microscope (TEM). Based on observations of the cell organelles, the purple-discolored uppermost leaves had many pigments formed in the epidermal cells unlike the normal middle leaves, and the cell wall thickness was twice as thick in the discolored leaves. The thickness of the thylakoid layer in the chloroplast, the number of starch grains, the size of starch all decreased in the discolored leaves, while the number of plastoglobule and mitochondria increased.

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\*Corresponding author: E-mail, sungwoolee@cnu.ac.kr Tel, +82-42-821-5727