

PA-82

Changes in Growth and Yield of Soybean According to the Intensity of End-trimming After Full Flowering Stage (R₂)

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[Introduction]

Recently, due to global climate change, the growth of vegetative parts has become more vigorous after flowering in soybean, resulting in poor ripening and delayed harvesting. Therefore, this study was conducted to figure out how suppression of vegetative growth by end-trimming after the full flowering stage affects the growth and yield of soybeans.

[Materials and Methods]

This experiment was conducted at the experimental farm of Gyeongsang National University. The soybean cultivar used in the experiment was "Sunpoong", which was sown on June 13, 2022, and end-trimming was carried out at R₂. The trimming treatments were divided into a control (T₀) that was not trimmed, and treatments that varied the trimming intensity with trimmed heights of -10cm (T₁), -20cm (T₂), and -30cm (T₃) from the canopy height. Plant growth was investigated at 13 days after treatment (DAT) and 42 DAT, and the plant height, shoot weight, pod number, and pod weight were measured, and hyperspectral analysis was performed on the upper layer of soybean canopy to know the conditions of leaves. Lodging degree was evaluated at 42 DAT, and the number of seeds and seed weight were measured, and the percentage of normal seeds and yield were determined at harvest.

[Results and Discussion]

Plant height of the soybean plant treated by trimming increased at 42 DAT regardless of trimming intensity, but the difference due to trimming was not recovered showing the order of T₃ < T₂ < T₁ < T₀ and the degree of lodging was the highest in T₀. At 42 DAT, T₁ was the highest and T₂ was the lowest in the shoot day weight, total pod weight, and total pod number, but on the 69th day after mowing, the number of seed and seed weight were high in the order T₃ < T₀ < T₂ < T₁. In particular, in T₁, the number of seeds was 1.5 times higher than that of T₀, and the seed weight was about 1.7 times higher. The hyperspectral image analysis conducted at 13 DAT showed a remarkable difference in reflectance in the 550nm band, and the reflectance was high in the order of T₁ < T₀ < T₃ < T₂. In addition, it was confirmed that the value of reflectance in the band range greater than 700nm which is related to plant senescence lowered in the trimmed plants as compared to the control, and thereafter, there was no significant difference at 42 DAT. As a result of the analysis with vegetation indices calculated from reflectances, the indices using the red-edge bands and the indices related to chlorophyll content, which reflect changes due to aging well, were increased in T₂ and T₃. In particular, it was found that leaf aging was relatively delayed in T₃, as the greenness and PSPI, which are sensitive to aging, were the lowest. On the other hand, it seems that the leaf chlorophyll content decreased more rapidly, and the time to harvest was shortened in T₁, as the indices related to aging or chlorophyll content were low. Therefore, it was known that end-trimming over the upper layer of the canopy after the flowering period can facilitate the harvesting time without delay by suppressing the vegetative growth of soybeans and promoting the transport of stored nutrients in leaves to developing seeds and leaf falling.

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