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The Relationship Between Green Stem Disorder and the Accumulation of Vegetative Storage Protein in Soybean

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[Abstract]

Green stem disorder (GSD) of soybean (*Glycine max* (L.) Merr.) is characterized by delayed senescence of stems with normal pod ripening and seed maturation (Hobbs, 2006). GSD complicates harvesting of soybeans by significantly increasing the difficulty in cutting the affected plants. There is also the potential for moisture in the stems to be scattered on the seed, reducing the grade and storability of the seed. Not only the cause of GSD is yet unknown, but also GSD cannot be evaluated until maturity, therefore the method to evaluate GSD in early growth stage with high sensitivity is necessary. In previous studies, it has been reported that vegetative storage protein (VSP) accumulates and the syndrome of GSD appears in soybean after depod treatment (Fischer, 1999). Soybean VSP is a storage protein which is abundant in young sink leaves and degraded during seed fill (Wittenbach, 1982). Hence, we have established a system to quantify VSP of high sensitivity by using standard protein made by genetically transformed *E. coli* and specific antibody against VSP, and studied the relationship between VSP and GSD, by depod experiment and drought/excess wet experiments. The result of depod experiment with the cultivar 'Yukihomare' was the same with the previous studies, VSP accumulated much more than control and the syndrome of GSD appeared in soybean in depod treatment. Drought and excess wet had different impact on GSD. Excess wet caused GSD of the cultivar 'Tachinagaha (GSD susceptible)', while drought caused a little syndrome of GSD in the cultivar 'Touhoku 129 (GSD resistant)'. The accumulation of VSP differed between the two cultivars over time. In conclusion, the accumulation of VSP came along with the emergence of GSD. Different cultivars showed different response to drought and excess wet. In the future, it is expected that the dynamics of VSP will be elucidated in detail, leading to the development of early diagnosis technology for green stem disorder and the elucidation of mechanism of soybean GSD.

Keywords: Soybean, Green stem disorder, Vegetative storage protein

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