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Morphological and Physiological Characteristics of Soybean by Various Environmental Stress

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[Introduction]

Soybean(*Glycine max* (L) Merr.) is most widely cultivated upland crops in Korea. Due to global climate change, Korea experiences drought and intensive rainfall events in turn during soybean cultivation. In addition, excessive or unbalanced use of chemical fertilizer causes soil nutrient stress or salt stress to crops. Therefore it is important to understand soybean response to those stress during grow season. This study investigated soybean response to environmental stress, such as drought, excessive water, deficit soil nutrients, excessive soil nutrients and salt stress.

[Materials and Methods]

This experiment was performed at NICS (National Institute of Crop Science), department of southern area in Miryang. Soybean seeds were planted in 30 wagner pots(1/2000) in June, 2021. Total of 6 treatments were applied with 5 replicates; deficit soil nutrients, excessive soil nutrients, drought, excessive water, 100mM of salt(salt 100) and 200mM of salt(salt 200). Soil nutrient treatments were applied to soil right before panting and other stresses began to apply at V3 stage and remain through the growing. There were also 5 pots without stress and normal growth. Every two weeks, leaf area and chlorophyll contents were measured. In addition, 1-aminocyclopropane-1-carboxylic-acid(ACC) contents were also measured from soybean leaves. Height and thickness of soybean stalks were also measured.

[Results and Discussion]

After applying salt treatment, soybeans with salt 200 showed yellow leaf color and wilted. Soybeans with salt 100 also showed similar response, but less severe. Heights of soybeans did not show significant different across stresses. However averaged values of stalk thickness were the greatest from excessive soil nutrients and the smallest from deficit soil nutrients, drought and excessive soil water. Soybean leaves from excessive soil water had the largest area, while ones from salt 100 had the smallest. Results of chlorophyll contents showed the greatest one from excessive soil nutrients and the smallest from salt 200. Since all the measurements were conducted at early stage of soybean growth, results may not definite. However these results show soybean reponse to various stress at early stage.

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