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Changes of soil water content and soybean (*Glycine max* L.) response to groundwater levels using lysimeter

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Abstract

Due to the climate changes in Korea, the numbers of both torrential rain events and drought periods have increased in frequency. Water management practice against water shortage and flooding is one of the key interesting for field crop cultivation, and groundwater often serves as an important and safe source of water to crops. Therefore, the objective of this study is to evaluate the effect of groundwater table levels on soil water content and soybean development under two different textured soils. The experiment was conducted using lysimeter located in Miryang, Korea. Two types of soils (sandy-loam and silty-loam) were used with three groundwater table levels (0.2, 0.4, 0.6m). Mean soil water content during the soybean growth period was significantly influenced by groundwater table levels. With the continuous groundwater level at 0.2m from the soil surface, soil water content was not statistically changed between vegetative and reproductive stage, but the 0.4 and 0.6m groundwater table level was significantly decreased. Lower chlorophyll content in soybean leaves was found in shallow water table treatment in earlier part of the growing season, but the chlorophyll contents were non-significant among water table treatments. Groundwater table level treatments were significantly influenced on plant available nitrogen content in surface soil. The highest N contents were observed in 0.6m groundwater table level. It is probably due to the nitrogen loss by denitrification as the result of high soil water content. The length and dry weight of primary root was influenced by groundwater level and thus the highest length and dry weight of root were observed in 0.6m water table level. This result showed that soybean root growth did not extend below the groundwater level and increased with the depth of groundwater table level. The results of this study show that the management of groundwater level can influence on soil characteristics, especially on soil water content, and it is an important practice of to reduce yield loss caused by the water stress during the crop growing season.

Keywords: groundwater, soybean, soil water, water management, lysimeter

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