

Siripan Banharn 2012 : Physiological Acclimatization of Soybean Plant when Grown under Saturated Soil Culture. Doctor of Philosophy (Botany), Major Field : Botany, Department of Botany. Thesis Adviser: Professor Ahiphan Pookpakdi, Ph.D. 213 pages.

The study on physiological responses of soybeans cultivars “Chakkrabhandhu” No. 1 when grown in saturated soil culture, as compared with the soybean plants receiving conventional irrigation, was conducted at Agricultural Research and Training Institute, Lanna Rachamongkla Technological University at Lampang province between July 2004 to October 2006. The study was divided into two sections, the pot trials and field experiment. Study involved with recording and data gathering on growth, yield, yield components and measuring various physiological characteristics of soybeans. Experiments were conducted using Factorial in Completely Randomized Design. Results of this study revealed that soybeans grown in saturated soil culture had the tendency of producing growth and yield as similar to those receiving conventional irrigation. In term of physiological characteristics, the chlorophyll content could be used as an indicator for acclimatization, at the point where the chlorophyll contents which were previously dropped at the earlier stage of growth when receiving saturated soil culture, returned to level similar to those of the conventional irrigated soybeans at  $V_5$ - $V_6$  growth stage. In relation to the stomatal resistance, saturated soybeans demonstrated the lower rate of stomatal resistance and allowed  $CO_2$  influx through leaves more readily. These results could be used to explain the reason in which photosynthetic rate of saturated soybeans were higher than those grown in the conventional irrigation. The results also revealed that transpiration rate, water potential and  $N_2$  fixation of the saturated soybean were much greater than the control, and the obtained data confirmed with previous findings which indicated that the water potential, water use efficiency and nitrogen fixation had made the saturated soybeans approached the acclimatization point more readily after suffered from brief flooding. As the result, saturated soybeans recovered and adjusted themselves through the increase in photosynthesis and finally increased their growth and yield up to the level similar or more than the conventional irrigation.

Keyword : Physiological response, Photosynthesis, Saturated Soil Culture, Soybean

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