

Assessment of Flooding Tolerance of Recombinant Inbred Lines of Soybean in Seedling Stage

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[Introduction]

Flooding is one of the major abiotic stresses which accounts for a considerable yield loss of crops like soybean. In this study quantitative measurement of chlorophyll content and plant dry weight - which are mainly affected by the flooding stress - was conducted to phenotype the RIL population for determining the degree of tolerance.

[Materials and Methods]

Two recombinant inbred line (RIL) populations along with their parents were evaluated for flooding tolerance under greenhouse condition in 2017 and 2018. Flooding stress was imposed at V1 through V2 growth stage by stagnating about 10 cm water level from the soil surface for 14 days.

[Results and Discussion]

Chlorophyll content and dry weight of both populations significantly ($p < 0.05$) varied with RIL and year, and their interaction except for the year-wise effect of chlorophyll content in population-2 (Danbaekkong×NTS1116). The two-year-mean chlorophyll content and dry weight of the population-1 under the flooding condition were 26.01 and 2.07g, whereas those under the control were 36.37 and 2.45g, respectively. Similarly, the values for the population-2 were 20.73 and 1.06g under the flooding condition and 35.24 and 1.92g under the control, respectively. Flooding tolerance index (FTI) was calculated from the chlorophyll content and dry weight of plants under flooding and normally irrigated conditions, and was used to measure the degree of flooding tolerance. The FTI values of RIL over two years ranged 0.490–0.932 for the population-1 (Paldalkong×NTS1116) and 0.387–0.852 for the population-2 with normal distribution patterns. Correlation coefficients of FTI over two years were 0.083 for population-1 and 0.084 for population-2. Relatively high values (>64%) of broad-sense heritability were observed for chlorophyll content and dry weight. The quantitative measurement of chlorophyll content and dry weight evaluated in the present study could be favorable to select the flooding tolerant soybean genotypes in seedling stage.

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