Leaf gas exchange in two soybean genotypes under flooding condition

Douglas Antônio Posso, Cristiane Jovelina da Silva, Eduardo Pereira Shimóia, Diego Gonçalves Ribeiro Lucas, Darwin Alexis Pomagualli Agualongo, Ana Cláudia Barneche de Oliveira, Luciano do Amarante,

Programa de Pós-graduação em Fisiologia Vegetal - Universidade Federal de Pelotas, Programa de Pós-graduação em Fisiologia Vegetal - Universidade Federal de Pelotas, Programa de Pós-graduação em Fisiologia Vegetal - Universidade Federal de Pelotas, Programa de Pós-graduação em Fisiologia Vegetal - Universidade Federal de Pelotas, Programa de Pós-graduação em Fisiologia Vegetal - Universidade Federal de Pelotas, Empresa Brasileira de Pesquisa Agropecuária - EMBRAPA Clima Temperato, Programa de Pós-graduação em Fisiologia Vegetal - Universidade Federal de Pelotas,

Flooding is one of the abiotic factors that most impair photosynthesis. To conserve water, plants close the stomata, leading to a reduction in photosynthesis net rate. In addition, soybean [Glycine max (L.) Merril] is the most cultivated grain with great importance worldwide so its necessity to select and study differential physiological responses between genotypes. The aim of this study was to evaluate the photosynthetic net rate in two soybean genotypes under root flooding conditions. The seeds of the genotypes (PELBR-7015C tolerant to waterlogging, and PELBR-7060 susceptible, both from the same parental genealogy) were sown in the soil in a 500 L water tank exposed at field conditions. When plants were at the reproductive stage, the root system was subjected to flooding with water (2 cm above the soil surface). The experiment was carried out in a fully randomized design constituted of two plants average of four water tanks. After eleven days of flooding, we analyzed the leaf gas exchange using an IRGA (LI-6400xt, Li-cor). On the photosynthetic net rate the susceptible genotype PELBR-7060 was ca. 9-fold negatively affected by flooding while PELBR-7015C could maintain its photosynthetic net rate at control plants levels. For stomatal conductance and transpiration rate analysis the results presented the same pattern, strongly reduction in the susceptible genotype and for the tolerant one, control plant level. Our results show that PELBR-7015C plants can bring great advances to the Lowland agricultural system scenario. Furthermore, future studies are important correlating our results to metabolic and molecular studies for bringing to the light the flooding tolerance mechanisms in soybean.

Keywords: Abiotic Stress, Waterlogging, Photosynthesis, Lowland, Glycine max