International Symposium “Root Research and Applications”
RootRAP, 2–4 September 2009, Boku – Vienna, Austria

Root respiration and carbon metabolism in response to self/non-self competition

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Carbon metabolism is a basic process essential for plant growth and survival that encompasses mainly photosynthesis, and respiration. Although they are many studies on photosynthesis, they are still limited studies on plant respiration in general and specifically on root respiration which plays a major role in whole plant carbon metabolism. In the current study, we investigated the affect of non-self competition stress on the performance of root respiration in the model species field pea (*Pisum sativum* var. *arvense* Poir. cultivar Dunn). Split root plants were planted in triplets so that each pot contained either two roots of the same plant (self) or of two different plants (non-self). The plants were watered with ample water (moist treatment) or salt-solution (0.1 mol NaCl L^{-1}; salinity treatment). As response to non-self competition shoot mass significantly decreased by 20%, while the root mass remained similar, resulting in an increase of the root:shoot ratio by about a third. Thus relatively more biomass and carbon was allocated belowground. But SRA of plants with non-self competition stress decreased significantly. A significant reduction of leaf dark respiration by a half, accompanied by a significant increase of root O_2 uptake by 27% in non-self plants. non-self plants were less affected by salt stress than self plants, indicating on a possible acclimation to future stress in non-self plants in a feed-forward acclimation mechanism.

Our results provide new information on root respiration, which indicates that carbon emission through root respiration may have been underestimated by up to 30%. Therefore it is essential to continue and explore the effects of self vs. non-self on carbon metabolism in order to produce more accurate climate change models that currently neglect respiratory changes in general and specifically root respiration, especially in such a wide phenomena in nature such as self vs. non-self.