Xiaochuang Cao et al., J Plant Pathol Microbiol 2018, Volume 9
DOI: 10.4172/2157-7471-C1-008

Mixed-nitrogen nutrition-mediated enhancement of drought tolerance of rice seedlings associated with photosynthesis, hormone balance and carbohydrate partitioning

Xiaochuang Cao, Chu Zhong and Qianyu Jin
China National Rice Research Institute, China

To investigate the response of rice growth to nitrogen forms under water-deficit condition, and its intrinsic mechanisms involved in photosynthesis, hormone signaling and root-shoot photoassimilates partitioning. A hydroponic experiment supplying different N forms (NO_3-, NH_4+, NO_3^-+NH_4+) was conducted in a greenhouse under water stress. Water stress significantly inhibited rice biomass, leaf area, leaf chlorophyll and Rubisco contents. However, mixed-N nutrition substantially alleviated these inhibitions compared with NO_3- nutrition. Mixed-N nutrition maintained a higher, ETR, ΦPSII and NP, thus causing higher photosynthesis and photochemical efficiency. Water stress up-regulated leaf SPS, but reduced leaf InvA. Water stress decreased IAA in leaf and cytokinins in root and their contents in mixed-N nutrition were higher than those in NO_3- nutrition. In mixed-N nutrition, the up-regulation of leaf SPS and IAA and the reduction of SSc and InvA in roots jointly resulted in the accumulation of sucrose in leaves and the inhibition of its transportation to roots, finally reducing R/S. The inhibited R/S reduces the photosynthate for root redundant growth, but provides more photosynthate for shoots, also increases its drought tolerance. We concluded that the strengthened water-deficit tolerance in mixed-N-supplied rice seedlings is closely associated with the improvement of photosynthesis and photochemical efficiency, hormone balance and root-shoot carbon partitioning.

Biography

Xiaochuang Cao has his expertise in plant nutrition and rice high yield cultivation technology. Recently, he focused to explain why the mixed-N (NO_3^-+NH_4+) nutrition enhances rice growth under water-deficit condition, from the aspects of photosynthesis, root-shoot carbon partitioning and hormone signaling.

caoxiaochuang@126.com