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## Water stress induced nitrogen redistribution to root improves nitrogen use efficiency at the vegetative stage of rice (Oryza sativa L.)

N can be easily transported from old organs to developing organs for reutilization. N remobilization between organs is important for high nitrogen use efficiency (NUE) at whole-plant level. Two hybrid rice cultivars japonica 'Yongyou 538' and indica 'Zhongzheyou 1' were hydroponically cultivated at low N (LN, 0.71 mM) and sufficient N (SN, 2.86 mM). The imposition of water stress, which was induced by 100 g•L-1 PEG 6000, resulted in an increase of NUE in 'Yongyou 538', but a reduction in 'Zhongzheyou 1'. Water stress reduced nitrate and ammonium uptake and accumulation in 'Yongyou 538'; whereas nitrate and ammonium uptake in 'Zhongzheyou 1' was not significantly affected. Contrary to 'Yongyou 538', 'Zhongzheyou 1' accumulated more ammonium in roots under water stress. In addition, water stress caused an increase in catabolism of carbon in roots of 'Zhongzheyou 1', as indicated by increased root activity, constant pyruvate kinase activity and sucrose concentration, and reduced total carbon. The degradation of protein was also augmented in 'Zhongzheyou 1'. In contrast, the consumption of assimilates in 'Yongyou 538' was significantly inhibited, allowing more carbon stored in roots. Furthermore, water stress resulted in a significant increase in N allocation in root at SN. NUE was positive correlated with the percentage of N allocated in roots ($r=0.723$, $n=32$, $p<0.01$), but negatively correlated with the percentage of N allocated in leaves ($r=-0.756$, $n=32$, $p<0.01$). The results indicate that attenuation of root catabolic activity under water stress reduces nitrogen uptake and enhances the accumulation of carbon and nitrogen in roots, subsequently improves NUE at whole-plant level.

### Biography

Xiaochuang Cao has his expertise in plant nutrition and rice high yield cultivation technology. Recently, he focused to explain why the mixed-N (NO3-+NH4+) nutrition enhances rice growth under water-deficit condition, from the aspects of photosynthesis, root-shoot carbon partitioning, and hormone signaling. His results provide new insights for improving plant tolerance to water stress via nutrient resource management in certain drought-prone regions.

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