

Title: Nitrogen promotes tiller bud outgrowth by influencing cytokinin biodegradation and strigolactone biosynthesis in rice

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Abstract (max 200 words): Nitrogen positively regulates tiller number in rice, which has a positive impact on yield. In order to increase yield, high amounts of nitrogen is applied in the field, which leads to environment problems. Nitrogen can influence the cytokinin and strigolactone pathways, which may be the mechanism to regulate rice tiller bud outgrowth. Cytokinin oxidase/dehydrogenase (CKX) family function in cytokinin biodegradation, which may influence tiller bud outgrowth and sensitivity to nitrogen. In this study, we found each *CKX* gene has specialised function. In particular, *ckx4 ckx9* double mutant showed dwarf and increased tiller phenotypes, and can still produce tiller in extremely low nitrogen condition. Furthermore, we found low nitrogen caused higher expression of *CKX4* and *CKX9* and strigolactone biosynthesis genes *D17* and *D10* in the axillary bud. Interestingly, nitrogen had little or no influence on the expression of *CKX4* and *CKX9* in axillary bud showed in *d10* and *d14* strigolactone mutants. Based on these data, we propose a model whereby nitrogen partly inhibits strigolactone biosynthesis, which then reduces the expression of *CKX4* and *CKX9* in the axillary bud, leading to promotion of tiller bud outgrowth. Our research results give an insight into the mechanisms of nitrogen regulated tillering and green production.