

## Research Group of Improving Nitrogen-use Efficiency and Yield for Sustainable Agriculture Institute of Genetics and Developmental Biology, Chinese Academy of Sciences



Nature 封面文章  
Cover story of Nature

Toward an environmentally sustainable agriculture and food security, the group focused on the frontier field of plant growth-metabolic coordination and made breakthroughs in the molecular mechanisms of synergistically improving rice yield and nitrogen-use efficiency (NUE). The group revealed the mechanisms of G proteins mediated regulation of nitrogen sensing and response, manipulation of G-protein signaling synergistically enables improved NUE and rice yield, which make an important contribution to a better understanding of plant growth-metabolism coordination for sustainable agriculture. The group deciphered the molecular code of NUE decline in GRVs and demonstrated that tipping the GRF4-DELLA-NGR5 balance towards increased GRF4 and NGR5 abundance enhanced sustainable green revolution yields in both rice and wheat. The group also made achievements in rice breeding by design using elite alleles cooperatively improved grain yield and NUE, and developed a series of high-NUE and high-yield varieties, thus providing theoretical basis and valuable gene resources for ensuring agricultural sustainability and food security.

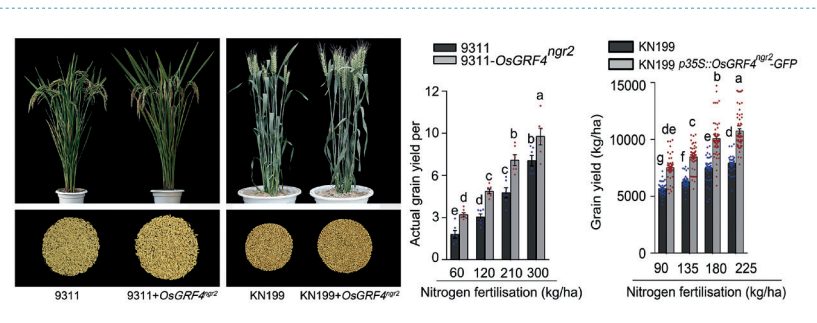
### Outstanding contributors of this research group

#### Fu Xiangdong

Dr. Fu Xiangdong made a breakthrough on the mechanisms of understanding the Green Revolution trade-off between grain yield and nitrogen-use efficiency and modulating growth-metabolic coordination for sustainable agriculture, also presented a prime example of how pursuing fundamental plant scientific understanding objectives led rapidly to a breeding strategy for a new green revolution and agricultural sustainability.

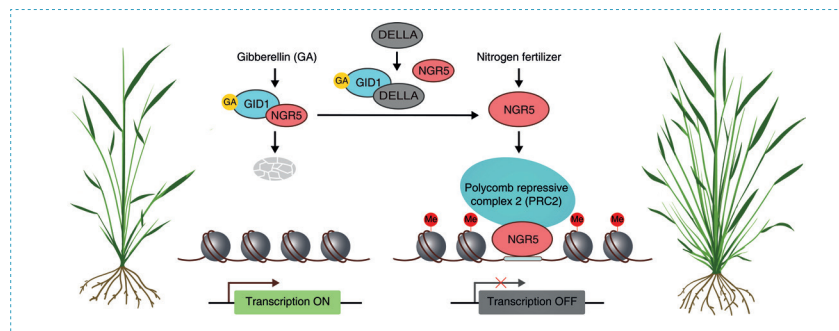


Science 封面文章  
Cover story of Science



GRF4-DELLA 分子模块调控植物生长 - 代谢平衡实现可持续农业发展

GRF4-DELLA module regulates plant growth-metabolism coordination for sustainable agriculture



提高“绿色革命”水稻品种产量和氮肥利用效率的表现遗传调控新机制

Enhanced sustainable green revolution yield via nitrogen-responsive chromatin modulation in rice



研究团队合影  
Research group photo

### 水稻高产和氮肥高效利用协同调控机制研究集体

推荐单位：中国科学院遗传与发育生物学研究所

#### 研究集体主要科技贡献：

该研究集体面向保障国家粮食安全和农业可持续发展的重大需求，瞄准“植物生长与代谢协同调控”国际前沿，在高产和氮高效协同机制研究方面取得具有重要国际影响力的原创突破。揭示 G 蛋白协同提高水稻产量和氮肥利用效率新机制；破译“绿色革命”矮秆品种氮肥利用效率下降的分子密码，提出“减肥增效”育种新策略；揭示水稻高产株型和氮高效性状协同的分子基础，利用分子设计理念育成“中禾优”系列国审品种，突破了高产和氮高效难以协同改良的育种瓶颈，为保障国家粮食安全和农业绿色可持续发展提供了理论依据和宝贵的基因资源。



傅向东 Fu Xiangdong

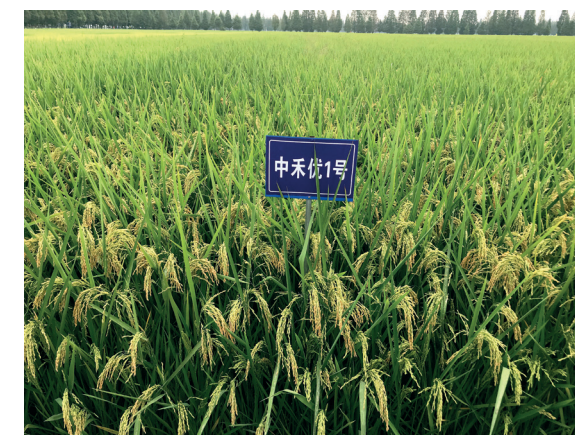
#### 研究集体突出贡献者

傅向东 中国科学院遗传与发育生物学研究所

主要科技贡献：1、揭示“绿色革命”矮化育种导致氮肥利用效率下降的分子机制；2、解析了G蛋白信号途径提高水稻产量和氮肥利用效率的调控网络；3、提出调控植物生长-代谢平衡实现可持续农业发展的育种新策略。

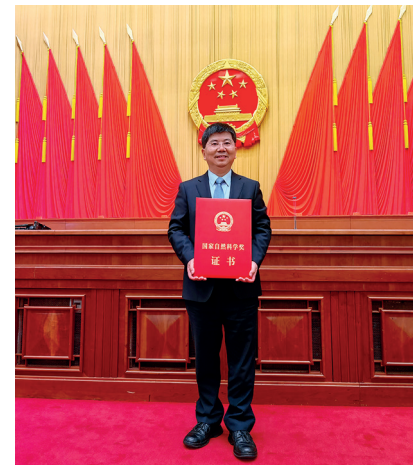
#### 研究集体主要完成者

钱前 吴昆 刘倩 李姗

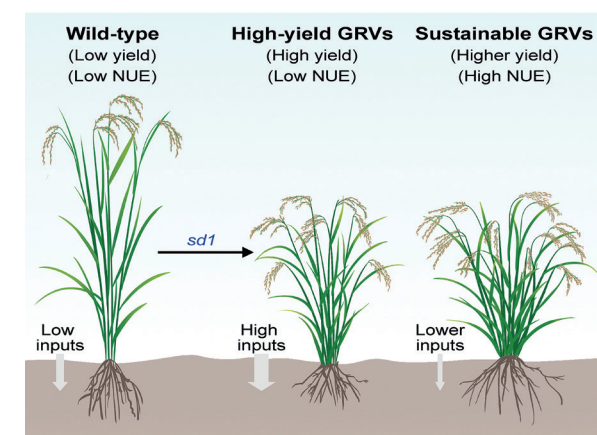


高产和氮高效协同改良的中禾优系列新品种

Field demonstration planting of Zhongheyou 1



颁奖现场  
Award Presentation Scene



可持续发展农业育种新策略

New breeding strategies for sustainable agriculture