

Scientists find new mechanisms regulating rice grain size and weight

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Rice is one of the most important staple foods in the world, and increasing rice production is crucial to the rapid growth of the global population.

Grain size and [weight](#) are important yield and appearance quality traits, so optimizing grain size and weight is a key strategy to increase crop yield and improve appearance quality.

Recently, a joint research team revealed the GW2-WG1-OsbZIP47 pathway regulating rice grain size and weight, which provides new insight on application of increasing crop yield and improving grain appearance quality.

This study was published in *Molecular Plant* on April 27.

Researchers led by Prof. LI Yunhai at the Institute of Genetics and Developmental Biology of the Chinese Academy of Sciences, Prof. WANG Dekai at the Zhejiang Sci-Tech University, Profs. QIAN Qian and ZENG Dali at the China National Rice Research Institute and Prof. Dirk Inze at Ghent University are involved in the study.

The researchers isolated WG1 gene from an original transgenic line WG1-OE with wider and heavier [grains](#). WG1 encodes a CC-type glutaredoxin OsGRX8, which is localized in the nucleus.

Upregulation of WG1 significantly increased grain width and weight, while knockout of WG1 using CRISPR/Cas9 technology led to longer and thinner grains. Cytological analysis showed that WG1 regulates grain width by promoting [cell proliferation](#).

WG1 interacts with the transcription factor OsbZIP47 and represses its transcriptional activity by recruiting the transcriptional co-repressor ASP1, so as to regulate grain size. OsbZIP47 restricts grain width growth by decreasing cell proliferation.

Further results revealed that a known grain size regulator-E3 ubiquitin ligase GW2 ubiquitinates WG1 proteins and targets them for

degradation. Genetic analyses support that GW2, WG1 and OsbZIP47 function in a common pathway to control grain growth.

These findings reveal a genetic and molecular framework for the GW2-WG1-OsbZIP47 regulatory module-mediated control of grain size and weight, opening new perspectives for using this regulatory pathway to improve [grain size](#) and weight in crops.

More information: Jianqin Hao et al. The GW2-WG1-OsbZIP47 pathway controls grain size and weight in rice, *Molecular Plant* (2021). [DOI: 10.1016/j.molp.2021.04.011](https://doi.org/10.1016/j.molp.2021.04.011)

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