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Genetic and Molecular Factors Determining Grain Weight in Rice

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Frontiers in plant science**Abstract**

Grain weight is one of the major factors determining single plant yield production of rice and other cereal crops. Research has begun to reveal the regulatory mechanisms underlying grain weight as well as grain size, highlighting the importance of this research for plant molecular biology. The developmental trait of grain weight is affected by multiple molecular and genetic aspects that lead to dynamic changes in cell division, expansion and differentiation. Additionally, several important biological pathways contribute to grain weight, such as ubiquitination, phytohormones, G-proteins, photosynthesis, epigenetic modifications and microRNAs. Our review integrates early and more recent findings, and provides future perspectives for how a more complete understanding of grain weight can optimize strategies for improving yield production. It is surprising that the acquired wealth of knowledge has not revealed more insights into the underlying molecular mechanisms. To accelerating molecular breeding of rice and other cereals is becoming an emergent and critical task for agronomists. Lastly, we highlighted the importance of leveraging gene editing technologies as well as structural studies for future rice breeding applications.

Keywords: rice, grain weight, grain size, regulatory mechanisms, molecular biotechnology

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