

Research Insights

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Application of Plant Growth Regulators in Enhancing Loquat Fruit Set

Xicheng Wang ¹, Zhen Li ² ✉¹ Institute of Life Sciences, Jiyang College of Zhejiang AandF University, Zhuji, 311800, Zhejiang, China² Hainan Institute of Biotechnology, Haikou, 570206, Hainan, China✉ Corresponding author: zhen.li@hitar.orgInternational Journal of Horticulture, 2026, Vol.16, No.2 doi: [10.5376/ijh.2026.16.0008](https://doi.org/10.5376/ijh.2026.16.0008)

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Abstract Loquat (*Eriobotrya japonica*), a key specialty fruit tree in southern China, enjoys high economic value due to its nutritious properties and unique flavor. However, in actual production, loquat often faces challenges with low fruit set and unstable yield, hindering the development of the industry. This study describes the physiological basis and key influencing factors of loquat fruit set, as well as the types and functional characteristics of commonly used plant growth regulators. The study focuses on their mechanisms of promoting fruit set through regulation of ovule development, pollen tube growth, and carbon and nitrogen metabolism. Furthermore, the study systematically reviews recent progress in the application of regulators in loquat cultivation, exploring the effects of different treatment methods, application timing, varietal responses, and comprehensive regulatory measures. Although regulators show promise in improving fruit set, they still face numerous challenges, including dosage safety, varietal adaptability, and the elucidation of regulatory mechanisms. This study holds the promise of achieving a synergistic improvement in loquat fruit set, yield, and quality, providing theoretical support and technical guidance for efficient cultivation and sustainable industrial development.

Keywords Loquat; Fruit-setting rate; Plant growth regulators; Hormonal regulation; Fruit tree cultivation

1 Introduction

Loquat (*Eriobotrya japonica* Lindl.), a subtropical evergreen fruit tree native to south-eastern China, is economically and nutritionally important. Loquat is widely cultivated in East Asia, the Mediterranean region, and South America and is prized for its good flavor, quick ripening, and high levels of vitamins, minerals, and antioxidant compounds (Su et al., 2024). Loquat is a key southern provincial fruit crop in China's Fujian, Zhejiang, and Sichuan provinces, and an important contributor to regional agricultural economies. Loquat production, however, is still constrained by agronomic problems and year-to-year yield variability relative to other dominant fruit crops.

One of the greatest limitations to loquat production is that it bears a very low percentage of fruit set, normally ranging from 1% to 5% when it is under natural pollination (Bons et al., 2019). The inefficiency of fruiting is mostly because of physiological fruit drop, partial pollination, and ovule abortion—limitation that is aggravated by unfavorable weather and suboptimal orchard management. Consequently, fruit production and quality are negatively affected, limiting the economic yield of loquat production and making the crop less competitive in the global fruit market.

Plant growth regulators (PGRs) also emerge as potential candidates to solve the problem of loquat fruit set in recent years. PGRs are naturally occurring or synthetic chemicals that have the capability to control endogenous hormone levels and physiological processes and to initiate reproductive development. Various PGR groups including auxins, gibberellins (GAs), cytokinins, ethylene inhibitors, and abscisic acid analogs have been studied for their capacity to induce pollen germination, ovule development, nutrient transport, and prevention of physiological drop of the fruit (Huang et al., 2021; Peng et al., 2022). PGR treatment was observed to have measurable effects on improving the retention and production of loquat fruit under open-field and protected cultivation regimes (Liang and Huang, 2024).