This study explored the research progress on plant growth regulators (PGRs) in promoting loquat fruit set, including the physiological basis of fruit set, the types and functional characteristics of commonly used PGRs, their mechanisms of action, and field application techniques. The study focused on practical challenges such as dosage optimization, varietal response differences, and potential side effects. The study aims to integrate the latest research findings to provide theoretical basis and practical guidance for increasing loquat yield and achieving sustainable production.

2 Physiological Basis and Influencing Factors of Loquat Fruit Set

2.1 Characteristics of flowering and fruit setting in loquat

Loquat (*Eriobotrya japonica*) is an evergreen tree that flowers commonly from autumn to winter with fruit formation in late spring to early summer. Loquat fruit growth is sigmoid and has a high correlation between the length of rapid growth and final fruit size. Both seed number and fruit size have a positive correlation and seed weight with flesh and fruit weight. During the stage of rapid growth, significant physico-chemical changes occur, including color alteration, development of sugar, and loss of firmness in fruit and organic acids, which are associated with high ethylene production and with a small peak of respiration. These findings indicate that fruit ripening of loquat on the tree is a climacteric process with comparatively minor levels of ethylene production in an initial stage of development (Amorós et al., 2003; Su et al., 2024).

2.2 Major physiological and environmental factors affecting fruit set rate

Loquat fruit set is controlled by a combination of environmental and physiological factors. Growth of the fruit is regulated by hormones to a great extent, particularly by auxin and gibberellin, and by auxin particularly during the stage of fruit enlargement. Recent multi-omics analysis pinpointed candidate genes such as ETHYLENE INSENSITIVE 4 (*EjEIN4*) and TORNADO 1 (*EjTRN1*) as key regulators of fruit weight and thus implying gene regulation of set and size of the fruit (Peng et al., 2022). Mineral nutrition is required as well since biennial concentrations in leaves and soil of iron, calcium, magnesium, zinc, potassium, and nitrogen significantly affect fruit set, soluble solid content, and acidity and thus both fruit set and quality (Huang et al., 2021). Sunburn and reduced fruit set and quality may be caused by environmental stresses such as high light intensity and temperature. Heat stress induces stress response and hormone signaling pathways levels of hormones and gene expression, and this is crucial through the participation of heat shock proteins and auxin in the heat stress response (Chen et al., 2021). Agronomic practices including fruit and flower thinning have been found to improve fruit set and fruit quality, with optimal thinning intensities yielding heavier and sweeter fruits and greater yield (Mostert et al., 2024; Nordi et al., 2025) (Figure 1).

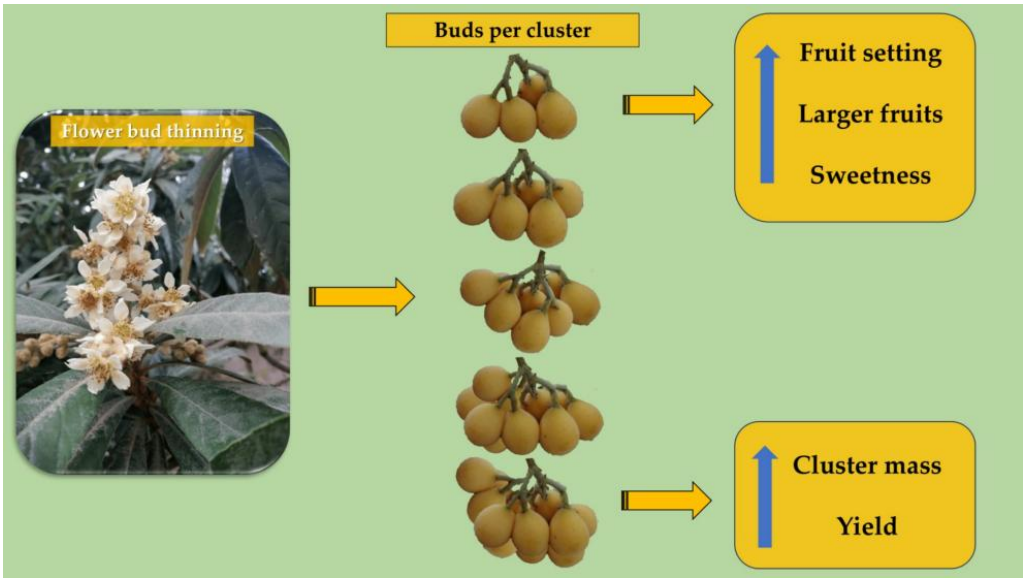

Figure 1 Relationship between fruit thinning intensity and fruit size and yield (Adopted from Nordi et al., 2025)