

## 7 Comparative Evaluation of Pruning Systems

### 7.1 Trade-off between yield and fruit quality

Comparative evaluation of loquat pruning systems clearly shows that yield, fruit quality, labor efficiency, and long-term orchard performance are jointly determined by how pruning regulates crop load, canopy structure, and vegetative vigor. Flower thinning in loquat reflects a typical “yield-quality” continuum: when 12 flower buds are retained per panicle, cluster weight and yield per tree reach their maximum; reducing to 4 buds per panicle lowers total yield but significantly increases individual fruit weight, fruit size, and sweetness. This indicates that stronger crop load regulation shifts production from yield-oriented to high-quality fruit production (Nordi et al., 2025). The double heading-back pruning system produces more vigorous fruiting shoots with more leaves and thicker branches. By concentrating resources on fewer but more efficient fruiting units, this system not only enlarges fruit size but also improves yield, and to some extent alleviates the traditional trade-off between fruit size and yield by enhancing early cell division.

### 7.2 Suitability of pruning systems under different orchard conditions

In high-density orchards of olive, apple, and similar species, combining winter structural pruning with summer pinching or hedging can control tree size and improve the balance between vegetative and reproductive growth, while maintaining or even increasing yield. However, if mechanical pruning is too frequent or too severe, yield or fruit size may decrease under limited light conditions. In high-density or overly vigorous loquat orchards, a pruning system with periodic heavy heading-back or partial renewal, combined with mechanized operations and manual fine adjustments, is more suitable for maintaining canopy openness, controlling tree height, and achieving uniform high-quality production. In contrast, in low-density orchards or those with weak vigor, a simpler and lighter pruning approach can be adopted.

### 7.3 Effects of tree age and vigor on pruning outcomes

The double heading-back pruning system in loquat has been developed in mature commercial orchards. By conducting summer pruning and a second heading-back in late summer or autumn, strong new shoots are induced, which can form larger inflorescences and fruits in subsequent years. In older citrus and apricot trees, strong renewal pruning combined with adequate nutrient supply can restore canopy growth, improve fruit set, and rebuild productivity. However, in young or weak trees, excessive pruning may have negative effects, delaying fruiting and reducing yield (Sharma et al., 2025). Experiments in high-density olive cultivation show that staged pruning (winter plus summer) is particularly effective in young and vigorous trees, helping to stabilize yield and maintain a compact canopy structure (Lodolini et al., 2023).

## 8 Practical Applications in Loquat Orchard Management

### 8.1 Pruning strategy recommendations for high-yield production

Under high-yield production conditions, pruning should prioritize maintaining a sufficient number of fruiting shoots and a stable source-sink relationship, rather than simply pursuing larger individual fruit size. In traditional cultivation systems, post-harvest pruning from spring to early summer promotes the formation of summer shoots, which undergo flower bud differentiation in late summer. Under this system, usually only about half of the inflorescences are retained for commercial production. Double-heading refers to the first heading after harvest, followed by a second pruning of the resulting summer shoots, removing about half of the branches. This method produces fewer but stronger fruiting shoots with thicker branches and higher leaf chlorophyll index, thereby enhancing carbohydrate supply. Compared with single heading, it can improve both fruit size and overall yield. For orchards where yield is the main goal, moderate control of inflorescence number helps increase cluster weight and yield per plant, although the average fruit size may decrease. Combined with a reasonable nitrogen-potassium fertilization ratio, it can promote vigorous shoot growth while avoiding excessive vegetative growth and shading.

### 8.2 Pruning strategies for improving fruit quality

When high-quality fruit production is the main objective, pruning and load regulation should be adjusted toward “fewer but better,” producing fewer fruits that are larger, sweeter, and more uniform. During full bloom, thinning flower buds to retain only a few per cluster can consistently result in larger fruit, higher soluble solids content, and