

### 2.3 Relationship between canopy structure and yield

Canopy structure determines the distribution of photosynthetically active radiation within the canopy, affects water transport and transpiration, and ultimately influences carbon acquisition and allocation. When trees are tall, unpruned, and have overly dense canopies, severe shading occurs inside the canopy, fruiting sites concentrate on the outer layer, and reproductive organs are more exposed to low temperature and sunburn, leading to reduced yield. In contrast, proper training and pruning that reduce tree height, open the canopy, and control branch number can improve light penetration and ventilation, and reduce the occurrence of pests and diseases. Vegetative growth parameters such as trunk cross-sectional area, shoot length, leaf area, and inflorescence size are significantly positively correlated with yield per tree and fruit size. This indicates that an optimal balance between vegetative growth and reproductive growth must be maintained by regulating canopy vigor and structure (Lin et al., 2025).

### 2.4 Sensitivity of loquat to pruning intensity and timing

In most production areas, loquat is usually pruned after harvest, generally from April to May. The summer shoots that emerge afterward complete flower bud differentiation and form flower buds by late summer or early autumn (Su et al., 2024). If pruning is too light, many weak shoots will participate in flowering, leading to excessive fruit set and smaller fruits. In contrast, overly heavy pruning may remove too many potential fruiting branches, reducing inflorescence number and overall yield. Removing about half of the vigorous summer shoots can effectively control inflorescence number, while promoting the remaining shoots to develop more leaves, thicker branches, and larger floral organs, ultimately improving fruit size. Regulation of vigorous shoots promotes cell division during floral organ development, and most fruit cell layers are formed before flowering. Therefore, any disturbance to shoot vigor or pruning timing before flowering can have a long-term effect on potential fruit size. Since loquat flowering and fruit development occur during cool or even cold seasons, any pruning or canopy-opening practice that changes the microclimate, light conditions, or temperature around the buds may affect the expression of key flowering regulatory genes such as *EjFTs* and *EjRAVs*, thereby influencing floral initiation, re-flowering ability, and fruit set (Peng et al., 2021).

## 3 Common Pruning Systems in Loquat Cultivation

### 3.1 Light pruning and its management characteristics

Loquat growers adopt various pruning systems, which differ in pruning intensity, timing, and objectives of canopy structure regulation, and these differences significantly affect subsequent fruit yield and quality. Light pruning is generally applied to mature trees whose canopy structure has already been established and whose production performance is stable. This method mainly involves removing dead branches, diseased branches, pest-damaged branches, crossing branches, and overly dense vegetative shoots, while retaining fruiting branch groups and the existing canopy framework as much as possible. By moderately opening up the canopy and improving internal light penetration and ventilation, light pruning helps maintain fruit quality and reduce disease occurrence without significantly reducing the number of inflorescences or overall yield (Li et al., 2005).

### 3.2 Moderate pruning and its application scenarios

Moderate pruning aims to more actively regulate shoot vigor, inflorescence density, and the balance between vegetative and reproductive growth, and thus has a more direct relationship with yield and quality optimization. In loquat production, a common moderate pruning practice is heading back fruiting shoots shortly after spring harvest. This heading treatment removes the terminal part of shoots that have just fruited, stimulating the emergence of strong summer shoots and limiting the total number of future inflorescences. These new shoots usually form flower buds in late summer or autumn and have a more appropriate leaf-to-fruit ratio, providing sufficient carbohydrate supply for fruit development. Moderate pruning is particularly suitable for trees with excessive flowering and small fruit size, or for orchards targeting high-end markets where large fruit size and high sugar content are prioritized over simply maximizing yield.

### 3.3 Heavy pruning and renewal strategies

Heavy pruning and renewal strategies are mainly applied when loquat trees become too tall, overly dense, or structurally aged. In unpruned or poorly managed orchards, the canopy is often large and crowded, with fruits