better appearance quality, although total yield will be lower compared with treatments retaining more buds. Double-heading promotes strong branch growth, enhances early cell division, and downregulates the expression of cell division inhibitors EjFWL1/2 in flower buds, significantly increasing single fruit weight and the proportion of premium-grade fruit. In practice, combining these measures (such as cultivating strong fruiting shoots through annual double-heading pruning and applying moderate flower thinning) can significantly improve average fruit weight and the proportion of high-quality fruit. Pruning also improves canopy ventilation and light penetration (by removing diseased, weak, crossing, and inner canopy branches and maintaining proper spacing of fruiting shoots), which promotes fruit coloration, reduces disease incidence, and enhances fruit uniformity—critical for meeting the high standards of the fresh fruit market. In addition, bagging fruit clusters with breathable paper or plastic bags can be used; studies have shown that this practice significantly improves fruit firmness, soluble solids content, and peel color (Hussain et al., 2024).

8.3 Integration with other management practices (fertilization, irrigation, planting density)

Effective pruning must be integrated with fertilization, irrigation, and planting design to achieve synergistic effects and avoid management imbalance. There is a significant interaction between autumn pruning and nitrogen-potassium management: maintaining an appropriate N-K ratio after pruning helps promote shoot growth, flower bud differentiation, cell division, and fruit enlargement, thereby improving yield and quality in the next season. Excessive nitrogen supply combined with insufficient pruning can lead to excessive vegetative growth, canopy shading, and reduced fruit quality. In contrast, combining light to moderate pruning with optimized nitrogen application can significantly improve tree vigor, fruit set, and productivity in older apricot trees (Sharma et al., 2025). Post-harvest and pre- plus post-harvest deficit irrigation strategies can advance flowering and harvest time, save about 18%~30% of irrigation water, and in some cases increase early yield; when drought periods are properly scheduled, fruit size is little affected or not negatively affected (Hueso et al., 2021). In semi-arid regions, combining such deficit irrigation with canopy size control through pruning is particularly important, as water resources must be allocated among multiple crops. Planting density and canopy structure determine the intensity and timing of pruning: high-density orchards require more frequent topping and lateral pruning to control tree height and maintain good light conditions. In high-density olive and mango systems, staged pruning has been shown to improve yield and water use efficiency (Hahn et al., 2022).

8.4 Common mistakes and optimization strategies

Common problems in loquat pruning include: excessive retention of inflorescences and flower buds, resulting in small fruit and low sugar content; improper or overly intense structural pruning, causing tree stress and reduced short-term yield; and neglect of canopy structure management, leading to overly tall trees, dense inner canopies, and outward migration of fruiting sites. Poor coordination between pruning and fertilization may result in either poor recovery of heavily pruned trees due to insufficient nutrients, or excessive vegetative growth and suppressed fruiting under excessive nitrogen supply. In regions using deficit irrigation, failure to adjust pruning intensity accordingly may cause excessive pruning to exacerbate water stress and hinder tree recovery.

Optimization strategies include: adopting standardized and easily applicable pruning systems, such as renewal pruning or double-heading techniques, to systematically update fruiting branches and improve scaffold branch quality; adjusting flower thinning intensity based on market goals (e.g., retaining four flower buds per cluster for high-quality production, or increasing slightly for higher yield); using digital or empirical canopy light assessment methods to guide branch angle and density adjustments; and dynamically adjusting nitrogen–potassium ratios and irrigation regimes according to pruning intensity to support vigorous and balanced regrowth (Ballester et al., 2018). In addition, strengthening training for pruning personnel and implementing a phased approach—testing new techniques in small orchard areas before wider application—can help reduce risks while continuously optimizing pruning systems suited to local varieties and ecological conditions.

9 Conclusion and Prospects

Loquat shows a high response to pruning, and a well-designed pruning system is one of the key factors determining fruit yield and quality. Pruning mainly works by regulating canopy structure, light distribution, and