

Research Report

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Effects of Different Cultivation Management Models on Yield and Commercial Traits of Changshan Huyou

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Abstract This study summarizes the effects of different management methods on the yield and quality of Changshan Huyou. It was found that conventional management could ensure stable yields, but it was prone to soil degradation and environmental pressure. Ecological and organic management can enhance fruit quality and also contribute to product differentiation, but it has higher requirements for environmental conditions and technical levels. Precise and integrated management, through intelligent irrigation, digital monitoring and nutrient regulation, has improved resource utilization and also made fruit quality more stable. The research also pointed out some problems, such as the trade-off between output and quality, differences in adaptability among different regions, and the lack of long-term comparative data. In the future, the development of Changshan Huyou should focus on the application of intelligent agriculture, the integration of breeding and management, as well as the promotion of sustainable cultivation models. This study aims to provide references for the efficient production, green development and brand building of Changshan Huyou.

Keywords Changshan Huyou; Cultivation management models; Yield and quality; Precision agriculture; Sustainable development

1 Introduction

Changshan Huyou (*Citrus changshan-huyou*) has an attractive fruit shape, mostly pear-shaped, spherical or flat-spherical, with a golden color. It is a characteristic product of Changshan County, Quzhou City, Zhejiang Province, and also a product with a geographical indication of China. It has received widespread attention due to its strong adaptability and high commercial value. At present, Changshan Huyou has been promoted and cultivated in Zhejiang, Hunan and other places, demonstrating good environmental adaptability and stable yield and flavor (Zhong, 2004; Tan et al., 2012; Yu et al., 2012).

The fruit of Changshan Huyou is rich in vitamins, 16 kinds of essential amino acids for the human body, as well as elements such as phosphorus, potassium, iron and calcium. It also contains flavonoids, coumarins and terpenoids. These substances not only enhance its nutritional value but also endow it with certain medicinal and health care functions. The unripe fruit dried product "Quzhou bitter orange pericarp" has been included in the Chinese Pharmacopoeia (Huang et al., 2025). In addition, the cultivation and processing of Changshan Huyou have played a significant role in promoting the local economy and increasing farmers' income (Zhong, 2004; Tan et al., 2012).

However, there are still many challenges in the production of Changshan Huyou. Factors such as climate, soil and management methods can affect output, causing fluctuations and thereby influencing the long-term stability of the industry (Yu et al., 2012). Fruits often vary in terms of flavor, nutrition and appearance, which limits the development of commercialization and branding (Huang et al., 2025). Meanwhile, with the increasingly fierce competition in the citrus market, Changshan Huyou needs new breakthroughs in variety improvement, cultivation techniques and deep processing and utilization (Zhong, 2004).

This study evaluated different cultivation and management models and compared their effects on the growth, yield and commercial traits of Changshan Huyou. The results show that optimizing management measures can enhance