

2.3 Quality evaluation indicators and methods

2.3.1 Sensory evaluation

Sensory evaluation is the core basis for assessing Longjing tea quality. According to national and industry standards, a 100-point scoring system is typically used, evaluating appearance, liquor color, aroma, taste, and infused leaves, with aroma and taste often assigned higher weights (Shan et al., 2023; Bassiony et al., 2024; Zeng et al., 2024; Zhang et al., 2024). Trained panelists assess tea samples through visual inspection, aroma perception, tasting, and leaf observation. This method effectively captures key sensory attributes such as freshness, chestnut-like aroma, tenderness, mellowness, and sweetness.



Figure 1 Different stages in the production process of Longjing tea

To improve interpretability, quantitative descriptive analysis (QDA) is increasingly used to break down flavor attributes into subcategories such as umami, sweetness, bitterness, astringency, freshness, chestnut aroma, floral aroma, and grassy notes (Shan et al., 2025; Zeng et al., 2024). The CATA method has also been applied to link descriptive terms with consumer preferences. Studies show that enhanced umami, sweetness, and pleasant aromas increase consumer acceptance, whereas excessive bitterness and grassy notes reduce it (Deng et al., 2025).

2.3.2 Physicochemical indicators and instrumental analysis

To overcome subjectivity in sensory evaluation, physicochemical measurements are widely applied. Common indicators include amino acids, tea polyphenols, caffeine, water extractives, catechins, phenolic acids, organic acids, and flavonol glycosides, which are closely related to taste attributes (Shan et al., 2025). Non-volatile compounds mainly determine taste, while volatile compounds govern aroma. Techniques such as GC–MS, GC–IMS, and LC–MS are widely used to analyze these components (Shan et al., 2023; Zhang et al., 2024).