

7.2 Measurement and comparison of indicators related to sweetness and acidity traits

Quantitative evaluation of high-sweetness, low-acidity types relies on integrated measurement of sugars, acids, and derived indices. Across numerous cultivars, soluble solids (SSC), titratable acidity (TA), and the SSC/TA ratio have been established as core indicators of eating quality, with high SSC and moderate TA yielding balanced “sweet-tart” profiles. In multi-cultivar surveys, SSC and TA ranges are often broad, allowing selection of genotypes that exceed breeding targets (e.g., $\geq 8\%$ SSC and $\approx 0.8\%$ TA) or express higher SSC/TA ratios indicating greater perceived sweetness and milder acidity (Klakotskaya et al., 2023).

Beyond bulk metrics, detailed profiling of individual sugars and acids improves discrimination among candidate cultivars. HPLC-based analysis of 25 cultivars showed that variation in glucose, fructose, sucrose, citric acid, and malic acid strongly differentiates genotypes and underpins differences in TQI, with some cultivars like ‘Sandra’ excelling in both primary metabolites and overall quality score (Milosavljević et al., 2023). Soilless-culture work in Japanese varieties found fructose and glucose as major sugars and citric acid as the dominant organic acid, but identified ‘Tochiotome’ as having higher TSS/TA and total sugars/total organic acids ratios than other cultivars, clearly linking compositional profiles to sweetness-acidity traits.

7.3 Evaluation of breeding strategies and practical application outcomes

Recent breeding and selection efforts emphasize integrating multi-trait quality data to identify high-performing, sweet, low-acid materials suitable for diverse environments. Large multi-location trials demonstrate that germplasm (genotype) explains more variation in SSC and TA than location, and that a subset of genotypes concurrently meets modern breeding goals of $\geq 8\%$ SSC and $\sim 0.8\%$ TA, making them attractive parents for combining sweetness and acceptable acidity in new cultivars (Klakotskaya et al., 2023) (Figure 2). Cluster analyses of dozens of cultivars using yield, SSC, TA, and SSC/TA effectively group genotypes with similar target traits, helping breeders prioritize those with naturally high sugar/acid balance and good agronomic potential (Xu et al., 2025).

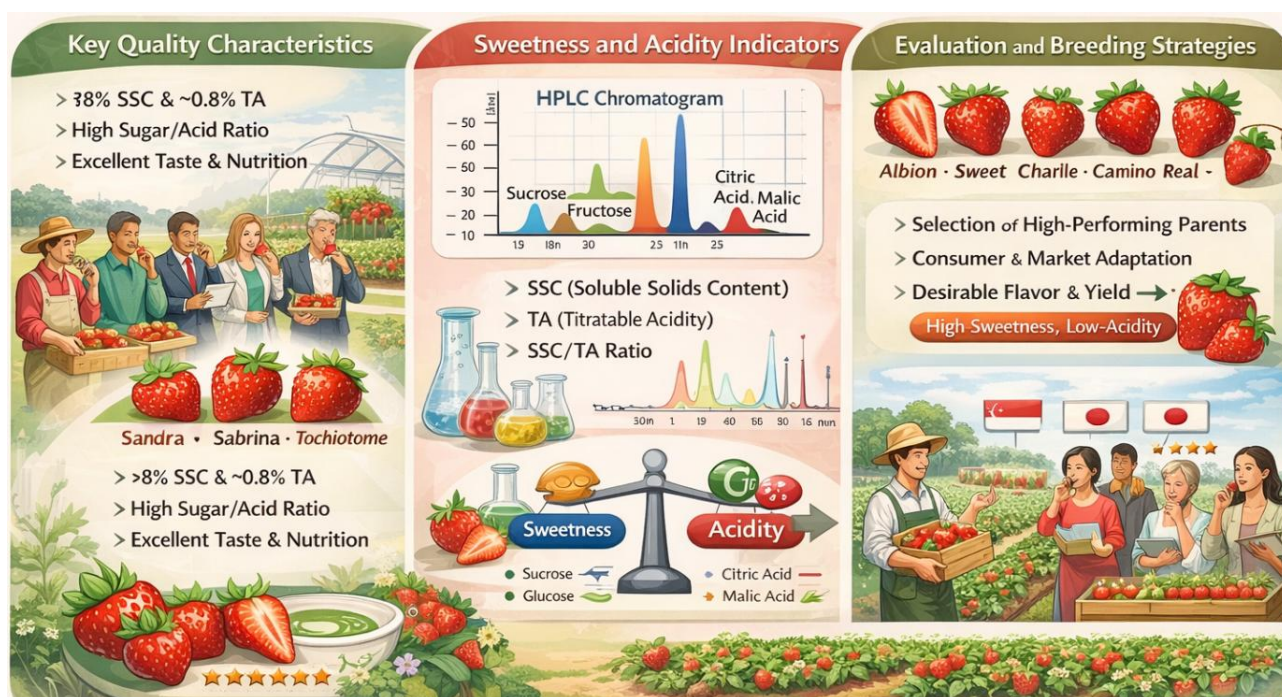


Figure 2 The selection and evaluation of high-quality, high-sweetness, low-acidity strawberry cultivars

On-farm and market-oriented evaluations confirm that such selection strategies translate into tangible improvements in consumer satisfaction and market fit. In a cross-regional quality assessment, strawberries with higher SSC and lower TA were preferred by both Singaporean and Japanese consumers, although Singaporean assessors favored especially low acidity, indicating that high-sweetness, low-acidity cultivars are particularly suitable for certain export markets (Radović et al., 2025). Sensory and chemical studies in Texas similarly