Pre-treatments that maintain or increase sugar content can improve flavor and consumer acceptance. High sugar levels also promote Maillard reactions and caramelization, which can help form desirable flavors if controlled properly. However, excessive browning and sugar crystallization may reduce product quality.

4.3 Peel thickness and crack resistance

Peel properties affect mechanical strength and surface quality during dehydration. A peel with good elasticity and integrity helps maintain fruit structure, reduces cracking, and lowers contamination risk during drying (Lachtar et al., 2022). In contrast, fragile peels are more likely to crack or show excessive browning, which reduces market value.

Color stability (L*, a*, b*, ΔE) is commonly used to evaluate peel quality. Compared with natural sun drying, controlled drying systems are better at maintaining brightness and color uniformity (Zare and Jalili, 2020). Pre-treatments such as sulfite treatment or osmotic treatment can further reduce browning, but their effectiveness depends on the variety and processing conditions.

4.4 Drying efficiency and dehydration rate

Drying efficiency depends not only on the drying method but also on variety characteristics, such as fruit size and composition. Artificial and assisted drying systems can usually shorten drying time to 1-3 days, while traditional sun drying takes much longer (Nagaraja et al., 2016).

Pre-treatments like osmotic dehydration or soaking can increase effective moisture diffusivity and speed up water removal. Indicators such as effective moisture diffusivity, activation energy, dehydration ratio, and energy consumption are widely used to evaluate drying performance.

4.5 Quality of dried products (texture, color, flavor, and storage stability)

The final product quality reflects a combination of physical, chemical, and sensory properties. The texture should remain soft and chewy, and proper pre-treatment and drying methods can improve hardness and rehydration capacity (Gençdağ et al., 2021).

Color is an important commercial attribute, and products with lighter and more uniform color are usually preferred. Controlled drying systems are better than natural sun drying in maintaining color. Appearance, aroma, and taste are the main factors affecting consumer acceptance.

Storage stability depends on maintaining low moisture content and low water activity while limiting oxidation and microbial growth. Properly processed figs can be stored for several months, although quality gradually declines over time (Dumitru, 2018). Advanced preservation methods, such as coating treatments and optimized drying–storage combinations, can further extend shelf life and maintain product quality.

5 Comparative Evaluation of Dual-Purpose Performance of Fig Varieties for Fresh Consumption and Processing

5.1 Comprehensive evaluation model and scoring system

For fresh figs, a weighted evaluation system is usually applied to rank eating quality, including fruit size, shape, color, SSC (soluble solid content), acidity, and sensory attributes (Prgomet et al., 2021). For dried or processed products (such as dried fig slices and osmo-dehydrated figs), indicators like TSS (total soluble solids), acidity, peelability, absence of defects, color stability, and sensory preference are combined into an overall score (Shishkina et al., 2022). Multivariate statistical methods, such as principal component analysis (PCA), canonical correlation analysis (CCA), and cluster analysis, are often used to integrate morphological, agronomic, and biochemical traits. These methods help classify genotypes into groups and identify materials with superior overall performance.

5.2 Correlation between fresh quality traits and drying traits

Fresh quality traits (such as fruit size, SSC, and peel characteristics) are generally positively correlated with dry matter content, sugars, and phenolic compounds. This suggests that genotypes with good fresh-eating quality may