Review Article Open Access

Evaluation of Fig Varieties for Dual-Purpose Fresh and Dried Use

Jiankun Jin [1,2]
1 Jinhua Yuanguo Agricultural Development Co., Ltd., Jinhua 312000, Zhejiang, China
2 Zhejiang Agronomist College, Hangzhou 310021, Zhejiang, China
Corresponding author: 23527089@qq.com

Bioscience Evidence, 2026, Vol.16, No.2 doi: 10.5376/be.2026.16.0006
Received: 18 Jan., 2026
Accepted: 23 Feb., 2026
Published: 09 Mar., 2026

Preferred citation for this article:
Jin J.K., 2026, Evaluation of fig varieties for dual-purpose fresh and dried use, Bioscience Evidence, 16(2): 68-78 (doi: 10.5376/be.2026.16.0006)

Abstract This study takes fig (*Ficus carica* L.) as the research object and conducts a systematic analysis of the overall quality performance of different varieties from the perspective of dual use for fresh consumption and drying. Under a unified evaluation framework, multidimensional comparison and evaluation of germplasm resources were carried out focusing on key indicators for fresh consumption, including fruit appearance traits, pulp quality, flavor characteristics, nutritional composition, and postharvest storage performance, as well as processing suitability indicators such as dry matter content, sugar accumulation, peel characteristics, drying efficiency, and dried product quality. Significant differences were observed among fig varieties in terms of morphology, physiological and biochemical traits, and sensory quality. Some superior genotypes showed synergistic advantages in both fresh quality and drying performance, such as higher soluble solids content, better peel structure, and stronger antioxidant capacity. Combined with optimized cultivation management practices and harvesting strategies, the comprehensive utilization value of dual-purpose varieties can be further improved. This study provides a theoretical basis and practical reference for fig variety selection, resource development, and the integrated development of fresh and dried fig industries.

Keywords Fig (*Ficus carica* L.); Dual-purpose evaluation; Fresh quality; Drying suitability; Variety selection

1 Introduction

Fig (*Ficus carica* L.) is one of the oldest domesticated fruit trees. It is widely grown in Mediterranean and semi-arid regions and is increasingly regarded as a functional food crop. It is easy to propagate vegetatively, can adapt to a wide range of soils and climates, and has long been closely linked with traditional dietary systems. These factors have allowed fig cultivation to continue for thousands of years. Fresh figs contain about 80% water and spoil very easily. Their postharvest storage life is usually only a few days, which limits market circulation and leads to significant losses in areas without adequate cold-chain conditions (Pandidurai et al., 2021). In contrast, drying can significantly concentrate sugars, dietary fiber, minerals, and various phytochemicals, resulting in a stable product with high energy density, longer shelf life, and wider uses. New drying methods, such as slice drying or osmotic dehydration, can improve year-round supply while maintaining or even enhancing phenolic compounds and mineral content (Manjunath et al., 2019).

In terms of nutrition, both fresh and dried figs are rich in carbohydrates, dietary fiber, minerals (especially potassium and calcium), vitamin C, and polyphenolic compounds with antioxidant activity (Sandhu et al., 2023). The drying process significantly increases the concentration of sugars and dietary fiber, and it usually also raises total phenolic content and antioxidant capacity, especially in dark-skinned cultivars and in peel tissues (Yang et al., 2023).

This study evaluates fig cultivars from a dual-purpose perspective. Under uniform conditions, it systematically assesses both fresh consumption and drying performance, focusing on key fruit traits related to fresh use and important indicators related to drying. By comparing different cultivars and selecting those that meet quality requirements for both uses, this study provides a scientific basis for cultivar selection in new and existing orchards. It also promotes the use of locally adapted but underutilized germplasm resources and supports the development of an integrated fresh–dried fig industry chain in Mediterranean-type environments.

2 Germplasm Resources and Variety Selection

2.1 Overview of global fig germplasm diversity

Fig germplasm resources are very rich and widely distributed in the Mediterranean Basin, West Asia, and newly developed cultivation regions. A large pool composed of local varieties, wild types, and introduced cultivars has been characterized using morphological, pomological, biochemical, and molecular tools. The results consistently show high phenotypic and genetic diversity (Sclavounos et al., 2023).

Studies from Tunisia, Morocco, Algeria, Azerbaijan, Greece, and Iran indicate wide variation in tree structure, leaf traits, and especially in fruit size, shape, color, and ripening time. Although most germplasm can be grouped into a few basic fruit shape and skin color categories, the variation within these groups is still significant (Abdelsalam et al., 2019).

Analyses based on molecular markers such as SSR and ISSR show that fig germplasm has abundant alleles, high polymorphism, and relatively weak genetic structure. Most of the variation exists within populations rather than among populations or regions (Ali-Shtayeh et al., 2014; Ahmad and Noori, 2023).

2.2 Selection criteria for candidate varieties

In dual-purpose evaluation, the selection of candidate varieties aims to cover different fruit traits, quality characteristics, and genetic backgrounds. Key focus is placed on fruit-related traits, such as single fruit weight, fruit size, shape, skin color, flesh thickness, and dried fruit weight. These traits show wide variation ranges and high coefficients of variation, and they are important discriminant indicators in multivariate analysis (Khadivi and Mirheidari, 2022).

Morphological and agronomic traits (such as tree vigor, yield, and maturity time) are combined with physicochemical and biochemical indicators (such as soluble solids, acidity, phenolic compounds, flavonoids, and antioxidant capacity). These indicators are closely related to consumer preference and processing suitability (Almeida et al., 2022).

2.3 Description of selected fig varieties

Local varieties from traditional fig-growing regions perform well in fruit size, dried fruit weight, and sensory quality, and they are important genetic resources for breeding. Among North African germplasm, some local varieties have large, nearly spherical fruits, attractive skin color, and high sugar content, making them suitable for both fresh consumption and drying (Hssaini et al., 2019). Germplasm from the Eastern Mediterranean region includes types with relatively large fruits, diverse skin colors, and good overall quality, showing a wide range of phenotypic variation.

Introduced varieties such as “Brown Turkey” have been more systematically studied in terms of growth characteristics, yield, fruit traits, and nutritional quality. Some of these varieties show strong performance in combined morphological and biochemical evaluations (Almeida et al., 2022). The combination of local and introduced varieties reflects both the long-term diversification of figs and their current commercial value.

3 Fresh Consumption Evaluation Indicators

3.1 Fruit appearance traits (size, shape, peel color)

In the fresh market, figs must first meet consumers’ visual expectations. Fruit size and weight are key commercial evaluation criteria because they directly affect grading and market attractiveness. There are large differences in average fruit weight among varieties; for example, genotypes such as ‘Banane’, ‘Brown Turkey’, and ‘San Martino’ usually produce significantly larger fruits (Mahmoudi et al., 2018) (Figure 1). Fruit shape (length-to-width ratio) and ostiole characteristics are also included in standardized description systems, as they influence visual appeal, handling convenience, and safety (e.g., susceptibility to insect or pathogen entry) (Tikent et al., 2025).

Peel color is the most direct indicator reflecting varietal characteristics and maturity. Light- and dark-colored varieties can be clearly distinguished, and their color parameters (L*, C*, h°) show strong varietal dependence.

Dark-colored varieties usually have lower hue angle (h°) and higher contents of anthocyanins and phenolic compounds, while light-colored varieties show higher brightness (L*) and chroma (C*) (Hssaini et al., 2020). Changes in peel and pulp color are also among the most sensitive indicators of ripeness and are often used together with firmness to determine the optimal harvest time.

Figure 1 Photographs of the studied fig cultivars (Original, 2015) (Adopted from Mahmoudi et al., 2018)

3.2 Flesh quality (texture, juiciness, seed content)

The acceptance of fresh figs largely depends on their texture, especially flesh firmness and juiciness. Firmness is commonly used as an important indicator of harvest timing and maturity. Fruits harvested at a higher maturity stage (i.e., "tree-ripe") are usually softer, but when firmness is still sufficient to withstand transport, they are more preferred by consumers.

Professional sensory evaluation usually includes firmness, juiciness, graininess, stickiness, and smoothness. These characteristics vary with cultivar and maturity level. Fruits that are not fully ripe usually show higher compression force and thicker skin, giving a firmer perception, sometimes accompanied by bitterness or astringency. In contrast, fruits at higher maturity are juicier and softer.

Seed content and the perception of achenes are also important factors. Sensory evaluation often scores seed presence and adhesion, as excessive seed content may negatively affect mouthfeel. Differences among varieties in pulp thickness and cavity size influence the pulp proportion and juiciness (Mahmoudi et al., 2018).

3.3 Flavor characteristics (sugar–acid ratio, aroma components)

Fig flavor results from the combined effects of sugars, organic acids, phenolic compounds, and volatile substances. Soluble solid content (SSC) and titratable acidity (TA) are commonly used indicators. The SSC:TA ratio (maturity index, MI) is closely related to perceived sweetness and overall acceptance (Pereira et al., 2020). Tree-ripe fruits usually have higher SSC and lower TA, and SSC is often more strongly correlated with consumer preference than TA.

Descriptive sensory studies show that different varieties have unique aroma profiles, which can be described by attributes such as "fruity," "melon-like," "berry-like," "citrus-like," and "honey-like" (King et al., 2012). Fruits with lower maturity often show "green" and astringent notes, while those at higher maturity present stronger sweetness and flavor intensity.

Instrumental analysis (SPME–GC–MS) shows that fig aroma consists of a complex mixture of volatile compounds, including alcohols, aldehydes, esters, and terpenes. Key compounds such as hexanal, (E)-2-hexenal, and limonene contribute significantly to the aroma of fresh figs (Gündeşli et al., 2024). Principal component analysis often indicates that the maturity index (MI) and pulp color parameters are important predictors of sensory quality.

3.4 Nutritional composition (sugars, vitamins, phenolic compounds)

Fresh figs are characterized by relatively high carbohydrate content, especially glucose and fructose, which dominate in both peel and pulp and vary among cultivars. SSC reflects both sugar accumulation and water content and is a core indicator of fresh quality.

In addition, figs are rich in vitamin C, minerals (especially potassium and calcium), dietary fiber, and small amounts of protein, with significant differences among varieties and tissues (Maatallah et al., 2024).

In recent years, phenolic content and antioxidant activity have gradually been included in quality evaluation systems. This is particularly important for dark-skinned varieties, whose peels usually contain higher levels of phenolic compounds and show stronger antioxidant capacity.

3.5 Shelf life and postharvest performance

For fresh consumption, shelf life is a key evaluation indicator because figs have high moisture content and soften easily, making them highly perishable fruits. Postharvest performance mainly includes weight loss rate, firmness retention, color stability, decay incidence, and the maintenance of SSC and bioactive compounds during storage (Byeon and Lee, 2020).

There are differences among varieties in maintaining firmness and external quality. Varieties with higher initial firmness can be harvested at higher maturity while still maintaining good transport tolerance.

Postharvest treatments such as modified atmosphere packaging (MAP) and UV-C treatment can significantly extend shelf life. For example, under low-temperature conditions, combining UV-C with MAP can effectively maintain fruit firmness, reduce decay rate, and preserve good appearance (Souza et al., 2022). Cold storage can also alter metabolite composition, indicating that different varieties respond differently to storage conditions.

4 Evaluation Indicators of Drying Suitability

4.1 Dry matter content and moisture characteristics

The initial dry matter content determines how much water needs to be removed and has a clear effect on drying time, energy consumption, and final texture. The target moisture content of safe dried fig products is usually around 18%~24% (wet basis), which corresponds to a relatively low water activity and helps long-term storage (Pandidurai et al., 2021). Varieties or treatments with higher solid content can reach this target moisture faster and usually show a lower dehydration ratio.

Moisture loss generally follows thin-layer drying kinetics and is mainly in the falling-rate period. Effective moisture diffusivity and equilibrium moisture content are often used to compare drying behavior among different varieties and product forms. Osmotic pre-dehydration and sugar solution treatments can remove part of the water before drying and make the initial moisture more consistent, which improves process control and helps retain nutrients.

4.2 Sugar accumulation and caramelization potential

High total soluble solids (TSS) and sugar contents (glucose, fructose, sucrose) are important for achieving proper sweetness, water activity, and texture in dried figs. During drying, sugars become concentrated, and TSS can increase to about 30~35 °Brix or even higher (Villalobos et al., 2016).

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 also show stronger flavor and higher functional value after drying (Arvaniti et al., 2019). In Smyrna-type figs, dry fruit weight is significantly correlated with leaf density, fruit length, and fruit width, indicating that vigorous growth and larger fruit size often lead to higher dry yield (Khadivi et al., 2018). Fruit geometry, peel characteristics, sugar content, and phenolic compounds tend to change together, and can be used as key combined indicators to predict dual-purpose potential.

5.3 Screening and identification of high-performance dual-purpose varieties

Dark-skinned varieties from Algeria and Morocco show good fruit traits, high consumer acceptance, and relatively high levels of phenolic compounds and antioxidant capacity. These varieties are suitable both for fresh consumption and for producing dried products with high nutritional value (Tikent et al., 2022). Some underutilized Italian varieties, such as ‘Processotto Nero’, ‘Natalese Nera’, and ‘Verde di Natale’, perform well in fruit weight, TSS, peelability, and maturity time. After processing into dried fig slices, they also receive high sensory scores, indicating good processing adaptability as well as good fresh-eating quality (Ferrara et al., 2023) (Figure 2). Varieties ranked highly in comprehensive evaluations (such as ‘Bursa Siyahı’, ‘Yediveren’, elite local genotypes from Turkey and Bangladesh, and ‘Mlouki’ and ‘Assal’) are also considered important dual-purpose candidates when drying conditions are available (Maatallah et al., 2024).

Figure 2 Drying process and product transformation of underutilized local fig cultivars into fig disks (Adapted from Ferrara et al., 2023)

5.4 Trade-off between fresh quality and drying adaptability

Traits preferred in the fresh market (such as easy peeling and obvious skin cracking) may increase the risk of damage during sun drying or storage, while crack-free skin is more favorable for dried product quality. Highly mature fruits with high SSC and soft texture have advantages for fresh consumption, but their low mechanical strength makes them more prone to damage during handling and may affect drying uniformity. In contrast, fruits with slightly firmer texture and higher dry matter content are more suitable for dehydration processing (Shishkina et al., 2022). Although higher phenolic content and dark skin color can improve nutritional value, improper control during drying may intensify browning (Uslu et al., 2024).

6 Case Study of Dual-Purpose Fig Varieties

6.1 Evaluation of representative fig varieties

‘Brown Turkey’ is generally regarded as an early-bearing and high-yielding variety, showing medium to relatively high productivity along with desirable fresh fruit quality. Its fruits are of moderate size, have relatively high soluble solids content, and perform well in consumer evaluations in terms of flavor and texture (Koly et al., 2024).

Similar integrated morpho-pomological and biochemical assessments have also been applied to local varieties in the Apulia region, such as ‘Processotto Nero’, ‘Natalese Nera’, and ‘Verde di Natale’. Key indicators, including fruit weight, peel color, ease of peeling, total soluble solids (TSS), and ripening time, were systematically recorded prior to processing (Ferrara et al., 2023).

6.2 Performance under fresh consumption conditions

For fresh consumption, ‘Brown Turkey’ demonstrates good fruit traits and nutritional quality, ranking relatively high in multivariate comprehensive evaluations. This is mainly attributed to its favorable flavor, texture, juiciness, as well as its vitamin C content and antioxidant-related properties (Koly et al., 2024). These findings suggest that this variety is more suitable as a stable and reliable option for the fresh fruit market rather than a premium cultivar aimed at extreme sensory quality.

6.3 Drying processing performance and product quality

Studies on the drying of ‘Brown Turkey’ figs indicate that, with appropriate pretreatments—such as soaking in fructose or sucrose solutions and sulfiting-combined with controlled tray drying or oven drying processes, it is possible to obtain dried fig products with a moisture content of about 24% (wet basis). These products can maintain good sugar retention, moderate acidity, mineral content, and relatively high sensory scores, including color, texture, and flavor (Singh and Kaur, 2025). Varieties with better initial fruit characteristics, such as higher fruit weight, better coloration, higher TSS, and easier peeling, tend to perform better in consumer preference evaluations, where appearance and pleasant flavor are the main factors driving acceptance.

7 Cultivation and Management Practices

7.1 Agronomic measures affecting fruit quality

Moderate deficit irrigation can improve the quality and storage life of fresh figs, but excessive water stress reduces gas exchange, promotes leaf drop, and shortens the production cycle (Ammar et al., 2020). Under semi-arid conditions, controlling irrigation at about 85%~95% of crop evapotranspiration (ETc) can optimize yield, water use efficiency, and fruit quality. At the same time, potassium fertilization can partly alleviate water stress (Moura et al., 2023). Integrated water-fertilizer management and balanced application of N-P-K fertilizers can significantly increase yield, fruit size, total soluble solids (TSS), sugar content, and ascorbic acid compared with rainfed or low-input systems (Ali et al., 2025). Pruning intensity and timing (closely related to phenological stages) are also important, helping balance vegetative growth and fruiting, and improving marketable yield and fruit size (Pereira et al., 2017).

7.2 Harvest timing for dual-use optimization

Fig is a climacteric fruit and is highly perishable, so harvest maturity strongly affects quality. Fruits harvested at higher maturity (“tree-ripe”) have higher single fruit weight, soluble solids content (SSC), and SSC:TA ratio, but lower acidity and firmness, and are more acceptable to consumers than those harvested at “commercial maturity” (Crisosto et al., 2010). Under dry conditions in India, the best eating quality usually occurs 7~8 weeks after syconium development. Early harvesting can cause cell structure disorder, while overripe fruits have high water content, poor texture, and are more prone to cracking and decay (Singh et al., 2023). For dual purposes (fresh consumption and processing), fruits for long-distance fresh markets should be harvested at slightly lower maturity, while fully ripe fruits are more suitable for local consumption or drying.

7.3 Regional adaptability and environmental effects

Fig cultivars show strong genotype × environment interaction. Different cultivars vary greatly in yield, earliness, and TSS, so selection should be based on local climate conditions and market timing. Differences also exist among cultivars in photosynthetic efficiency, oxidative stress indicators, and drought tolerance, highlighting the need to match cultivars with irrigation regimes according to local water availability (Ammar et al., 2020). Climate change, including rising temperatures and reduced rainfall, together with pest and disease pressure, has already led to yield decline in some Mediterranean regions (Mellal et al., 2023).

7.4 Pest and disease factors affecting fruit quality

Pests and diseases directly affect fruit marketability and suitability for drying. In tropical field trials, mealybug infestation and ostiole-end cracking significantly reduced fruit quality, and different cultivars showed different levels of susceptibility (Moniruzzaman et al., 2020). Fungal pathogens such as *Diaporthe* spp. can cause leaf blight, branch dieback, and fruit spot, weakening tree vigor and affecting fruit appearance (Nur-Shakirah and Mohd, 2025). In southern Italy, fig decline has been identified as a disease complex caused by multiple factors, including Botryosphaeriaceae, Fusarium species, and bark beetles, characterized by cankers, vascular discoloration, wilting, and significant yield loss (Habib et al., 2025).

8 Challenges and Future Research Directions

8.1 Limitations of current evaluation methods

At present, most evaluations mainly focus on morphological traits and fruit characteristics (such as fruit size, color, weight, and soluble solids content, SSC), as well as simple multivariate ranking. These studies are often limited to a single region or specific climatic conditions. Drying properties, postharvest performance, and storage responses are rarely integrated with field data, although cold storage studies have shown that different cultivars exhibit significant quality differences during storage (Byeon and Lee, 2020). Molecular diversity studies (such as ISSR, SSR, and iPBS) are usually not well connected with detailed fruit quality phenotyping, which limits their direct application in breeding selection (Uçer et al., 2025).

8.2 Breeding needs for dual-purpose trait improvement

Many screening studies have identified superior genotypes with large fruit size, high SSC, rich bioactive compounds, or strong drought resistance. However, these traits are rarely integrated into systematic breeding programs. Wild species, local varieties, and underutilized germplasm resources show wide phenotypic and genetic variation, and they have the potential to develop ideal dual-purpose types (for both fresh consumption and processing). However, they are mainly used for resource characterization rather than systematic hybrid utilization (Elmeknassia et al., 2025). Future breeding should not only improve fresh fruit quality but also focus on key traits such as high dry matter content, peel characteristics, ostiole size, and stress resistance (Aljane et al., 2018).

8.3 Role of genomics and phenotyping technologies

The availability of chromosome-level fig genome assemblies and the development of high-density molecular markers make it possible to link SNPs and candidate genes with traits such as fruit size, sugar content, acidity, bioactive compounds, and drought response regulatory networks (e.g., NAC transcription factor FcJA2) (Ren et al., 2025). Studies based on SSR, ISSR, and iPBS have shown high genetic diversity within populations and weak geographic differentiation, providing a strong foundation for marker-assisted selection (Qurbanova et al., 2025). Future research should combine these molecular markers with standardized and high-throughput evaluations of fruit quality, stress physiology indicators, and drying suitability.

Author Contributions

The author conducted this study, including literature review, data analysis, and the drafting and revision of the manuscript. The author has read and approved the final version of the manuscript.

Conflict of Interest Disclosure

The author affirms that this research was conducted without any commercial or financial relationships that could be construed as a potential conflict of interest.

References

Abdelsalam N.R., Awad R.M., Ali H.M., Salem M.Z., Abdellatif K.F., and Elshikh M.S., 2019, Morphological, pomological, and specific molecular marker resources for genetic diversity analyses in fig (*Ficus carica* L.), HortScience, 54(8): 1299-1309. https://doi.org/10.21273/HORTSCI14091-19

Ahmad F. and Noori I.M., 2023, Evaluation of genetic diversity of figs (*Ficus carica* L.) in Sulaymaniyah governorate using morphological, pomological and ISSR molecular marker, Tikrit Journal for Agricultural Sciences, 23(4): 147-175. https://doi.org/10.25130/tjas.23.4.13

Ali S.I., Murali V., Suchitra V., and Rajasekhar M., 2025, Evaluation of fig (*Ficus carica* L.) cultivars for fertigation response in breba crop yield and quality in the Northern Telangana zone, Journal of Advances in Biology & Biotechnology, 28(7): 32-45.
https://doi.org/10.9734/jabb/2025/v28i72523

Ali-Shtayeh M.S., Jamous R.M., Zaitoun S.Y.A., Mallah O.B., and Mubaslat A.K., 2014, Genetic diversity of the Palestinian fig (*Ficus carica* L.) collection by pomological traits and RAPD markers, American Journal of Plant Sciences, 5(9): 1139-1155.
https://doi.org/10.4236/ajps.2014.59127

Aljane F., Essid A., and Nahdi S., 2018, Improvement of fig (*Ficus carica* L.) by conventional breeding and biotechnology, In: Advances in Plant Breeding Strategies: Fruits (Vol. 3), Springer, Cham: 343-375.
https://doi.org/10.1007/978-3-319-91944-7_9

Almeida P.D., Pavan B.E., Rodrigues M.G.F., Gaspar G.D.F., Giro L.D.P., and Silva R.F.D., 2022, Genetic parameters and gains with the selection of fig tree genotypes, Acta Scientiarum Agronomy, 44: e55796.
https://doi.org/10.4025/actasciagron.v44i1.55796

Ammar A., Aissa I.B., Mars M., and Gouiaa M., 2020, Comparative physiological behavior of fig (*Ficus carica* L.) cultivars in response to water stress and recovery, Scientia Horticulturae, 260: 108881.
https://doi.org/10.1016/j.scienta.2019.108881

Arvaniti O.S., Samaras Y., Gatidou G., Thomaidis N.S., and Stasinakis A.S., 2019, Review on fresh and dried figs: Chemical analysis and occurrence of phytochemical compounds, antioxidant capacity and health effects, Food Research International, 119: 244-267.
https://doi.org/10.1016/j.foodres.2019.01.055

Byeon S.E. and Lee J., 2020, Differential responses of fruit quality and major targeted metabolites in three different cultivars of cold-stored figs (*Ficus carica* L.), Scientia Horticulturae, 260: 108877.
https://doi.org/10.1016/j.scienta.2019.108877

Crisosto C.H., Bremer V., Ferguson L., and Crisosto G.M., 2010, Evaluating quality attributes of four fresh fig (*Ficus carica* L.) cultivars harvested at two maturity stages, HortScience, 45(4): 707-710.
https://doi.org/10.21273/HORTSCI.45.4.707

Dumitru M.G., 2018, Biochemical changes of dried fruit of figs (*Ficus carica* L.) during storage, Revista de Chimie, 69: 3605-3610.
https://doi.org/10.37358/RC.18.12.6802

Elmeknassia M., Boussakouran A., Boulfia R., and Rharrabti Y., 2025, Genotypic variation in drought-season stress responses among traditional fig (*Ficus carica* L.) varieties from Mediterranean transition zones of Northern Morocco, Plants, 14(12): 1879.
https://doi.org/10.3390/plants14121879

Ferrara G., Magarelli A., Mazzeo A., Coletta A., Crupi P., Loperfido F., Maggi G., and Venerito P., 2023, Underutilized fig (*Ficus carica* L.) cultivars from Puglia region, Southeastern Italy, for an innovative product: Dried fig disks, Processes, 11(5): 1485.
https://doi.org/10.3390/pr11051485

Gençdağ E., Görgüç A., Okuroğlu F., and Yılmaz F.M., 2021, The effects of power-ultrasound, peroxyacetic acid and sodium chloride washing treatments on the physical and chemical quality characteristics of dried figs, Journal of Food Processing and Preservation, 45(1): e15009.
https://doi.org/10.1111/jfpp.15009

Gündeşli M., Uğur R., Urün I., Ercişli S., Kafkas N., Ilhan G., Spalević V., Ullah R., and Bari A., 2024, Evaluation of total phenolic content, sugar, organic acid, volatile compounds and antioxidant capacities of fig (*Ficus carica* L.) genotypes selected from the Mediterranean region of Türkiye, Horticultural Science, 51(2): 111-126.
https://doi.org/10.17221/84/2023-HORTSCI

Habib W., Carlucci M., Cavalieri V., Carbotti C., and Nigro F., 2025, Unveiling a disease complex threatening fig (*Ficus carica* L.) cultivation in Southern Italy, Plants, 14(18): 2865.
https://doi.org/10.3390/plants14182865

Hssaini L., Charafi J., Razouk R., Hernández F., Fauconnier M.L., Ennahli S., and Hanine H., 2020, Assessment of morphological traits and fruit metabolites in eleven fig varieties (*Ficus carica* L.), International Journal of Fruit Science, 20(Suppl 2): 8-28.
https://doi.org/10.1080/15538362.2019.1701615

Hssaini L., Hanine H., Razouk R., Ennahli S., Mekaoui A., Ejjilani A., and Charafi J., 2020, Assessment of genetic diversity in Moroccan fig (*Ficus carica* L.) collection by combining morphological and physicochemical descriptors, Genetic Resources and Crop Evolution, 67(2): 457-474.
https://doi.org/10.1007/s10722-019-00838-x

Khadivi A. and Mirheidari F., 2022, Selection of promising fig (*Ficus carica* L.) accessions using fruit-related characters, Food Science & Nutrition, 10(9): 2911-2921.
https://doi.org/10.1002/fsn3.2886

Khadivi A., Anjam R., and Anjam K., 2018, Morphological and pomological characterization of edible fig (*Ficus carica* L.) to select superior trees, Scientia Horticulturae, 238: 66-74.
https://doi.org/10.1016/j.scienta.2018.04.031

King E.S., Hopfer H., Haug M.T., Orsi J.D., Heymann H., Crisosto G.M., and Crisosto C.H., 2012, Describing the appearance and flavor profiles of fresh fig (*Ficus carica* L.) cultivars, Journal of Food Science, 77(12): S419-S429.
https://doi.org/10.1111/j.1750-3841.2012.02994.x

Koly K.A., Gomasta J., Alam M.S., Wahid S.A., Gulshan S.S., and Kayesh E., 2024, Morphological and physicochemical characterization of some exotic fig (*Ficus carica* L.) genotypes in Bangladesh, International Journal of Agronomy, 2024: 4735631.
https://doi.org/10.1155/2024/4735631

Lachtar D., Zaouay F., Pereira C., Martin A., Ben Abda J., and Mars M., 2022, Physicochemical and sensory quality of dried figs (*Ficus carica* L.) as affected by drying method and variety, Journal of Food Processing and Preservation, 46(3): e16379.
https://doi.org/10.1111/jfpp.16379

Maatallah S., Guizani M., Lahbib K., Montevecchi G., Santunione G., Hessini K., and Dabbou S., 2024, Physiological traits, fruit morphology and biochemical performance of six old fig genotypes grown in warm climates "Gafsa oasis" in Tunisia, Journal of Agriculture and Food Research, 17: 101253.
https://doi.org/10.1016/j.jafr.2024.101253

Mahmoudi S., Khali M., Benkhaled A., Boucetta I., Dahmani Y., Attallah Z., and Belbraouet S., 2018, Fresh figs (*Ficus carica* L.): Pomological characteristics, nutritional value, and phytochemical properties, European Journal of Horticultural Science, 83(2): 104-113.
https://doi.org/10.17660/eJHS.2018/83.2.6

Manjunath T.S., Babu P., Bagali A.N., and Jyadati K.S., 2019, Microbial and sensory evaluation of dried fig (*Ficus carica* L.) cultivars Bellary and Poona, International Journal of Current Microbiology and Applied Sciences, 8: 2493-2503.
https://doi.org/10.20546/ijcmas.2019.805.294

Mellal M.K., Khelifa R., Chelli A., Djouadi N., and Madani K., 2023, Combined effects of climate and pests on fig (*Ficus carica* L.) yield in a Mediterranean region: Implications for sustainable agricultural strategies, Sustainability, 15(7): 5820.
https://doi.org/10.3390/su15075820

Moniruzzaman M., Anuar N., Yaakob Z., Islam A.A., and Al-Khayri J.M., 2020, Performance evaluation of seventeen common fig (*Ficus carica* L.) cultivars introduced to a tropical climate, Horticulture, Environment, and Biotechnology, 61(5): 795-806.
https://doi.org/10.1007/s13580-020-00259-1

Moura E., Mendonça V., Figueiredo V., Oliveira L., Melo M., Irineu T., Andrade A., Chagas E., Chagas P., Ferreira E., Mendonça L., and Figueiredo F., 2023, Irrigation depth and potassium doses affect fruit yield and quality of figs (*Ficus carica* L.), Agriculture, 13(3): 640.
https://doi.org/10.3390/agriculture13030640

Nagaraja K., Sunil C.K., Chidanand D.V., and Ramachandra M., 2016, Drying kinetics of fig (*Ficus carica* L.) under various drying methods, Journal of Agricultural Engineering, 53(4): 42-48.
https://doi.org/10.52151/jae2016534.1614

Nur-Shakirah A.O. and Mohd M.H., 2025, Unveiling three Diaporthe species associated with diseased figs (*Ficus carica* L.) in Malaysia, Physiological and Molecular Plant Pathology, 136: 102554.
https://doi.org/10.1016/j.pmpp.2024.102554

Pandidurai G., Vennila P., and Amutha S., 2021, Evaluation of physicochemical characteristics of fresh and osmotic dehydrated fig (*Ficus carica* L.), Journal of Applied and Natural Science, 13(SI): 69-75.
https://doi.org/10.31018/jans.v13iSI.2779

Pereira C., Lopez Corrales M., Martín A., Villalobos M.C., Córdoba M.D.G., and Serradilla M.J., 2017, Physicochemical and nutritional characterization of brebas for fresh consumption from nine fig varieties (*Ficus carica* L.) grown in Extremadura (Spain), Journal of Food Quality, 2017: 6302109.
https://doi.org/10.1155/2017/6302109

Pereira C., Martín A., López-Corrales M., Córdoba M.D.G., Galván A.I., and Serradilla M.J., 2020, Evaluation of the physicochemical and sensory characteristics of different fig cultivars for the fresh fruit market, Foods, 9(5): 619.
https://doi.org/10.3390/foods9050619

Prgomet I., Gonçalves B., Vilela A., Pascual Seva N., and Prgomet Ž., 2021, Pomological and sensory properties of eight different fig varieties in Croatia, Glasnik zaštite bilja, 44(4): 82-87.
https://doi.org/10.31727/gzb.44.4.11

Qurbanova Q., Babayeva S., and Abbasov M., 2025, Analysis of the genetic diversity of Azerbaijani fig accessions (*Ficus carica* L.) using pomological traits and inter simple sequence repeat markers, Genetic Resources and Crop Evolution, 72(2): 1985-1998.
https://doi.org/10.1007/s10722-024-02072-6

Ren S., Gu X., Chen Z., Liu Y., Zhao X., Wang Y., Lu J., Cui J., Si Y., Zhang Y., Jin B., Wang Q., Lu Z., and Wang L., 2025, A chromosome-level genome assembly for *Ficus carica* provides genetic insights into flowerless fig fruit development, psoralen biosynthesis, and drought tolerance, Plant Communications, 6(10): 101470.
https://doi.org/10.1016/j.xplc.2025.101470

Sandhu A.K., Islam M., Edirisinghe I., and Burton-Freeman B., 2023, Phytochemical composition and health benefits of figs (fresh and dried): A review of literature from 2000 to 2022, Nutrients, 15(11): 2623.
https://doi.org/10.3390/nu15112623

Sclavounos A., Roussos P., Milla S., Kostas P., Samaras Y., Pozzi C., Molla J., Chitikineni A., Varshney R., and Voloudakis A., 2023, Genetic diversity of fig (*Ficus carica* L.) germplasm from the Mediterranean basin as revealed by SSR markers, Genetic Resources and Crop Evolution, 70(5): 1395-1406.
https://doi.org/10.1007/s10722-022-01509-0

Shishkina E.L., Dunaevskaya E.V., Pilkevich R.A., and Marchuk N.Y., 2022, Physiological and biochemical features of fig cultivars (*Ficus carica* L.) from the collection of the Nikita Botanical Gardens, Proceedings on Applied Botany, Genetics and Breeding, 183(4): 97-106.
https://doi.org/10.30901/2227-8834-2022-4-97-106

Singh A., Kishore K., Kumar P., Khapte P.S., Mishra D.S., Singh D., and Kothyari H.S., 2023, Phenological growth and development stages of common fig (*Ficus carica* L.) under arid climate of India, Folia Horticulturae, 35(2): 395-402.
https://doi.org/10.2478/fhort-2023-0028

Singh V. and Kaur A., 2025, Sustainable processing and nutritional enhancement of dried figs (*Ficus carica* L. cv. Brown Turkey) by different drying technologies, New Zealand Journal of Crop and Horticultural Science, 53(5): 2797-2812.
https://doi.org/10.1080/01140671.2025.2510598

Souza M., Artés F., Jemni M., Artés-Hernández F., and Martínez-Hernández G.B., 2022, Combined effect of UV-C and passive modified atmosphere packaging to preserve the physicochemical and bioactive quality of fresh figs during storage, Postharvest Biology and Technology, 194: 112106.
https://doi.org/10.1016/j.postharvbio.2022.112106

Tikent A., Laaraj S., Adiba A., Elfazazi K., Ouakhir H., Bouhrim M., Shahat A., Herqash R., Elamrani A., and Addi M., 2025, Nutritional composition, health benefits and quality of fresh and dried figs from Eastern Morocco, Scientific Reports, 15(1): 9776.
https://doi.org/10.1038/s41598-025-92131-4

Tikent A., Marhri A., Mihamou A., Sahib N., Serghini-Caid H., Elamrani A., Abid M., and Addi M., 2022, Phenotypic polymorphism, pomological and chemical characteristics of some local varieties of fig trees (*Ficus carica* L.) grown in Eastern Morocco, E3S Web of Conferences, 337: 04008.
https://doi.org/10.1051/e3sconf/202233704008

Uçer V., Ağlar E., Mortazavi P., Qureshi S., Ali A., Tatar M., Altaf M., Bedir M., Ercişli S., Nadeem M., and Baloch F., 2025, Exploring genetic diversity of Turkish fig (*Ficus carica* L.) germplasm using inter-primer binding site retrotransposon markers, Genetic Resources and Crop Evolution, 72(5): 5487-5498.
https://doi.org/10.1007/s10722-024-02283-x

Uslu N.A., Ozturk B., Ates U., and Aydın E., 2024, Evaluation of quality characteristics and bioactive compounds of fig fruit grown in the Black Sea region, Türkiye, Applied Fruit Science, 66(2): 689-698.
https://doi.org/10.1007/s10341-023-00987-5

Villalobos M.C., Serradilla M.J., Martín A., Pereira C., López-Corrales M., and Córdoba M.G., 2016, Evaluation of different drying systems as an alternative to sun drying for figs (*Ficus carica* L.), Innovative Food Science & Emerging Technologies, 36: 156-165.
https://doi.org/10.1016/j.ifset.2016.06.006

Yang Q., Liu Y., Guo Y., Jiang Y., Wen L., and Yang B., 2023, New insights of fig (*Ficus carica* L.) as a potential functional food, Trends in Food Science & Technology, 140: 104146.
https://doi.org/10.1016/j.tifs.2023.104146

Zare H. and Jalili H., 2020, Comparison of dried 'Sabz' fig (*Ficus carica* cv. Sabz) harvesting, drying, disinfection, and storage methods, International Journal of Fruit Science, 20(Suppl 3): S1741-S1750.
https://doi.org/10.1080/15538362.2020.1830918