

## The Golden Winter Fruit - Persimmon as a Functional Food from Orchards to Supermarkets

\*Mrs. E. Jyoshna and Dr. B. Anila Kumari

Dept. of Foods and Nutrition, PG&RC, PJTAU, Rajendranagar, Hyderabad India

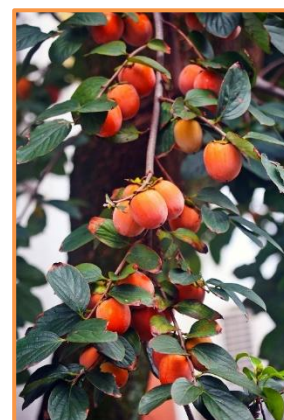
\*Corresponding Author's email: [ellandula.joshi@gmail.com](mailto:ellandula.joshi@gmail.com)

Persimmon (*Diospyros kaki*), popularly known in India as “Japani phal,” is emerging as a high-value winter fruit with strong consumer appeal and impressive nutritional credentials. Characterized by its bright orange color, honey-like sweetness and smooth texture, persimmon is increasingly recognized not only as a dessert fruit but also as a functional food rich in fiber, carotenoids, and polyphenols. The fruit’s distinctive sensory attributes intense sweetness, soft gel-like flesh in ripe astringent types and crisp texture in non-astringent cultivars make it highly acceptable across age groups, while its deep orange hue signals a high concentration of provitamin A carotenoids and other phytochemicals. From a food science perspective, persimmon’s composition of soluble and insoluble dietary fiber, pectin, and bioactive compounds positions it as more than a seasonal treat, it is a nutrient-dense, plant-based food with potential roles in promoting cardiovascular, digestive and metabolic health.



Globally, persimmon ranks among the most widely cultivated fruit crops, with major production in China, Japan, Korea and the Mediterranean and expanding cultivation in India’s Himalayan and subtropical regions. China dominates world production, accounting for the bulk of global output, followed by Korea, Japan, Spain and Brazil. In India, persimmon cultivation is concentrated in the northwestern Himalayan belt particularly Himachal Pradesh (notably Kullu and surrounding valleys), Jammu & Kashmir and Uttarakhand where cool winters and well-drained soils favor high-quality fruit development. Recent horticultural reports highlight Kullu as a key and expanding pocket for persimmon, with increasing acreage and farmer interest driven by the fruit’s high market price and low pest pressure compared to traditional temperate fruits. The fruit typically matures from October to January, aligning with the winter festival season and filling a niche for fresh, locally grown temperate fruit in Indian markets.

Its rising popularity is driven by changing consumer preferences toward nutrient-dense, plant-based foods and by the fruit’s versatility in fresh and processed forms. Urban consumers are increasingly seeking fruits that offer both sensory pleasure and functional benefits, such as high fiber, antioxidants and micronutrients, to support immunity, heart health and weight management. Persimmon fits this demand profile well, it is naturally sweet, requires no added sugar and delivers a meaningful portion of daily fiber and provitamin A in a single serving. Simultaneously, the global persimmon market is undergoing structural transformation, shifting from commodity based fresh fruit trade to value-added product development, including dried persimmons, jams, juices,



purees, powders and even cosmetic and nutraceutical ingredients. This diversification reduces dependence on the short fresh-fruit window, minimizes post-harvest losses and opens new revenue streams for growers and processors.

For food scientists, nutritionists and agri entrepreneurs, persimmon offers a compelling case study a seasonal fruit with high bioactive potential, clear health benefits and significant scope for value addition and product innovation. Scientific reviews document persimmon's rich profile of bioactive compounds, including polyphenols (ferulic acid, *p*-coumaric acid, gallic acid), flavonoids (quercetin, kaempferol, myricetin), tannins (proanthocyanidins) and carotenoids ( $\beta$ -carotene,  $\beta$ -cryptoxanthin, lutein, zeaxanthin). Proanthocyanidins in persimmon, particularly in astringent types, exhibit antioxidant activity reported to be 20–50 times higher than vitamins C and E on a molar basis, underscoring the fruit's potent free-radical scavenging capacity. These compounds, together with vitamins (C, A, some B vitamins) and minerals (potassium, manganese, copper), underpin the fruit's association with reduced oxidative stress, improved lipid profiles, better glycemic control and enhanced immune and vision health.



From a product development standpoint, persimmon's high pectin and fiber content make it suitable for gelled products like jams and jellies, while its natural sweetness and flavor intensity support formulation of juices, nectars and fruit blends. Drying technologies yield shelf-stable snacks with concentrated sugars and fiber, appealing to health-conscious consumers seeking alternatives to refined confectionery. Emerging applications include persimmon purees for baby foods and bakery fillings, frozen pulp for smoothies and desserts, spray-dried or freeze-dried powders for nutrition bars and mixes and extracts for functional beverages and supplements. In India, there is additional scope to integrate persimmon into traditional and regional preparations such as spiced preserves, *murabba*, lassi blends and winter *prasad* thereby aligning global functional food trends with local taste preferences.



This article through the light on the availability of persimmon, its nutritional composition, evidence-based health benefits, and the growing range of value-added products in the market. It synthesizes current literature on persimmon's bioactive compounds and physiological effects, outlines production and market trends in global and Indian contexts, and highlights opportunities for research, product innovation, and nutrition communication. By framing persimmon as both a horticultural asset and a functional food ingredient, the review aims to support food scientists, extension professionals, and entrepreneurs in leveraging this “golden winter fruit” for improved diets, diversified farm incomes, and sustainable value chains.

## Availability of Persimmon Fruit

### Global and Regional Production

Persimmon (*Diospyros kaki*) is native to East Asia but is now cultivated across temperate and subtropical zones worldwide. China remains the largest producer, accounting for the majority of global output, followed by the Republic of Korea, Japan, Brazil, Azerbaijan, and several Mediterranean countries including Spain, Italy, and Israel. Global production has expanded steadily over recent decades, driven by rising consumer demand for exotic and functional fruits, improved cultivars, and the fruit's adaptability to diverse agro-climatic conditions.

In recent years, India has seen increased cultivation, particularly in Himachal Pradesh, Uttarakhand, Jammu & Kashmir, and parts of the Northeast, where cool winters favor high-quality fruit development. Within Himachal Pradesh, the Kullu valley and surrounding mid-

hill zones have emerged as key persimmon-growing pockets, with farmers increasingly adopting the crop due to its relatively low pest and disease pressure, higher market price compared to traditional temperate fruits, and suitability to marginal lands. State horticulture departments and research stations are promoting improved, low-astringency cultivars and better post-harvest practices to enhance fruit quality and marketability. Although national level production statistics for persimmon are still limited in India, district level horticultural reports indicate a clear upward trend in area and output, especially in northwestern Himalayan districts.

The fruit typically matures in late autumn to early winter (October–January in the Northern Hemisphere), making it a key seasonal offering in winter fruit baskets. In India, this harvest window coincides with the festive and wedding season, boosting demand in urban and semi-urban markets where persimmon is marketed as a premium, health-promoting winter fruit. Its relatively short fresh-market window has encouraged the development of post-harvest handling protocols and processing technologies to extend shelf life and reduce losses. Because ripe persimmons are soft and prone to mechanical damage, proper harvesting at the right maturity stage, careful packing in cushioned trays, and rapid cooling are critical to maintaining quality during transport. Controlled-atmosphere storage, modified packaging and cold-chain logistics are being explored to stretch the fresh season and enable wider distribution beyond local markets.

### Types and Market Forms

Two main horticultural types dominate the market, distinguished primarily by their tannin content and eating quality:

#### Astringent Persimmons (e.g., Hachiya)

Astringent persimmons are high in soluble tannins (proanthocyanidins) when unripe, which impart a strong puckering sensation if consumed before full ripening. These fruits must be allowed to soften completely until the flesh becomes jelly-like and almost translucent; at this stage, tannins polymerize and become insoluble, eliminating the astringent taste. Hachiya-type fruits are typically heart- or acorn-shaped and are prized for their intense sweetness and rich flavor when fully ripe. They are especially suitable for processing into purees, baked goods, jams, and dried products, where their soft texture and high sugar content are advantageous.



#### Non-Astringent Persimmons (e.g., Fuyu)

Non-astringent persimmons contain low levels of soluble tannins even when firm, allowing them to be eaten crisp, like an apple, at various stages of maturity. Fuyu-type fruits are generally round and slightly flattened, with firm flesh that remains crunchy until fully ripe. This type is preferred for fresh consumption, retail display, and export, as it tolerates handling and transport better than astringent types. In India, non-astringent cultivars are gaining favor among growers targeting urban supermarkets and online fruit platforms, where consumers expect ready-to-eat, firm fruit with minimal preparation.

#### Market Forms and Value Chains

In retail markets, persimmons are sold in multiple forms, reflecting both traditional consumption patterns and modern food-industry needs

##### Fresh Whole Fruit

The dominant form globally and in India is fresh, whole fruit sold in supermarkets, fruit shops, and increasingly through e-commerce platforms. Fruits are often pre-graded by size, color and firmness, and packed in protective trays or mesh sleeves to minimize bruising. In premium markets, persimmons may be branded by cultivar (e.g., Fuyu, Hachiya, Rojo Brillante) and marketed as a high-value, health-oriented winter fruit. In Indian hill stations and metropolitan cities, fresh persimmons are displayed alongside other temperate fruits such as apples, kiwis and plums during the winter months.

### Pre-Graded and Packed for Export

For international trade, persimmons are carefully sorted, graded, and packed according to strict quality standards. Export-oriented supply chains emphasize uniform size, blemish-free skin, appropriate color development, and controlled firmness to ensure shelf life during long-distance transport. Countries like Spain, Israel, and South Africa have developed strong export markets for persimmon to Europe, the Middle East, and North America, using cold-chain logistics and branded packaging. India's persimmon exports are currently limited but hold potential, particularly from Himalayan regions, if post-harvest infrastructure and certification systems are strengthened.



### Processed and Industrial Forms

Beyond fresh fruit, persimmon is increasingly utilized in processed and industrial applications:

- **Dried slices and whole dried fruit:** Traditional in East Asia and the Mediterranean, dried persimmon is marketed as a chewy, naturally sweet snack rich in fiber and minerals.
- **Purees and concentrates:** Used by bakeries, ice-cream manufacturers, and dairy industries for flavoring, filling, and formulation.
- **Frozen pulp and slices:** Employed in smoothies, desserts, and foodservice applications, enabling year-round use despite seasonal production.
- **Powders:** Spray-dried or freeze-dried persimmon powders are incorporated into bakery mixes, nutrition bars, infant foods, and functional beverages.
- **Juices, nectars, and beverages:** Single-fruit or blended drinks, sometimes fortified or probiotic-enhanced, positioned as functional winter beverages.

These processed forms help absorb surplus or lower-grade fruit, reduce post-harvest losses, and create higher-margin products for domestic and export markets.

### Status and Trends in India

In India, persimmon is still a niche but fast-growing category, with increasing visibility in urban centers and hill-station markets during winter. Consumer awareness is rising through health-focused media coverage, social media, and retail promotions that highlight persimmon's nutritional benefits and exotic appeal. Prices in urban markets often range from ₹150 to ₹300 per kilogram or higher, depending on quality, origin, and packaging, positioning persimmon as a premium fruit.



Key drivers of growth in India include:

- **Climatic suitability:** Cool winters in the northwestern Himalayas provide ideal conditions for high-quality fruit with good color and sugar development.
- **Economic incentives:** Higher returns per unit area compared to some traditional temperate fruits encourage farmer adoption.
- **Market demand:** Urban consumers' interest in novel, nutrient-dense fruits supports expansion in modern retail and online channels.
- **Processing potential:** Emerging interest in value-added products offers additional income streams and risk mitigation for growers.

Challenges remain, including limited awareness of improved cultivars, variable post-harvest handling, fragmented supply chains, and the need for stronger branding and quality standards. Addressing these through extension support, farmer training, and public-private partnerships can further accelerate persimmon's transition from a niche hill-fruit to a recognized component of India's winter fruit basket and functional-food portfolio.

## Nutritional Composition of Persimmon

**Basic Nutrient Profile:** Persimmon is energy-moderate and nutrient-dense. Per 100 g of raw fruit, typical values include: Energy: ~70 kcal, Carbohydrates: ~18–19 g (including ~12–13 g natural sugars), Dietary fiber: ~3.6 g (about 12–15% of daily requirement), Protein: ~0.6 g, Fat: ~0.2 g. A medium-sized persimmon (about 168 g) provides approximately: 118–120 kcal, 31–32 g carbohydrates, 6 g dietary fiber, ~1 g protein. This makes persimmon a satisfying, naturally sweet snack that contributes meaningfully to daily fiber intake.



## Vitamins, Minerals, and Bioactive Compounds

Persimmon is particularly rich in:

- **Provitamin A carotenoids** ( $\beta$ -carotene,  $\beta$ -cryptoxanthin): Responsible for the deep orange color; support vision, immune function, and skin health.
- **Vitamin C (ascorbic acid)**: Contributes to antioxidant defense, collagen synthesis, and iron absorption.
- **Vitamin E and vitamin K**: Present in smaller amounts, supporting antioxidant and coagulation functions.
- **Minerals**: Notably potassium (~160–270 mg per fruit), manganese, copper, and some calcium, which support blood pressure regulation, bone health, and enzymatic reactions.

Persimmon also contains:

- **Polyphenols and flavonoids** (e.g., quercetin, kaempferol, proanthocyanidins): Associated with anti-inflammatory and cardioprotective effects.
- **Tannins**: Especially in astringent types; contribute to antioxidant activity but must be managed through ripening or processing.

The combination of soluble and insoluble fiber, along with a rich array of phytochemicals, positions persimmon as a functional food with multiple health-promoting properties.

## Health Benefits of Persimmon

### Cardiovascular Health

Persimmon supports heart health through several mechanisms:

- **Cholesterol management**: Soluble fiber binds bile acids and cholesterol in the gut, helping lower LDL (“bad”) cholesterol.
- **Blood pressure regulation**: Potassium and flavonoids contribute to vasodilation and sodium balance, supporting healthy blood pressure.
- **Antioxidant protection**: Carotenoids and polyphenols reduce oxidative stress and inflammation in blood vessels, potentially lowering atherosclerosis risk.

Epidemiological and experimental studies link higher intake of carotenoid-rich fruits like persimmon with reduced cardiovascular disease risk.

### Digestive and Metabolic Benefits

- **Digestive health**: With about 6 g fiber per medium fruit, persimmon promotes regular bowel movements, prevents constipation, and supports a healthy gut microbiota.
- **Blood sugar control**: Soluble fiber slows carbohydrate digestion and glucose absorption, helping prevent sharp post-meal blood sugar spikes.
- **Weight management**: Low energy density, high fiber, and natural sweetness make persimmon a useful tool for satiety and reducing intake of refined sugars.



## Immune, Vision and Skin Support

- **Immune function:** Vitamin C and carotenoids enhance immune cell activity and barrier function, especially important during winter.
- **Eye health:** Provitamin A carotenoids are essential for retinal function and may reduce risk of age-related vision issues.
- **Skin health:** Antioxidants protect skin from oxidative damage and support collagen synthesis via vitamin C.

## Value-Added Persimmon Products in the Market

### Rationale for Value Addition

Persimmon's seasonal nature, susceptibility to mechanical damage, and rapid softening (especially in astringent types) create post-harvest challenges. Value addition helps:

- Extend shelf life and reduce wastage
- Capture higher price points through processed and branded products
- Diversify income for farmers and FPOs (Farmer Producer Organizations)

### Key Product Categories

#### 1. Dried Persimmon

- Traditional sun-dried or controlled-dehydration slices and whole fruits
- High in natural sugars and fiber; marketed as healthy snacks or confectionery ingredients

#### 2. Jams, Jellies and Preserves

- Made from ripe pulp, often blended with other fruits or spices
- Used in breakfast spreads, bakery fillings, and dessert toppings

#### 3. Juices, Nectars and Beverages

- Single-fruit or blended drinks, sometimes fortified or probiotic-enhanced
- Positioned as functional winter beverages rich in antioxidants

#### 4. Purees and Concentrates

- Used by bakeries, ice-cream manufacturers, and dairy industries for flavoring and formulation
- Provide consistent quality and ease of handling for food processors

#### 5. Frozen Pulp and Slices

- For smoothies, desserts, and industrial applications
- Help manage seasonality by enabling year-round use

#### 6. Persimmon Powder

- Spray-dried or freeze-dried powders used in bakery mixes, nutrition bars, and infant foods
- Retain significant levels of carotenoids and fiber when processed correctly

#### 7. Functional and Specialty Products

- Persimmon-based nutraceuticals, antioxidant-rich extracts, and dietary supplements
- Under research for targeted health claims related to heart and metabolic health

In India, there is growing interest in developing persimmon-based products tailored to local tastes, such as spiced preserves, lassi blends, and traditional sweet preparations, alongside global-style dried snacks and juices. With its strong nutritional profile, clear health benefits, and versatile processing potential, persimmon is well-positioned to become a flagship fruit for winter nutrition and agri-value chains in India and beyond.