



## Rose (*Rosa* spp.): Introduction, Nutritional Importance and Value-Added Rose Products

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Rose (*Rosa* spp.) a member of the Rosaceae family, is globally recognized not only for its ornamental beauty but also for its economic, nutritional, medicinal and industrial significance. Species such as *Rosa damascena*, *Rosa centifolia*, *Rosa gallica* and *Rosa bourboniana* are particularly important for value-added processing due to their rich aroma, essential oil content and bioactive compounds. Rose petals and hips are abundant in carbohydrates, natural sugars, organic acids, anthocyanins, polyphenols, vitamin C and unsaturated fatty acids, conferring antioxidant, anti-inflammatory, digestive and skin-health benefits. These bioactive components have facilitated the development of a wide array of products, including gulkand, rose syrup, rose jam, rose tea, rose water, essential oils, rose hip juice and oil, floral beverages, rose-infused sweets, ice cream, powders, potpourri and traditional oils like Gul Roghan. Proper harvesting, hygienic handling and optimized processing techniques are critical to preserve aroma, pigments and nutritional quality. The rising demand for natural flavors, herbal remedies and functional foods has further enhanced the commercial scope of rose-based products, making *Rosa* spp. a versatile crop with significant agro-industrial potential.

**Keywords:** *Rosa* spp., rose petals, rose hips, value-added products, antioxidants

### Introduction

Rose, scientifically known as *Rosa* spp., belongs to the family Rosaceae and is one of the oldest cultivated flowering plants in the world. Revered as the “Queen of Flowers,” rose is admired not only for its beauty and fragrance but also for its immense economic, nutritional, medicinal and industrial value. The genus comprises nearly 200 species and thousands of cultivars differing in flower size, color, aroma and adaptability. Roses are widely grown in temperate and subtropical regions under open-field as well as protected cultivation systems. Although traditionally cultivated as cut flowers and loose flowers for ornamental purposes, roses have gained increasing importance in food processing, perfumery, cosmetics, pharmaceuticals and nutraceutical industries. The rising consumer preference for natural flavors, plant-based antioxidants, herbal remedies and clean-label ingredients has significantly enhanced the commercial scope of rose-based products.

### Important Rose Species Used for Processing

Not all rose species are suitable for commercial processing; highly fragrant and edible varieties are preferred. Among them, *Rosa damascena* (Damask rose) is the most commercially important species used for rose water, rose oil (otto), gulkand, syrups and perfumery due to its high essential oil content and strong aroma. *Rosa centifolia* (Cabbage rose) is valued in perfumery and traditional sweets for its rich fragrance. *Rosa gallica* is commonly utilized for jams and medicinal extracts, while *Rosa bourboniana* is preferred for

gulkand and aromatic preparations. Wild rose species are primarily used for rose hip products because of their high vitamin C and bioactive compound content.



### Botanical and Processing Characteristics

Roses are perennial, woody shrubs bearing thorny stems, compound leaves and bisexual flowers. The petals contain volatile aromatic compounds, flavonoids, anthocyanins and phenolic acids that contribute to their fragrance, color and therapeutic properties. Essential oils are stored in delicate oil glands within the petals, making proper harvesting critical. Flowers are usually harvested early in the morning when oil concentration is highest. For product preparation, fully opened yet fresh flowers are selected, and the bitter white petal base is removed. Hygienic handling, minimal exposure to excessive heat and rapid processing help preserve aroma, pigment and nutritional quality.

### Nutritional Composition of Rose Petals

Rose petals are nutritionally significant in addition to being aromatic. Carbohydrates are the predominant component, including natural sugars such as glucose, fructose and sucrose. They contain small amounts of proteins and minerals along with organic acids like malic acid and quinic acid that impart mild tanginess. Rose petals are rich in polyphenols and anthocyanins, particularly cyanidin-3-glucoside, which exhibit strong antioxidant and radical-scavenging properties. These compounds help reduce oxidative stress, support cardiovascular health, and contribute to anti-inflammatory and anti-aging effects.

### Nutritional and Functional Value of Rose Hips

Rose hips, the fleshy fruits formed after flowering, are highly nutritious and often more valuable than petals in terms of vitamin content. They are exceptionally rich in vitamin C and also contain carotenoids, flavonoids, phenolic compounds and essential fatty acids. The seeds yield oil rich in linoleic and linolenic acids, which are beneficial for skin health and cellular regeneration. Rose hip products are widely used in health beverages, dietary supplements, and cosmetic formulations due to their immune-boosting and antioxidant properties.



### Scope and Importance of Value-Added Rose Products

Value addition in rose (*Rosa* spp.) significantly enhances the economic, nutritional and industrial potential of this versatile crop. Rose petals and hips, rich in antioxidants, polyphenols, anthocyanins, vitamins and essential oils, can be transformed into a wide array of products such as gulkand, rose syrup, jams, teas, rose water, essential oils, rose hip juice and oil, floral beverages, sweets, powders, potpourri and infused oils like Gul Roghan. These products not only preserve the delicate aroma, flavor and bioactive compounds of roses but also offer health benefits such as antioxidant, anti-inflammatory, digestive and skin-nourishing effects. The growing consumer preference for natural, herbal, and functional foods has further increased the demand and market potential for rose-based products, providing

opportunities for small and large-scale agro-industries, rural entrepreneurship, export markets and sustainable livelihoods.

## Major Value-Added Rose Products and Their Preparation

### Gulkand

Gulkand is a traditional herbal preserve prepared from fresh, highly fragrant rose petals with sugar to produce a sweet, aromatic and semi-solid product. Fully bloomed flowers are harvested early in the morning when essential oil content is at its peak, and the petals are carefully separated, washed, and trimmed to remove the bitter white basal portion. After slight shade drying to remove surface moisture, the petals are finely chopped or gently crushed and mixed thoroughly with an equal or slightly higher quantity of sugar, generally in a 1:1 or 1:1.5 ratio. The mixture is arranged in alternate layers of petals and sugar in a clean, dry glass jar, pressed lightly, sealed properly and kept under direct sunlight for about three to four weeks for natural curing. During this period, it is stirred every few days to ensure uniform mixing and prevent spoilage, allowing the sugar to dissolve gradually through osmotic action and form a thick syrup while the petals soften and blend uniformly. After proper maturation, the gulkand develops a rich aroma, glossy appearance and smooth semi-solid consistency and it is stored in airtight containers in a cool place, where it serves as a cooling, digestive and mildly laxative preparation in traditional food and medicinal systems.



### Rose Syrup

Rose syrup is a concentrated sweet beverage base prepared by extracting the natural color, flavor and aroma from fresh fragrant rose petals, commonly obtained from *Rosa damascena*. Fresh petals are carefully cleaned, slightly crushed to rupture the tissues and mixed with sugar in approximately a 30:70 (petal:sugar) ratio to facilitate osmotic extraction of pigments and volatile compounds. This mixture is kept undisturbed for about 24–48 hours, during which sugar draws out the natural juices, color and flavor from the petals. After extraction, a measured quantity of water is added and the mixture is heated gently until the sugar dissolves completely without prolonged boiling to preserve aroma. The liquid is then filtered to remove petal residues and further boiled until it reaches about 65° Brix concentration, ensuring proper preservation and desirable consistency. A small amount of citric acid may be incorporated to enhance flavor, prevent sugar crystallization and improve shelf life. The finished syrup is cooled to room temperature, filled into sterilized glass bottles, sealed tightly and stored in a cool, dry place, where it serves as a refreshing base for beverages, desserts and traditional drinks when diluted with water or milk.



**Rose Petal Jam:** Rose petal jam is a sweet, aromatic preserve made from edible rose petals and sugar. The petals are carefully cleaned, trimmed to remove any bitter white bases, and lightly macerated with sugar overnight to allow the natural juices and aroma to release. The next day, the petal-sugar mixture is placed in a saucepan with a small quantity of water and gently simmered over low heat, ensuring that the delicate fragrance is preserved while the mixture thickens. Lemon juice is added during cooking, which enhances the flavor, balances the sweetness, and helps in achieving proper gel formation. The jam is cooked until it reaches a thick, spreadable



consistency and then poured hot into sterilized glass jars. The jars are sealed immediately to ensure long shelf life. Rose petal jam is enjoyed as a spread on bread, in desserts, or as a flavorful ingredient in various confectionery preparations, offering a natural floral aroma and subtle sweetness.

### **Rose Tea (Fresh and Dried)**

Rose tea is a fragrant and soothing beverage prepared from fresh or dried rose petals. For fresh tea, fully opened petals are carefully cleaned to remove dust and debris and then simmered gently in hot water for 5–10 minutes, allowing the delicate color, flavor and aroma to infuse into the water. The infusion is strained to remove petal residues and sweetened with sugar or honey as desired, producing a calming and antioxidant-rich drink. For dried rose tea, known as pankhuri, petals are carefully shade-dried or dried in a solar dryer at low temperatures to preserve bioactive compounds such as anthocyanins and polyphenols. Once crisp, the dried petals are packed in airtight, moisture-proof pouches to maintain aroma, flavor and quality. Dried rose tea can be brewed similarly, offering a convenient, long-lasting option that retains the floral fragrance, health benefits and soothing properties of fresh rose petals.



### **Rose Water**

Rose water is a fragrant and versatile product obtained from fresh rose petals, using hydro- or steam distillation. In this process, cleaned petals are placed in a distillation unit with water, typically in a 1:3 ratio and gently heated for 2–3 hours. The heat generates steam that carries the volatile aromatic compounds from the petals into a condenser, where it cools and separates as rose water. The resulting distillate is filtered to remove any impurities and stored in airtight glass containers to mature for several weeks, allowing the fragrance to develop fully. Rose water is widely used in culinary preparations such as sweets, beverages and desserts, as well as in cosmetics for its soothing, hydrating and anti-inflammatory properties. It also holds cultural and religious significance, being used in rituals, ceremonies and traditional practices.



### **Rose Essential Oil (Rose Otto and Absolute)/ Gul Roghan**

Rose essential oil, known as rose otto or rose absolute, is a highly prized aromatic extract obtained primarily from the petals. The most common method of extraction is steam distillation, where freshly harvested petals are placed in a distillation unit and steam passes through them, carrying volatile aromatic compounds into a condenser. Here, the steam cools and the oil separates naturally from water and is collected carefully. An alternative method, solvent extraction, involves treating the petals with solvents such as hexane to produce a waxy substance called rose concrete. This concrete is further processed with alcohol at low temperatures to remove waxes and yielding rose absolute, which represents the purest form of the essence. Because a very large quantity of petals often several tons is required to produce just one kilogram of oil, rose essential oil is one of the most expensive oils in the world. It is extensively used in perfumery, aromatherapy, skincare formulations and luxury cosmetic products for its rich floral fragrance, mood-enhancing properties and skin-nourishing benefits. The oil is stored in dark, airtight containers to prevent oxidation and preserve its delicate aroma.



### **Rose Hip Syrup/Juice**

Rose hip syrup/Juice is a nutritious and tangy beverage prepared from the fully ripe, red fruits of roses, typically *Rosa canina* or similar edible rose hips. The fruits are carefully harvested at peak ripeness to ensure maximum vitamin C and antioxidant content. After washing thoroughly to remove dirt and impurities, the rose hips are crushed and gently boiled in water to soften the pulp and



release soluble nutrients. The mixture is then pressed and filtered to remove seeds, fine hairs and other solids, yielding a clear nutrient-rich juice. Depending on preference, the juice may be lightly sweetened and pasteurized to improve shelf life before bottling. Rose hip juice is highly valued for its health-promoting properties, particularly as a natural source of vitamin C, antioxidants and bioactive compounds that support immunity, skin health and overall wellness.

### **Rose Hip Seed Oil**

Rose hip seed oil is a highly valued cosmetic and therapeutic oil extracted from the seeds of fully ripe rose hips, most commonly from *Rosa canina*. The seeds are carefully separated from the fruit, thoroughly washed and dried to prevent moisture-related degradation. Oil is obtained through cold pressing, which preserves the delicate bioactive compounds or alternatively via solvent extraction for higher yields. The extracted oil is then filtered to remove any particulate matter and stored in dark, airtight bottles to prevent oxidation and maintain potency. Rich in unsaturated fatty acids, vitamin E and antioxidants, rose hip seed oil is widely used in skincare and cosmetic formulations for its anti-aging, scar-reducing and skin-repairing properties, helping to improve skin texture, elasticity and overall health.



### **Rose Sherbet**

Rose sherbet is a refreshing traditional beverage made from fresh rose petals. To prepare it, clean petals are soaked in water overnight to allow the color, aroma and soluble bioactive compounds to diffuse. The next day, the petals are crushed gently and the liquid is filtered to remove solids. Sugar is then added and the mixture is boiled lightly until it reaches a slightly viscous consistency. Citric acid is incorporated during this process to enhance preservation and maintain the refreshing taste. Once cooled, the sherbet is filtered again to achieve clarity and bottled in sterilized containers. Before serving, it is typically diluted with chilled water, producing a cool aromatic drink ideal for hot weather, rich in natural antioxidants and floral flavor.



### **Rose Squash**

Rose squash is a concentrated floral beverage prepared in a manner similar to rose syrup or sherbet but designed to be diluted before consumption. Fresh rose petals are first extracted in water to obtain their fragrance and pigments. This extract is then mixed with a sugar syrup at approximately 40–50% concentration and fruit acids or permitted preservatives are added to enhance flavor stability and shelf life. The mixture is carefully filtered to remove particulate matter, lightly pasteurized to prevent microbial growth, cooled and filled into sterilized bottles. Rose squash is consumed by diluting a small quantity of the concentrate with water and ice, creating a refreshing, mildly sweet drink. Its aromatic flavor, coupled with the natural health benefits of rose petals, makes it a popular beverage in both traditional and modern culinary contexts.



### **Rose Honey (Gol-e-Ghand)**

Rose honey, also known as Gol-e-Ghand, is a traditional herbal preparation made by infusing fresh, fragrant rose petals into pure honey. Typically, petals are carefully harvested, cleaned and slightly crushed to release their natural aroma and bioactive compounds. The petals are then mixed thoroughly with honey in a clean glass jar and kept under sunlight for 7–10 days, allowing the honey to absorb the floral essence fully. This infusion produces a richly aromatic, naturally sweet product with both culinary and therapeutic value. Rose honey is traditionally believed to aid digestion, reduce hyperacidity and provide relief from migraines. Its



pleasant floral taste makes it suitable as a natural sweetener for teas, desserts and health tonics, while the bioactive compounds and antioxidants imparted from the rose petals enhance its functional benefits.

### Rose Vinegar

Rose vinegar is a fragrant and flavorful preparation made by infusing fresh, cleaned rose petals in natural vinegar. Typically, petals are placed in sterilized bottles and completely submerged in vinegar. The bottles are sealed and stored in a cool, dark place for two to three weeks, allowing the vinegar to absorb the floral aroma, color and bioactive compounds from the petals. After the infusion period, the rose petals are filtered out and the aromatic vinegar is bottled for use. Rose vinegar is widely utilized in culinary applications such as salads, dressings and marinades, also finds use in cosmetic formulations for its pleasant fragrance and mild astringent properties.



### Rose Jelly

Rose jelly is a delicate and aromatic preparation made by extracting juice

from fresh, edible rose petals and cooking it with sugar and pectin until the mixture reaches the gel stage. The boiling process ensures the sugar dissolves completely and the pectin sets the jelly to a smooth, semi-solid consistency. Once the desired thickness is achieved, the hot jelly is poured into sterilized jars and sealed immediately to preserve aroma, flavor and shelf life. The resulting product is clear, fragrant and versatile, suitable as a dessert topping, spread or ingredient in various confectionery applications.



### Rose petal-based sweets

Rose petal-based sweets are traditional value-added products that combine the natural fragrance and therapeutic properties of rose petals with classic Indian confectionery techniques. Popular preparations include rose petal chikki, rose laddoo, rose barfi and rose halwa. In rose petal chikki, dried rose petals are mixed with jaggery syrup cooked to the hard-ball stage, spread, flattened, and cut into crunchy pieces, offering a caramelized flavor blended with floral aroma. Rose laddoo is prepared by incorporating dried rose petals or gulkand with flour, sugar,

and ghee, shaped into soft, aromatic balls suitable for festive occasions. Rose barfi is a milk-based sweet made from khoya and sugar infused with rose petals or



essence, resulting in a rich, creamy texture with delicate fragrance. Similarly, rose halwa is prepared by cooking semolina or flour with ghee and sugar, enhanced with rose ingredients to produce a soft, pudding-like dessert garnished with nuts. Collectively, these rose-based sweets provide appealing sensory qualities, nutritional value, and market potential in traditional and functional food segments.

### Floral Ice Cream (Rose Ice Cream)

Rose ice cream is a creamy and aromatic dessert prepared by infusing warm milk or cream with fresh or dried rose petals to extract their natural flavor and fragrance. After the infusion, the liquid is strained to remove the petals and then combined with sugar and stabilizers to ensure smooth texture. The mixture is pasteurized and homogenized to improve consistency and safety, cooled to the required temperature, and churned in an ice cream maker. Finally, it is frozen and packed hygienically for storage, resulting in a delicate, floral-flavored ice cream that offers a unique combination of creamy richness and the subtle aroma of roses.



### Rose Powder

Rose powder is made by carefully shade-drying fresh rose petals until they become crisp, ensuring that their natural color, fragrance, and bioactive compounds are retained. The dried petals are then ground into a fine powder, sieved to remove coarse particles, and packed in moisture-proof containers to prevent clumping and preserve quality. This versatile powder is widely used in herbal cosmetics, face packs, food flavoring, and Ayurvedic preparations, offering both aromatic and therapeutic benefits.



### Potpourri

Potpourri is a decorative and fragrant product prepared by combining dried rose petals with aromatic spices such as cinnamon, dried lavender, and other natural ingredients. The dried petals are blended with a few drops of rose essential oil to enhance fragrance and then stored in a sealed container for several days to allow the scents to meld. Once matured, the mixture is placed in decorative bowls, sachets, or gift items, providing a long-lasting natural aroma for homes, offices, and special occasions.



### Challenges and Problems

Commercialization of rose-based products faces several constraints. High-quality production requires careful species selection, precise harvesting, and hygienic handling, which are labor-intensive. The perishable and seasonal nature of petals and hips, along with susceptibility to microbial spoilage, limits consistent supply. Processing for essential oils and other products demands large quantities and skilled labor, increasing costs. Variability in species, climate, and techniques affects quality, while small-scale growers often lack knowledge of modern processing and storage. Competition from imports and low market awareness further challenge profitability, highlighting the need for training, innovation, and standardized sustainable practices.

### Conclusion

Roses (*Rosa* spp.) are a multipurpose crop with opportunities for value addition in food, cosmetic, medicinal, and decorative sectors. The aromatic compounds, essential oils, polyphenols, anthocyanins, vitamins, and unsaturated fatty acids in petals and hips enable the production of nutritionally rich and therapeutically beneficial products. With careful species selection, timely harvesting, and hygienic processing, high-quality products such as gulkand, syrups, jams, rose water, essential oils, rose hip beverages, sweets, powders, and infused oils can be produced. Diversification of rose-derived products increases profitability, reduces post-harvest losses, and promotes sustainable agro-based entrepreneurship, while growing consumer demand for natural and functional products underscores the global economic importance of *Rosa* spp.