

## **The genus *Rosa*: An aristocrat from the plant family with class, color and fragrance**

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The Rosales includes 9 families and about 6300 species; the monophyly of this order is supported by molecular phylogenetic analyzes and characterized morphologically by a reduction or lack of endosperm and the presence (Rosaceae, Rhamnaceae, and some Ulmaceae) or absence (Cannabaceae, Urticaceae, and Moraceae) of a hypanthium. However, phylogenetic relationships within order are still not well resolved, but the principal families recognized are Rosaceae, Rhamnaceae, Ulmaceae, Cannabaceae, Urticaceae, and Moraceae. The family Rosaceae includes 90 genera and ca. 3000 species agrouped into three subfamilies: Rosoideae (28 genera/1200-1900 species), Dryadoideae (4/31), and Spiraeoideae (57/1350). This Family is cosmopolitan and most abundant in the Northern hemisphere with showy species such as apples, pears, peaches, plums, cherries, almonds, apricots, firethorns, meadowsweets, hawthorns, etc. The genus *Rosa* L. (Roses) are perennial, dicotyledonous plants belonging to the sub-family Rosoideae. In *Rosa* 435 taxa are recognized, 308 species, 13 subspecies, 28 varieties, 17 forms, and 71 natural hybrids (Fig 1).

### **Scientific classification:**

Kingdom: Plantae

Division: Magnoliophyta

Class: Magnoliopsida

Order: Rosales

Family: Rosaceae

Subfamily: Rosoideae

Genus: *Rosa* L.

Plant habit varies between dwarf bushes to climbers and vines to semi woody shrubs with stems characterized by sharp woody thorns or prickles. The prickles are green when immature but become, brown to black, hard woody on maturity, and turns white on dead branches or stems. Leaves pinnately compound, leaf margins serrated, leaflets ovoid, phyllotaxy opposite. Both accessory whorls present and mostly pentamerous, calyx alternate with petals, 5 bracteoles opposite petals, stamens and styles numerous, Fruits mostly red colored, aggregate (berry-like structures) commonly referred to as a rose hips. Mostly noted on wild species are not found in the domesticated species. Rose hips are rich in different pigments, carbohydrates and vitamins, citric acid, pectin, and flavonoids. Large flowers, bright coloration and fragrance makes this species a desirable ornamental plant actively used in the decoration of gardens, parks, lawns, boulevards, slopes and basins and as bordering hedges. The species is known for draught resistance and winter hardiness and prefers neutral, loamy and partly leached soil profile, less irrigation and bright sunny days



Fig 1. Ornamental plants of *Rosa* L. [Photo credit: W. Cetzal-Ix]



Fig 2. Different global cultivars of *Rosa* L. (Rosaceae). [Photo credits: R Sengupta & S. K. Basu]

Roses are native to Asia, with some species reported to be native from the continents of Europe, North America, and northwestern Africa. Roses cultivated across the planet for commercial purposes are either local and native species or cultivars and hybrids. Most species of roses undergoes hybridization quite easily and hence has been successful in generating wide varieties of clones, hybrids, mutants and genotypes producing a beautiful spectrum of different colored petals and wide ranges of fragrances. Roses are known to be cultivated in ancient China and then spread to the Indian subcontinent and to the empire of Persia most possibly for its fragrance and color; and then slowly to the Middle East and finally into the continent of Europe most possibly through the Arab traders. Historic accounts refer to the fact that roses became extremely popular among the ancient Romans and also among Roman aristocratic families and the royal court due to its beauty, fragrance and several pharmaceutical properties. Rose is the national flower of the United States of America, the United Kingdom and the Maldives. Different cultivars of *Rosa* sp are presented in Fig 2.

*Rosa* is one of major economically important genera of ornamental horticulture; also of nutritionally important for the edible temperate fruits, as well as for its medicinal or nutraceuticals uses. Several economically important species of the *Rosa* are summarized in Table 1.

### **The economical importance of Rose oil**

Rose oils constitute different ingredients like 2-phenylethanol, citronellol, ingredient geraniol, nerol, stearopten waxes etc. Rose oil is used as perfume in the production of soap and cosmetics and as flavor in liquors and tea. Being mildly antimicrobial and rich in fragrance, it is used in lotions, soaps and creams. It is also used in the traditional treatment of exhaustion and fatigue, anemia, asthma, liver dysfunctions and some gastrointestinal problems and due to positive impact on the nervous system activity; it is also used as a relaxing, toning and cooling agent.

**Table 1. Different species of rose and their color, habit, distribution, constituents and uses (based on USDA 2014).**

Plant Family	Scientific name	Common name	Flower color & E. oil content	Growth habit	Duration	Uses	Some distribution areas
Rosaceae	<i>Rosa abyssinica</i> R. Br. ex Lindl.	–	White; $\gamma$ -muurolene , caryophyllene oxide	Shrub	Perennial	medicinal, ornamental	Yemen, Ethiopia, Somalia
	<i>Rosa acicularis</i> Lindl.	Prickly wild rose, Bristly rose	Pink (rarely white); –	Shrub	Perennial	Food, medicinal, ornamental	North Asia, Europe, and North America
	<i>Rosa agrestis</i> Savi	Fieldbriar	White; Sesquiterpenes	Shrub	Perennial	Medicinal, ornamental	Central and Southern Europe, Asia Minor and the Caucasus
	<i>Rosa ×alba</i> L. (pro sp.)	White rose of York	White;–	Sub shrub	Perennial	Medicinal, ornamental	USA ,eastern Asia
	<i>Rosa albertii</i> Regel	Albert Rose	White; –	Shrub	Perennial	Food, medicinal, ornamental	Kazakhstan, Mongolia
	<i>Rosa arkansana</i> Porter	Prairie wild rose	white to pink colored flowers;–	Shrub	Perennial	Food, medicinal, ornamental	USA
	<i>Rosa arvensis</i> Huds.	Field rose	White; –	Shrub	Perennial	Ornamental	Europe, Turkey
	<i>Rosa beggeriana</i> Schrenk	Begger rose	Milky white; –	Shrub	Perennial	Food, medicinal, ornamental	Turkey, Iran, Kyrgyzstan, Kazakhstan, Afganistan, W-Pakistan and Central Asia
	<i>Rosa bella</i> Rehder & E.H. Wilson	Floribunda rose	Pink; –	Shrub	Perennial	Food, medicinal, ornamental	North-western China
	<i>Rosa blanda</i> Aiton	Labrador rose	Light to dark rose pink; –	Shrub	Perennial	Food, ornamental	N-America
	<i>Rosa bracteata</i> J.C. Wendl.	Macartney rose	White; –	Shrub	Perennial	Food, ornamental	Asia
	<i>Rosa bridgesii</i> Crép.	Pygmy rose	Pink; –	Shrub	Perennial	Ornamental	USA
	<i>Rosa brunonii</i> Lindl.	Himalayan Musk rose	White; eugenol , citronellol , geraniol ,terpinen-4-ol	Shrub	Perennial	Food, medicinal, ornamental	Central and west Asia
	<i>Rosa canina</i> L.	Dog rose	pale pink, deep pink to white; 2-phenethyl alcohol ,eugenol.	Shrub	Perennial	Food, medicinal, ornamental	Kazakhstan, USA
	<i>Rosa carolina</i> L.	Carolina rose, pasture rose	Pale to mid pink; –	Shrub, sub shrub	Perennial	Food, medicinal, ornamental	USA
	<i>Rosa caudata</i> Baker	–	Deep pink; –	Shrub	Perennial	Ornamental	USA
	<i>Rosa centifolia</i> L.	Provence rose	Pink, more rarely white or dark red; phenethyl alcohol, geranyl acetate, geraniol, linalool, citronellol	Shrub	Perennial	Medicinal, ornamental	French
	<i>Rosa chinensis</i> Jacq	China rose	Pale pink to scarlet/crimson; Quercetin 3- <i>O</i> -(2",6"-digalloyl)- $\beta$ -D-glucoside	Shrub	Perennial	Food, medicinal, ornamental	China

**Table 1. continued.**

Plant Family	Scientific name	Common name	Flower color& E. oil content	Growth habit	Duration	Use	Some distribution areas
Rosaceae	<i>Rosa ×damascena</i> Mill. (pro sp.)	Damask rose	Pink; Nonadecane , heneicosane , docosane , citronellol, 9- nonadecene	Sub shrub	Perennial	Food, medicinal, ornamental	Iran, Syria
	<i>Rosa davidii</i> Crép.	Father David's rose	Rosy pink; –	Shrub	Perennial	Food, medicinal, ornamental	Asia
	<i>Rosa davurica</i> Pall.	Shi Mei, Daurian rose	Pink; eugenol , benzyl alcohol , β-ionone , dihydro-β- ionol , linalol , benzaldehyde	Shrub	Perennial	Food, medicinal, ornamental	East Serbia, Mongolia , China , Korea, Japan
	<i>Rosa dumalis</i> Bechst.	Glaucous Dog-rose	Dark to light pink	Shrub	Perennial	Ornamental	SW Asia, Europe Tajikistan, Afghanistan, Pakistan , Kashmir, India
	<i>Rosa ecae</i> Aitch.	–	Deep yellow;–	Shrub	Perennial	Ornamental	Central Asia , northwest China
	<i>Rosa fedtschenkoana</i> Regel	Fedchenkovsk iy rose	White;–	Shrub	Perennial	Food, medicinal, ornamental	USA
	<i>Rosa ferruginea</i> Vill.	Redleaf rose	Clear pink;–	Subshru b	Perennial	Ornamental	USA
	<i>Rosa foetida</i> Herrm.	Persian yellow rose	Deep yellow; n-nonadecane , heptadecene, n-dodecanoic acid	Shrub	Perennial	Medicinal, ornamental	Asia (Iran)
	<i>Rosa foliolosa</i> Nutt. ex Torr. & A. Gray	White prairie rose	White to rose pink;–	Subshru b	Perennial	Ornamental	SE-USA
	<i>Rosa forrestiana</i> Boulenger	–	Pale to bright pink;–	Shrub	Perennial	Ornamental	China
	<i>Rosa gallica</i> L.	Gallic rose	Rose pink, crimson;–	Shrub	Perennial	Ornamental	Ukraine, Caucasus, Iraq, Europe
	<i>Rosa gymnocarpa</i> Nutt.	Bald-hip rose, wood rose	Pink;–	Shrub	Perennial	Ornamental	NW-America
	<i>Rosa ×harisonii</i> Rivers	Harison's yellow rose, yellow rose of Texas	Sulphur- yellow, deep yellow;–	Subshru b	Perennial	Ornamental	USA
	<i>Rosa indica</i> L.	Cyme rose	Light pink to deep pink;–	Subshru b	Perennial	Medicinal, ornamental	Asia
	<i>Rosa jundzillii</i> Besser	–	Pale to rosy pink;–	Shrub	Perennial	Ornamental	Europe, Russian, Turkey
	<i>Rosa ×kamtchatica</i> Vent.	Kamchatka rose	Pink with paler centers;–	Shrub	Perennial	Ornamental	Russia
	<i>Rosa kokanica</i> Regel ex Juz.	Kokand rose	Bright yellow;–	Shrub	Perennial	Food, medicinal, ornamental	Iran ,Afghanistan, Mongolia, Kazakhstan
	<i>Rosa laevigata</i> Michx.	Cherokee rose	White, creamy white;–	Shrub	Perennial	Ornamental	Laos, Vietnam, China
<i>Rosa laxa</i> Retz.	Lax rose	white to pale pink; –	Shrub	Perennial	Food, medicinal, ornamental	Russia	

**Table 1. continued.**

Plant Family	Scientific name	Common name	Flower color & E. oil content	Growth habit	Duration	Use	Some distribution areas
Rosaceae	<i>Rosa majalis</i> J. Herrm.	May rose	Purplish pink, mid pink; –	Shrub	Perennial	Medicinal, ornamental	Europe, Siberia(Russia)
	<i>Rosa maracandica</i> Bunge	Samarkand rose	Golden-yellow; –	Shrub	Perennial	Ornamental, honey plant	USA, Asia
	<i>Rosa micrantha</i> Borrer ex Sm.	Small flower sweetbriar	Pink; –	Shrub	Perennial	Food, medicinal, ornamental	W, S, C-Europe, Russia, Caucasus, Armenia, Lebanon, Turkey and North West Africa
	<i>Rosa minutifolia</i> Engelm.	Baja rose	Bright pink; –	Subshrub	Perennial	Ornamental	USA, Mexico
	<i>Rosa mollis</i> Sm.	Soft downy rose	Pink to purplish; –	Shrub	Perennial	Ornamental	USA, UK, Europe
	<i>Rosa moschata</i> J. Herrm.	Musk rose	White, cream; citronellol, geraniol, nerol	Subshrub, vine	Perennial	Ornamental	S-Europe, N-America, SW-Asia, Mediterranean
	<i>Rosa moyesii</i> Hemsf. & E.H. Wilson	Mandarin rose	Pink to blood-red; –	Shrub	Perennial	Ornamental	W-China

Based on USDA, 2014

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