

FAMILY- SOLANACEAE (POTATO FAMILY)

The Solanaceae, or nightshades, are an economically important family of flowering plants. The family ranges from annual and perennial herbs to vines, lianas, epiphytes, shrubs, and trees. It includes a number of important agricultural crops, medicinal plants, spices, weeds, and ornamentals. Many members of the family contain potent alkaloids, and some are highly toxic,

Diagnostic characteristics:

Herbs or shrubs with usually alternate, simple and exstipulate leaves, flowers solitary or cymes, calyx often persistent and enlarged, 5-cleft corolla or corolla lobes 5, plaited or valvate in bud, stamens 5 on corolla tube, anthers conniving, sometimes open by pore, ovary bilocular with many ovules in each locule, placentae swollen and septum oblique, fruit a berry or capsule .

Distribution pattern:

The family has a worldwide distribution, being present on all continents except Antarctica. The greatest diversity in species is found in South America and Central America. Solanaceae commonly called 'Brinjal family'. It includes about 90 genera and 2000 species.. There are around 15 genera and 90 species found in India occurring chiefly in the Himalayas and Southern and Eastern parts of India Well known examples are mostly cultivated species such as *Solanum tuberosum* (Potato) *Nicotiana tabacum* (Tobacco), *Lycopersicon esculentum* (Tomato), *Capsicum frutescens* (Red pepper), *Solanum melongena* (egg plant or brinjal).

Systematics

Bentham & Hooker	Engler & Prantl	Hutchinson
Dicotyledons	Dicotyledoneae	Dicotyledons
Gamopetalae	Sympetalae	Herbaceae
Bicarpellatae	Tubiflorae	Solanales
Polemoniales	Solanaceae	Solanaceae
Solanaceae		

According to Bentham and Hooker the Polemoniales consists of five families, they are Polemoniaceae, Hydrophyllaceae, Boraginaceae, Convolvulaceae and Solanaceae. Engler and Prantl have placed all these families in order Tubiflorae into small groups (orders). He placed Solanaceae Convolvulaceae and Solanaceae in the order Solanales. Hutchinson has also shown the close systematic relationship of the Geraniales with the Convolvulaceae.

General Characteristics

Habit: Mostly annual herbs (*Solanum nigrum*), undershrubs (*Solanum melongena*). Some are shrubs (*Solanum torvum*) rarely trees (*Solanum grandiflorum*) and climbers (*Solanum seaforthianum*).

Root: Fibrous or tuberous Taproot, branched.

Stem: In most species stem is Herbaceous or woody, smooth and branched but sometimes it is prickly or spinous. The spines are modified branches, In *Solanum tuberosum* underground stem tubers are formed.

Leaves: Simple, Petiolate, exstipulate, alternate or opposite, entire (*Petunia*), simple, lobed or pinnatifid (*Solanum*), They are pinnately compound in *Lycopersicon* and *Solanum tuberosum*. In the inflorescence portion the leaves often become sub-opposite or opposite.

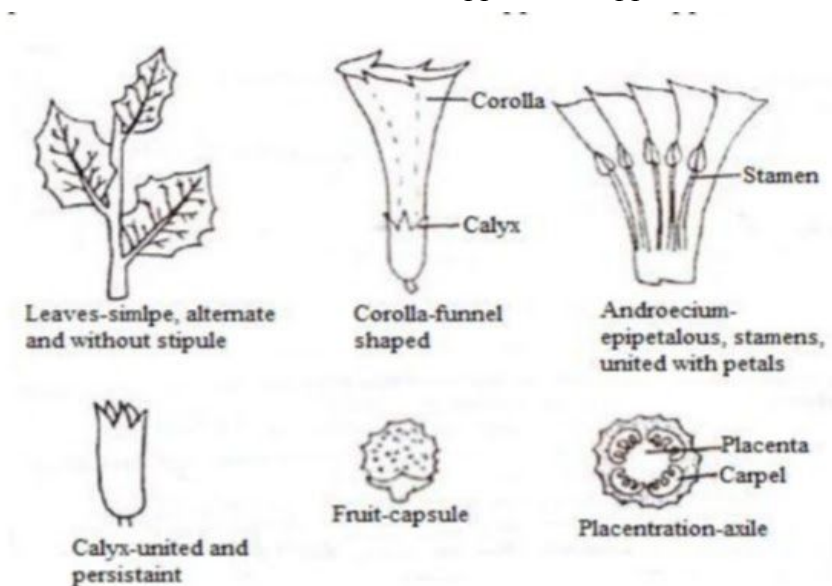


Fig. 7.1 Vegetative and floral parts of Solanaceous plant

Inflorescence: The flowers are often borne in Cymes which are lateral, axillary or terminal. In some species of *Solanum* the cymes are extra-axillary appearing to rise from the middle of an internode. The flowers are solitary and axillary in *Datura* and clustered in *Withania*.

Flower: The flowers are ebracteate, actinomorphic (Zygomorphic in *Salpiglossis*), bisexual (unisexual in *Withania coagulans*), pedicellate, pentamerous and hypogynous. Calyx: Sepals 5, gamosepalous (five-lobbed or five partite), persistent (in the fruit condition also) green; often much enlarged in the fruit, valvate aestivation.

Corolla: Petals 5, gamopetalous, rotate or companulate (*Physalis*) or infundibuliform (*Petunia*) trumpet- shaped (*Datura*). The limb is usually five-lobed or rarely ten-lobed as in *Datura*. Twisted or valvate aestivation. Sometimes the corolla is strongly zygomorphic and may become bilabiate (*Schizanthus*).

Androecium: The stamens are usually 5, polyandrous and epipetalous on the corolla tube and alternate with the lobes. They are commonly of unequal height. In Zygomorphic forms there are only four in *Salpiglossis* or two *Schizanthus* fertile stamens and remaining are represented by staminodes. The anthers are often conniving (*Solanum*), dithecal, introrse and dehiscing by longitudinal slits or by apical pore free or united, basifixed.

Gynoecium: Bicarpellary (the number of carpels often increase in *Lycopersicon* and *Capsicum*, syncarpous, The ovary is superior and bilocular (sometimes in *Datura* and *Nicandra* the number of locules increases to three to five by formation of pseudoseptum (false septum) with numerous ovules in each locule (few in *Cestrum*) on axile placentation. The placentae are often swollen and the septum is oblique. In *Capsicum* the ovary becomes unilocular in the upper

region by receding of placentae and appears to be parietal. The style is linear and the stigma is capitate or shortly lobed. A hypogynous nectariferous disc is usually present at the base of the ovary.

Fruit: Fruit is a berry which is sometimes (*Physalis*) enclosed within an inflated bladder-like calyx or it is capsule which dehisces by valves (*Datura*) or circumscise above the middle. Seed: Numerous, compressed, discoid or subreniform, endospermic with curved or straight embryo.

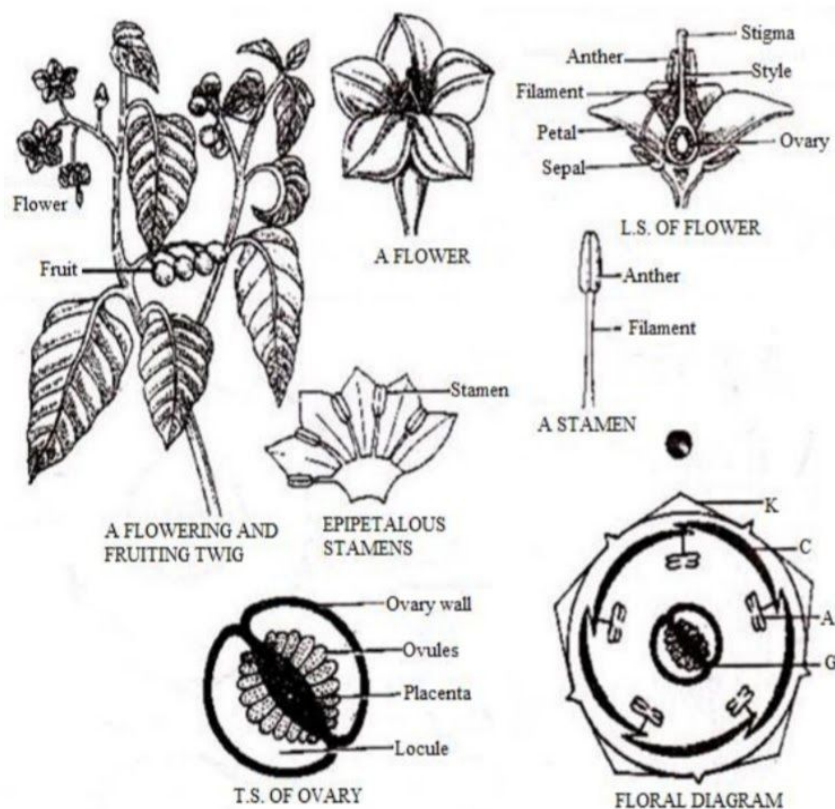


Fig.7.3 Floral details of *Solanum nigrum*

Pollination: Usually conspicuous flowers of the solanaceae are visited by insects for nectar secreted by a hypogynous disc. In *Solanum tuberosum* usually self pollination occurs.

Floral formula

<i>Solanum</i>	Ebr	⊕	♀	$\overline{K_{(5)} C_{(5)} A_5 \underline{G}_{(2)}}$
<i>Salpiglossis</i>	Ebr	%	♀	$\overline{K_{(5)} C_{(5)} A_4 \underline{G}_{(2)}}$

Important genera: *Solanum tuberosum* (Potato), *Nicotiana tabacum* (Tobacco), *Lycopersicon esculentum* (Tomato), *Capsicum frutescens* (Red pepper) *Solanum melangena* (egg plant or

brinjal), *Solanum nigrum* (Makoi), *Cestrum nocturnum* (Rat-ki-rani), *Hyoscyamus niger* (henbane), *Cestrum nocturnum*, *Withania somnifera* (Ashwagandha).

Economic importance

The solanaceae are of great economic importance. They yield food, drugs, tobacco and many ornamentals.

1- As food stuff: Genus *Solanum*, which contains the potato *S. tuberosum*, in fact, another common name of the family is the "potato family", the tomato (*S. lycopersicum* syn. *Lycopersicon esculentum*), and the eggplant or aubergine (*S. melongena*). Another important genus, *Capsicum*, produces both chili peppers and bell peppers. The dried fruits of *Capsicum annum* (Chillies or red pepper, Mirch) are the principal source of chilli powder of commerce used as spice in India. *C. frutescens* is used in making hot sauces and as a vegetable. Fruits of *Physalis* produce the so-called ground cherries, *Physalis* (4-jet-Ground-Cherry), it produces an edible fruit. This fruit is enclosed in a bladder like calyx called husk. So it is called husk tomato.

2- Tobacco: *Nicotiana tabacum* (tobacco) has great commercial value. Its leaves are dried and made into tobacco. This tobacco is used for making cigarettes.

3- As Medicinal plants: Many members of this family produce powerful alkaloids e.g. *Atropa belladonna* (Belladonna) which are the source of atropine. It is used for making belladonna plasters. Atropine is a medicinal extract. These are used in many medicines such as overcoming spasm of involuntary muscles, dilating pupils and relieving pain. It is a valuable antidote in case of poisoning by opium. The dried leaves and flowering tops of *Datura stramonium* (Datura) are source of drug stramonium used chiefly in spasm of the bronchioles in asthma and in treatment of parkinsonism. It contains alkaloids daturines and atropine. One of the chief ingredients of the Ayurvedic preparation, Kanaka Asava used as sedative and intoxicant. The dried leaves and flowering tops of *Hyoscyamus niger* (henbane) used as sedative in nervous affections and irritable condition of asthma and whooping cough. The fruits of *Withania somnifera* (Ashwagandha) constitute the Ayurvedic drug Ashwagandha prescribed for hiccup, female disorders, cough and rheumatism. Another species *Withania coagulans* (Indian rennet) is used in asthma, chronic complaints of liver, colic and as blood purifier.

4- Ornamental Plants: Many plants are cultivated in the gardens for their beautiful flowers. Such as *Petunia*, *Nicotiana glauca*, *Cestrum nocturnum* (Rat-ki-rani, night queen or night jasmine), *Cestrum diurnum* (Din- ka-raja or day jasmine), *Salpiglossis* and *Solanum*.