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**SOLANACEAE: HISTORICAL ASPECTS**

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**Abstract:** Solanaceae is a family of flowering plants that contains a number of important agricultural plant as well as many toxic plants. The family is also informally known as the nightshade or potato family. The solanaceae is a large varied family of trees, shrubs and herbs including 90 genera & more than 2000 species. About seventy species included in approximately twenty one genera are found in India. Solanaceae is a cosmopolitan family. Though the species are distributed throughout the world, they are more prevalent in Tropics & subtropics. Solanaceae family contains a diverse range of alkaloids and includes Scopolamine, Atropine & hyoscyamine. These are the key alkaloids of this family. Presence of these alkaloids makes this family medicinally important.

**Keywords:** Solanaceae, Herbs, Alkaloid

## INTRODUCTION

Solanaceae is a family of flowering plants that contains a number of important agricultural plant as well as many toxic plants. The name of family comes from the Latin solanum “the nightshade plant”, which means “quieting” refers to sedative effects associated with many of the species due to the presence of alkaloids, but the further etymology of that word is unclear<sup>1</sup>. Alternatively, it has been suggested the name originates from the Latin verb solari, meaning “to soothe”. This presumably refers to alleged soothing pharmacological properties of some of the psychoactive species of the family.

The family is also informally known as the nightshade or potato family. The family includes Datura, Mandragora, Belladonna, Capsicum, Solanum, etc<sup>2</sup>.

The Solanaceae family is characteristically ethnobotanical, that is, extensively used by humans. It is important source of food, spice and medicine. However, solanaceae species are rich in alkaloids whose toxicity to humans and animals ranges from mildly irritating to fatal in small quantities.

## History & Morphological characteristics of Solanaceae<sup>2,3</sup>

Solanaceae because of the high diversity and beneficial properties to human beings extensively remain the subject of taxonomical studies in history.

From the early years of the twenty centuries taxonomist from different regions paid attention to this family. Kirk (1927) studied the Solanaceae of Britain. In this area Solanaceae was represented by twelve different genera. According to Kirk Solanum and Datura genus has narcotics properties. Solanum nigrum L. and Atropa belladonna acutt non Linn. are poisonous species of this area. Datura stramonium L. is an invasive species of the region. Hyoscyamus niger L. is rare species whereas in the past it was cultivated in this region for its medicinal properties.

The morphological characters he mainly emphasized were habit of the plant leave characters, corolla and fruit. Based on corolla tubes length family is divided into two major groups. One with the short and other with long and bell shaped corolla tube. He placed Solanum into first group whereas

Hyoscyamus, Datura and Atropa are the part of the second group.

Flora of the British Isles was studied by Clapham in 1962. The morphological markers mainly used for taxonomic purposes were related to stamens, habit of plant and position of flower whether it is erect or drooping. Based on morphological markers related to androecium's characters, family is divided into two major groups. One group consists of Solanum genus and this group is characterized by prominent stamens, anthers longer than filaments and opening of anthers by an apical pore. Second group possessed included stamens with anthers shorter than filament and anthers opened by a longitudinal slit.

Ary and Gregory 1972 described Solanum nigrum L, Datura stramonium L. and Hyoscyamus niger L. in "The Oxford Book of wild flowers". They mentioned all of these three species as highly poisoned. However Solanum nigrum L is not poisonous. In certain regions of Pakistan it is used as a vegetable and fruit is also edible. They also mentioned that hyoscyamine characteristic chemical compound of these species has now replaced by the morphine and codeine obtains from opium.

Hawkes and Edmond, 1972 in Flora of Europe mentioned Atropa (2 species), Hyoscyamus (4 species), Withania (2 species) and Solanum (15 species). Atropa belladonna auctt. non L. and A. baetica Willk. are included in the European Atropa genus but absent from Pakistan. Hyoscyamus pusillus L. and H. niger L are the common species of the both regions. He misapplied the name of Withania frutescens (L.) Pauquy for W. coagulans (stocks) Dunal. Six medicinally important species of the Solanum namely S. nigrum L, S. americanum Mill. , S. pseudo-capsicum, S. tuberosum and S. melongena were found in Europe. These species used for the treatment of ailments in that area. The S. americanum Mill, was treated as the separate species rather than the part of S. nigrum L, the characters of differentiation were more or less umbellate cyme, corolla diameter (0.5-0.9cm), erect fruiting pedicles and shiny black berry. Hawkes presented the entirely different taxonomic status of S. villosum Mill. He considered it as the subspp of S. iuteum Miller and also misapplied the name of S. luteum subspp Iuteum Miller for it.

Heywood in 1979 studied the family Solanaceae and divided it into five tribes. The tribes were Nicandreae, Solanaeae, Datureae, Gestreae and Salplglossideae.

These tribes were sub divided into two groups on the basis of embryo position. Nicandreae, Solaneae and Datureae were included into first group with curved embryo. Whereas second group comprised of Gestreae and Salplglossideae. This group had straight or only slightly curved embryo.

Guinea is an important habitat for plants of Solanaceae. Symon studied the flora of this area particularly with reference to Solanaceae in 1985. The classification. Solarium is one of the largest genus of Solanaceae in this area. The genus Solanum was divided into two subgenus Lycianthes and Solanum. The morphological markers, given importance for the identification of species were life form, tomentum, prickles, type of inflorescence, shape and color of flowers, shape and kind of fruits. The Datura and Capsicum are naturalized and are represented by 1-2 species only.

Pojarkova (1997) described Solanaceae from USSR. He mainly emphasized on lower order taxonomy of this family. Family has divided into five tribes (Solaneae, Atropeae, Nicotianeae, Daturinae and Nicandreae). Solarium, Capsicum, Atropa, Hyoscyamus and Datura are the part of this flora. Tribe Solaneae is further divided into four sub tribes. Solaninae, Sarachinae,

Margaranthinae, and physalidinae, Solanum is the single genus of sub tribe Solaninae with 33 species. This large genus is divided into two subgenus Eusolanum with 19 species and Leptostemonum with 14 species.

Jennifer and James, 1997 study Black nightshades *S. nigrum* L. and its related species in detail. In this monograph they give description about taxonomy, phytoeny, medicinal and nutritional value of Black nightshades. Taxonomically *S. nigrum* L. is considered species complex. Morphological markers which they utilized for the identification of species were stem and leaves colour, pubescence, margins, flower colour, fruit colour and shape, number of berries per plant and number of seeds per berry.

According to Jennifer and James although *S. nigrum* L is potential minor crop but as it is weed in the areas in which vegetables and cereal are main crops, the problem caused by these species as weed, ranges from economical losses that is why its growth is not promoted.

The solanaceae is a large varied family of trees, shrubs and herbs including 90 genera & more than 2000 species. About seventy species included in approximately twenty one genera are found in India. Solanaceae is

a cosmopolitan family. Though the species are distributed throughout the world, they are more prevalent in Tropics & subtropics<sup>4</sup>.

Solanaceae are known for possessing a diverse range of alkaloids. One of the most important groups of this compound is called the tropane alkaloid.

Chemically, the molecules of these compounds have a characteristic bicyclic structure and include Scopolamine, Atropine & hyoscyamine. These are the key alkaloids of this family. Presence of these alkaloids make this family medicinally important.

Pharmacologically, these are the most powerful known anticholinergics in existence, meaning they inhibit the neurological signals transmitted by the endogenous neurotransmitter, acetylcholine. Symptoms of overdose may include mouth dryness, dilated pupils, ataxia, urinary retention, hallucinations, convulsions, coma and death<sup>5</sup>.

Despite the extreme toxicity of the tropanes, they are important drugs when administered in appropriate dosages. They can reverse the cholinergic poisoning, which can be caused by overexposure to pesticides and chemical warfare agents such as sarin. More commonly, they can halt many types of

allergic reactions. Scopolamine, a commonly used ophthalmological agent, dilates the pupils and thus facilitates examination of the interior of the eye. They can also be used as antiemetics in people prone to motion sickness or receiving chemotherapy<sup>6, 7</sup>.

Atropine has a stimulant effect on the central nervous system and heart, whereas scopolamine has a sedative effect. A famous alkaloid from the Solanaceae family is nicotine. Like the tropanes, its pharmacology acts on cholinergic neurons, but with the opposite effect (it is an agonist as opposed to an antagonist). It has a higher specificity for nicotinic acetylcholine receptors than other Ach proteins. Its effects are well known.

Medicinally important species of the family Solanaceae belong to following genera namely:

- Solanum
- Atropa
- Capsicum
- Datura
- Withania
- Hyoscyamus
- Nicotiana
- Miscellaneous

These species are extensively used for medicinal purpose throughout the country.

### **CONCLUSION**

As discussed above, it seems that Solanaceae family contains a diverse range of alkaloids and includes Scopolamine, Atropine & hyoscyamine. These are the key alkaloids of this family. Presence of these alkaloids makes this family medicinally important.

Pharmacologically, these are the most powerful known anticholinergics acting on parasympathetic nervous system. But, though they are therapeutically parasympathomimetics; overdose may include various adverse effects like mouth dryness, dilated pupils, ataxia, urinary retention, hallucinations, convulsions, coma and death. So, dose should be strictly decided and monitored. As, despite the extreme toxicity of the tropanes, they are important drugs when administered in appropriate dosages.

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