Acanthaceae A.D. De Jussien (Acanthus family)

Distribution:

Acanthaceae is a large cosmopolitan family distributed mostly in the tropical and subtropical areas of the world. They are found in the equinoctial regions of both the Old and New World, with a few species extending north into the south of Europe, Pennsylvania and Japan and Southwards to the Cape of Good Hope and the southern coast of New Holland.

The plants of Acanthaceae are Paleotropical, Neotropical cape and Australian. They are centered on Indomalaysia, Asia, Africa, Brazil and Central America. In New Zealand region members of Acanthaceae are entirely absent. (Royle, 1970) (Figure-3.1).

Genera of the Acanthaceae are distributed throughout India, from Himalaya to Kanyakumari, Andman, Nikobar and western to north eastern India (Figure-3.2). They are common in plains and also at considerable elevations in the mountains of central, east, west, south and north India. They are found in moist and shady habitats in the forest, waste lands among the grassy localities. Many of the genera of this family are peculiar to India, especially its southern parts, or common to these, the Malayan Peninsula and Indian Archipelago. From the forests of Silhet a few extend to Nepal and hence, as far north as the banks of the Sutlej.
Some penetrate from the longitudinal into the transverse valleys of the Himalaya, even in most northern parts. A few only of this family ascend the mountains, some of which may be seen at as great an elevations as between 7000 and 8000 feet, in 30° N. latitude.

In Rajasthan this family is represented by 30 genera and 81 species (Shetty and Singh, 1993). Members of the Acanthaceae are distributed throughout Rajasthan, in arid, semi-arid, rocky region as well as buried and marshy places (Figure-3.3).

All the genera of the family are shrub, undershrub and annual or perennial herbs, including only one perennial climbing herb Thunbergia laevis Nees. (Sharma, 2004).

**Taxonomy:**

Acanthaceae comprise about 250 genera and 2500 species. They are denizens, mainly of the warmer parts of the world. It is characterized by a variety of biological types and habit; shrubs, herbs or rarely trees. Herbs are annual to perennial; self supporting or epiphytic, or climbing; when climbing, stem twiners, the twiners twinning clockwise. Trees hydrophytic or halophytic or mesophytic or xerophytic.

The leaves are usually in opposite decussate parts, extipulate, simple, entire or sometime pinnately lobed. The occurrence of cystoliths which appear as protuberances or streaks when the leaf is
held against light is characteristic feature of most of the taxa though they may be lacking.

The inflorescence is built upon a basically cymose plan. In the floral region, the bracts are arranged in opposite-decussate pairs. The internodes are comparatively much shorter. The bracts are usually green but may become petaloid. In the axil of each bract, there is either a single flower or a cyme of three.

Flowers are bracteate, pedicellate or subsessile, the presence of two or more bracteoles is a very characteristic feature of this family. The flowers are complete, characteristically medianly zygomorphic either due to suppression of one or three posterior stamens or due to the bilabiate corolla or both.

Androecium consists of four didynamous stamens or only two stamens. In such cases, it is the posterior one or three stamens which are either completely suppressed or reduced to staminodes.

Gynoecium consists of two, medianly placed united carpels. The ovary is superior and has a single terminal style ending in a bilipped stigma in which the posterior lip is often reduced.

Fruit is a loculicidal capsule which splits almost up to the base. In the subfamily Acanthoideae, the funicle forms a hook like projection, known as the jaculator or retinaculum which presses the seed like a leaf-spring. As the fruit dehisces, the seed break from the
funiculus and is thrown to a considerable distance by the hook-like jaculator.

Pollination is by insects cross pollination is favoured by protandry.

**Systematic position**

Angiospermae  
Dicotyledonae  
Gamopetalae  
Bicarpellatae  
Personales  
Acanthaceae

**Affinities:**

There is a general consensus of opinion that the Acanthaceae are derived from the Scrophulariaceae or stocks ancestral to them, Hutchinson considered it as the most advanced family of his Personales. Bessey (1915) had adopted a similar view by placing it at the top of his Scrophulariales. The family differs from the Scrophulariaceae in having cystoliths in the leaves and the often presence of retinacula on the seeds. The genus *Nelsonia* with numerous ovules in each loculus is a link form between the two families.
**Distinguishing Features:**

Herb, shrubs, rarely trees, with opposite-decussate leaves; cystoliths often present in leaves and stem; cymose or recemose inflorescence; flower bisexual, usually medianly zygomorphic, sometimes nearly actinomorphic, bracteate and bracteolate, pentameric, cyclic, hypogynous; sepals 5, usually free, sometimes slightly united, imbricate, reduced in certain taxa; petals 5, united, contorted or imbricate, bilabiate or infundibuliform or Salver-form; stamens 4, 2 or rarely 5; anthers dithecous, introse, longitudinal often with the two anther halves situated at different levels upon the filament and quite often spurred; gynoecium bicarpellary, carpels median, syncarpous; ovary superior bilocular or unilocular; placentation axile or parietal, ovules two or many in two rows in each loculus; style single terminal with a bilipped stigma in which the posterior lip is often reduced; prominent hypogynous nectar disc present; fruit a loculicidal capsule, rarely a drupe; seeds often with jaculator; endosperm usually lacking, rarely present.

**Cytology:**

Basic chromosome number is $2n = 34$ (Daniel, 2000; Daniel and Balkwill, 2000 and Sharma *et al.*, 2010).
Economic importance:

The family includes large number of ornamentals and has high therapeutic applications mainly due to alkaloids present in the leaves.

Taxonomic Considerations (Phylogeny):

Acanthaceae is divided into two subfamilies depending upon the presence or absence of jaculators, i.e. the curved retinacula which support the seeds.

Subfamily Thunbergioideae-seeds without jaculators.

Subfamily Acanthioideae - seeds with jaculators.

Most taxonomists presume Acanthaceae to have been derived from Scrophulariaceae or stocks ancestral to them (Lawrence, 1951). Hutchinson (1969 and 1973) considers it to be the most advanced taxon of the Personales. Bessey (1915) agreed with this view and treated it as the most advanced amongst the members of Scrophulariales. Cronquist (1968 and 1981) also includes this family in the same order as Bessey.

Justicia adhatoda:

*Justicia adhatoda* Nees. (Synonym: *Adhatoda vasica* Nees. and *Adhatoda zeylanica* Nees.) (Figure-3.4A, 3.4B).
Occurrence and Distribution

It commonly grows in waste lands and distributed throughout India upto an altitude of 1300m. Besides India, it is found in Myanmar, Sri Lanka, Burma and Malaysia.

Classical names

Vasa, Vasaka, Simhasya, Shimhaparna, Tamra, Vaiska, Vajidanta, Atarusha, Atarushka, Shimhika, Vrisha

Vernacular names

English : Vasaka
Hindi : Arusa, Bakas, Adusa, Rusa
Bengali : Basak, Bakas
Gujarati : Aradusi, Adulso
Kannada : Adusoge, Kurchigida, Pavate, Bansa
Malayalam : Adalodakam
Marathi : Adulsa
Punjabi : Bhekkar
Tamil : Adhatodai, Pavettai
Telugu : Addasaramu
Kashmiri : Bahekar, Baikar, Bansuth, Babading
Konkani : Adusogae
Oriya : Arusa, Basung
Botanical description

Perennial, evergreen, profusely branched shrub, 1.2-2.5m high with unpleasant smell. Leaves are cauline, opposite, decussate, petiolate, lanceolate or ovate-lanceolate, entire, leathery with acute apex. The leaves are retained throughout the season. Flowers are white with red or yellow barred throats, in spikes with large bracts. Capsule clavate, longitudinally channeled, 1.9-2.2 cm long. Seeds are globular, endospermic and provided with jaculator (Figure-3.5, 3.6, 3.7, 3.8).

Parts used:

Root, leaf, flower and fruits are used for therapeutic use.