MORPHOLOGY OF PLANTS
Species identification by the key

1a. Plants tomentose with erect glandular hairs; corolla white, 15-18 cm long, 5-lobed with 5 intermediate teeth; capsules reflexed .................. D. Inoxia

1b. Plants glabrous or pubescent; corolla white, dull-white or purplish, 5-lobed without intermediate teeth; capsules erect reflexed ......................... 2

2a. Branches tinged with purple; corolla more than 15 cm long, purplish outside; capsules deflexed, with short, blunt spines ......................... D. metel

2b. Branches green; corolla upto 8 cm long, dull or pure-white; capsules erect with long, pointed spines ..................................................... 3

3a. Corolla pure white, 6-8 cm long; capsules with numerous, narrow spines ................................................................. D. stramonium

3b. Corolla dull-white, 4-6 cm long; capsules with fewer, broad-based spines .................................................................................. D. ferox

1) Datura inoxia Mill.

Vernacular names:- Angel’s trumpet, thorne apple, downy throne apple, Indian-apple, moonflower or sacred Datura (Wikipedia, 2006).

Family:- Solanaceae

Description:

Erect, grey-tomentose, much-branched herb, 60-90 cm tall; stem woody below. Leaves ovate, 7-15 x 5-9 cm, unequal sided and sub-cordate at base, obscurely sinuate-dentate, acute, densely soft pubescent on both surfaces; petioles 5-10 cm long; tomentose. Flowers solitary; peduncles 1-1.5 cm long, stout, densely pubescent. Calyx 6-10 cm long, tubular, pubescent outside; teeth triangular-acute, 1-2 cm long. Corolla pure white, 10-12 cm across; lobes deltoid, acute with 5-6 mm long teeth alternating with them. Filaments adnate to corolla tube for a considerable length. Capsules globose 2.5- 3.5 cm in diameter, minutely grey-tomentose, clothed with long, slender, weak spines. Seeds subreniform, pale brown, smooth. Flowering and fruiting – September to march. (Plate- 01)
Distribution:-

The plant has been cultivated in some European countries. In India, it is grown in Bangalor, Ahmedabad, Pune, Lucknow, Pilani and Jammu (Bhattacharjee and Supriya Kumar, 1998). It is native to the America and introduced in Africa, Asia, Australia and Europe (Wikipedia, 2006).

2) *Datura ferox* L.

**Vernacular names:** Eng.- *fierce thorne apple, large thorne apple, large spine thorne apple* (George, 1982).

**Family:-** Solanaceae

**Description:**

Stout, appressed pubescent, branched annual herb, 0.5 - 1.5 m tall. Leaves broadly ovate 7.5 -12.5 x 7.0 -10.0 cm oblique at the base, coarsely lobed, acute or acuminate, minutely pubescent; petioles 2.5 -8 cm long, pubescent. Flowers solitary, from the fork of branches, peduncle 0.5 -1.5 cm long calyx 2.5 -3 cm long; tube narrowed towards apex, 5 –angled: teeth lanceolate, acute, 4 - 6 mm long, hairy outside. Corolla tube widened upwards; lobes very short, broadly triangular, acuminate. Stamens 5; filaments adnate to the base of corolla tube. Capsules ovoid - ellipsoid, erect, 3–3.5 x 2-3 cm, spiny; spines with broad base, sharp, half as long as the capsule. Seeds D-shaped, flat, brown, flowering and fruiting - September to December (Plate- 01).

**Distribution:**

The plant is native of China but now widely distributed in worm regions of the world (George, 1982).

3) *Datura metel* L.


**Family:-** Solanaceae

**Description:**
Erect, glabrous, much-branched, annual herbs, 0.5–1m tall: branched often tinged with purple. Leaves ovate, 4.5-20 x 3-15 cm, obliquely cuneate at base sinuate – dentate, acute or acuminate; petioles 4 – 10 cm long, purple – tinge. Flowers solitary; peduncles 1 - 2 cm long, minutely pubescent. Calyx 8 – 10 cm long, tubular, pubescent outside; lobes lanceolate, acuminate. Corolla 15 -28 cm long, purplish outside white within; lobes triangular – acute. Filaments adnate to the corolla for half their length. Capsules globose, Ca. 4 x 3.5 cm, spinous with short tubercles. Seeds subreniform, pale brown. Flowers and fruiting: - November to February (Plate- 02).

**Distribution:**
The plant is distributed through India (Varier’s, 1997; Pandey, 2003). It is native to Asia and Africa. Widely cultivated and naturalized in tropic. It occurs throughout India in waste place (Bhattacharjee and Supriya Kumar, 1998). Frequent on waste and along roadsides (Naik et al 1998)

4) *Datura stramonium* L.

**Vernacular names:-** *Datura, Jimson weed, stink weed, mod apple, thron apple stramonium, apple thorn, Datura tatula, Datura seeds,* Eng. – *thorn apple, stramonium,* Hindi- *Datura,* dhatura (Bengali, Gujrati, and Marathi), dhattura, ummatta, kanaka, shivpriya (Sanskrit), and ummatta (Tamil, Telugu, Kanarese and Malyalam).

**Family:-** *Solanaceae*

**Description:**

Erect, sparsely pubescent, annual herbs 40-90 cm tall; branches green. Leaves ovate, 8-15 x 5-10 cm, obliquely cuneate at base, deeply sinuate - dentate, acute or acuminate; petioles 3-10 cm long, hairy. Apprised pubescent. Flowers solitary; peduncles 0.5-1 cm long, hairy. Calyx 3.5-5 cm long, tubular, 5- ribbed; teeth lanceolate, 5- 6 mm long hairy within. Corolla 6-8 cm long; lobes rounded, acuminate. Filaments adnate to the corolla tube for more then half their length. Capsule globose, 4-5 cm in diameter, minutely tomentose,
covered with numerous, sharp spines, seeds subreniform, brown smooth, flowering and fruiting: - July to October (Plate- 02).

Distribution:

It is believed that *Datur stramonium* is native of Asia and it was imported to Europe and then to temperate parts of North and South America (HerbalGram, 2006). The genus is widely distributed in the warm and tropical regions of the world (Kofi Busia and Fiona Heckels). Found all over the country, it is native of Asia (Pandey, 2003).

It is native to Caspian region of Europe, North America and Indian subcontinent. It is cultivated in Europe and South America. In India, it has been successfully grown in Kashmir Valley, hills of Himachal Predesh, Utter Pradesh and also grown during winter season in northern plains. It occurs in temperate Himalaytas upto 2500m and in hilly regions of central southern India (Bhattacharjee & Kumar, 1998). Frequent on waste land and along with stream banks (Naik *et al* 1998). In most parts of India it grows as a wasteland weed, but is cultivated for its alkaloids in some parts of India and in Europe (Chandra and Pandey 1989).

MEDICINAL PROPERTIES AND USES OF PLANTS

1) *Datura inoxia* Mill.:

The plant is useful in agitation or maniacal conditions (CSIR 1992). It was used as a painkiller in certain initiation rituals and given as a narcotic to the ritual sacrifices for this purpose, the preferred method of administration was either by enema or as a rolled up leaf suppository which reduce some of the less pleasant side effects of the drugs (B&T world seeds [database online], 2001).

The plant having folk uses such as Seeds with oils are used for painful joints. Poultice of leaf is used in piles and skin diseases. Leaves of *D. inoxia* are smoked for asthma. Seed extract of *D. inoxia* and dry grapes (Raisin) are used for flu, asthma and cough (Syed Rehmat *et al*, 2006).
Leaves of *D. inoxia* are applied externally in swelling of limbs. Extract of leaves of *D. inoxia* is helpful in toothache and epilepsy. Leaves extract effect the nervous system, overdose may induce vomiting, coma and even death. Seeds are antipyretic and narcotic. Dried leaves and seeds are used in treatment of asthma. Plant is commercial source of scopolamine used as pre-anesthetic in surgery, in ophthalmology and prevention of motion sickness (Purohit and Vyas 2004).

Root leaves and seeds are used in Ayurvedic medicine. Seeds contain hyoscine, hyoscyamine and tracks of atropine. All parts of plant are poisonous (Naik et al 1998)

2) *Datura ferox* L.:

The medicinal use of *Datura ferox* is similar to all the species of *Datura*. seeds are considered to be more poisonous then those of other species (Naik et al 1998)

3) *Datura metel* L.:

According to Varier’s 1997, the plant is acrid, narcotic, anodyne, antispasmodic, intoxicant and emetic, and is useful in asthma, cough fever, ulcers and skin diseases. The roots are used to treat bites from rabid dogs and also used to cure insanity. The leaves are used for ophthalmodynia, otalgia, lumbago, sciatica, neuralgia, mumps and painful swellings. The juice of the leaves is used for epilepsy, cephalalgia and dandruff. The seeds are aphrodisiac, narcotic and antispasmodic and are useful in odontalgia, otalgia, gastropathy and skin diseases and are good to treat dandruff and lice.

All parts of the plant are strongly intoxicant, narcotic, aphrodisiac, toxic, antispasmodic and anodyinous. The dried leaves and twigs of the plant are smoked as an antispasmodic in asthma, whooping, cough, bronchitis etc. the juice of the fruit is useful dressing for the scalp to check dandruff and falling of hair. The seeds are astringent, antispasmodic, narcotic anodyinous, intoxicating, aphrodisiac, bitter carminative and stomachic. The paste of seeds is used for decaying teeth, piles, fistula, tumors and parasitic skin diseases (Pandey, 2003)
The whole plant is antiseptic, narcotic, sedative and is useful for asthma. The poultice of its leaves checks inflammation of breasts caused by excessive formation of milk (Bhattacharjee and Kumar, 1998). Leaves narcotic and antispasmodic (CSIR, 1992). The plant is considered to be more poisonous and useful than *D. inoxia* Mill. (Naik et al., 1998)

4) *Datura stramonium* L. :

It is narcotic, antispasmodic, anodyne, ache reliever, helps in relieving the spasm of the bronchitis in asthma. It is used in the treatment of parkinsonism and haemorrhoids. Young fruits are sedative and intoxicating. Leaves applied after roasting are useful in relieving pain.

The leaves and seeds of *D. stramonium* are narcotic and sometimes used for criminal poisoning. It is also utilized in medicine for the treatment of asthma. The genus *Datura* has been extensively used in all the continents except Australia for its narcotic and hypnotic properties. The *D. stramonium* was known as narcotic as early as 37 A.D. Even today this is one of the favorite source of ‘knockout drops’ in the tropical regions (Pandey, 2003).

*D. stramonium* is antispasmodic in asthma and parkinson’s disease. The dried leaves are smoked in a pipe or home made cigarette to treat asthma. It is also used in the treatment of delirium tremor and monia. It is also used for pre anesthetic medicine in surgery, in child birth, in ophthalmology prevention of motion sickness. The leaves are also applied to boils and ulcers. A decoction of flowers and roots has been used as a sedative to calm patients during setting of fractures. The plants is dangerous hallucinogen (Bhattacharjeen and Kumar, 1998).

*D. stramonium* is narcotic, antispasmodic, mydriatic and anodyne. Leaves used in cigarettes for asthma. Seeds quite often employed for homicidal purpose (CSIR, 1992). The chopped leaves are applied to dermatitis, the decoction used an antiseptic in vaginitis (FEO, 1986).

It is anodyne, anthelmintic, antiasthmatic, antidandruff, anti-inflammatory, antispasmodic, hallucinogenic, hypnotic, mydriatic and narcotic. The thorn apple is a bitter narcotic plant that relieves pain and encourages
healing (Bown, 1995). It has a long history of used as a herbal medicine. Though it is very poisonous and should be used with extreme caution. The leaves flowering tops and seeds are anodyne, antiasthmatic, antispasmodic, hallucinogenic, hypnotic, mydriatic and narcotic (Chittendon, 1956; Grieve, 1984; Chiej, 1984; Launert, 1981; Triska, 1975; Lust, 1983; Uphof, 1959; Mills & Bown, 1995; Chopra, et al 1986). The seeds are the most active medicinally (Grieve, 1984). The plant is used internally in the treatment of asthma and parkinson’s disease, excess cause giddiness, dry mouth hallucinations and coma (Bown, 1995). Externally it is used as a poultice or wash in the treatment of fistulas, abscesses wounds and severe neuralgia (Bown, 1995; Moerman, 1998). The use of this plant is subject to legal restrictions in some countries (Bown, 1995). It should be used with extreme caution and only under the supervision of a qualified practitioner since all parts of the plant are very poisonous and the difference between a medicinal dose and toxic dose is very small (Lust, 1983; Weiner, 1980; Bown, 1995). The leaves should be harvested when the plant is in fully flower; they are then dried for later use (Grieve, 1984). The leaves can be used as a very painful mind-altering drug; they contain hyoscyamine and atropine (Weiner, 1980). There are also traces of scopolamine a potent cholinergic-blocking hallucinogen, which has been used to calm schizoid patients (Weiner, 1980). Atropine dilates the pupils and is used in eye surgery (Foster & Duke 1990). The leaves have been smoked as an antispasmodic in the treatment for asthma, though this practice is extremely dangerous (Weiner, 1980; Foster & Duke, 1990). The seeds are used in Tibetan medicine, they are said to have a bitter a acrid taste with a cooling and very poisonous potency (Tsarong, 1994). It is analgestic, anthelmintic and anti inflammatory, they are used in the treatment of stomach and intestinal pain due to worm infestation, toothache and fever from inflammations (Tsarong, 1994). The juice of the fruit applied to the scalp to treat dandruff (Medicinal plants of Nepal; Plants for a future: database Search Results).

The action of D. stramonium is closely similar to that of balladona. If anything, it has a more profound effect upon the sympathetic system and upon
the vagus. If the dose be large enough it will disturb the rhythm of heart action and induce delirium, exerting these effects more readily and more powerfully than does belladonna. *Datura stramonum* is probably the most violent deliriant of the solanaceae. Its alkaloid daturine is closely akin to, if not identical with hyoscyamine, American manufacturers are now utilizing *D. stramonium* for the preparation of atropine from Daturaine and during the year 1917 of the great world war this source practically prevented an atropine famine in the American drug markets.

Fermented or bruised fresh leaves of *D. stramonium* may be applied to inflamed and painful parts to reduce swelling and relieve pain. In this manner it is often useful in mammitis orchitis, swollen joints, and painful external hemorrhoids. An ointment of *D. stramonium*, carefully prepared without burning, it is an excellent application for painful and engorged piles or as the ointment basis for other agents to be used for the same purpose. It is also soothing in cutaneous hypertrophy around the anus with intolerable itching and sometimes semiparalent secretion. It is rendered more effective by incorporating with it 5-10% of salicylic acid, *D. stramonium* leaves alone or with tobacco, lobelia, grindelia and nitrate of potassium are universally employed as an asthma power. It is used by igniting the power and inhaling vapors, or by smoking it in a pipe or in the form of cigarettes. It is among the most prompt of measures for the temporary relief of the paroxysms of purely spasmodic asthma.

The specific indication of *D. stramonium* is impaired innervation. The face is red and bloated and of a deeper congestive appearance than that for belladonna; there is continual talking and the patient is in easy, can not rest well in any positions, and is possessed of an ungrounded fear. There may or may not be furious, enraged or destructive delirium. Localized and superficial pain or spasm with pain, is experienced. It is also indicated by convulsive cough, the purely spasmodic asthmatic attacks. When the dyspnea is dependent upon respiratory or cardiac lessions it is less useful. In all *D. stramonium* cases there is cerebral irritation causing most often violent excitability or less frequently depressive irritability. The dose, therefore should be governed accordingly;
medium doses for the former, minute doses for the latter. In no instance are the full physiologic doses necessary except in the cure of the opium habit, when the drug may be pushed to the full limit of endurance. It remains to be seen whether permanent damage may be done to the intellectual faculties from such dosage; as in the case with atropine.

In medicinal doses *D. stramonium* is an anodyne antispasmodic, without causing constipation or lessening of the extract of virne and will prove serviceable in many instance where opium can not be given.

*D. stramonium* is useful for the relief of pain, when pain is due to irritability, as in enteralgia, gastritis and enteritis neuralgic dysmenorrheal, spasmodic intestinal pain, tic douloureux, sciatica, and the pains of chronic rheumatism, *D. stramonium* serves well, however, in headache, with dizziness and hyperacidity of stomach and in gastric headache when associated with nervous erethism and unsteadness (Harvey 1922).

*D. stramonium* is considered a valuable medicine. *Datura* was known to the ancient Hindu physicians who regarded it as intoxicant, emetic, digestive, and heating. The whole plant is considered as narcotic, anodyne, and antispasmodic. It has properties analogous to those of belladonna. Seed is considered to have a strong aphrodisiac effects. According to Ayurveda, seeds are acrid, bitter, tonic, febrifuge, anthelmintic, alexiteric, emetic, and useful in leucoderma, skin disorders, ulcers, bronchitis, jaundice and piles (Agharkar 1991). Dried leaves, flowering tops and seeds are used in indigenous medicine in the treatment of asthma. Leaves and seeds possess narcotic properties and sometimes used for criminal poisoning. *Datura* leaves are an integrated part of herbal cigarettes available in Indian markets Chief alkaloids of *D. stramonium* are hyoscyamine, scopolamine, and atropine. Alkaloid atropine is used as stimulant for central nervous system and in form of sulphate, to dilate the pupil. In homoeopathic system of medicine, a widely used drug named stramonium is prepared from mature seed of *D. stramonium*, and is considered to act on the human brain (Ghosh 1988).