

## *Plumbago zeylanica* L.

Synonym: *Findlaya alba* Bow.; *Molubda scandens* (L.) Raf.; *P. scandens* L.; *P. viscosa* Blanco; *Thela alba* Lour.

Family: Plumbaginaceae

Ayurvedic Name: Chitrak

Hindi Name: Chitra, Chira

Trade Name: Chitrak, Chitrak mool

Habit: Perennial undershrub

Part Used: Roots and milky juice

Active Ingredient: Plubagic acid, Plumbagin



**Biological activity:** Anticancer, Antimicrobial, Anti-inflammatory, Antioxidant, Anti-asthmatic

**Traditional and Therapeutic use:** Chitrak is a reputed thermogenic, astringent, anthelmintic, abortifacient, carminative, appetizer, and expectorant. Roots stimulate the central nervous system. Oil prepared from roots is useful in rheumatism, joint pain, and paralysis. Milky juice of leaves is used for external application in scabies.

**Morphological and floral characteristics:** Perennial undershrub, 1.5–2.0 m tall, with rambling branches. Its active growth occurs during rainy season and ceases in post-flowering stage. Leaf is simple, opposite, 4–10 cm long, 3–5 cm broad, oval, pointed, smooth, and shiny. Roots are light coloured inside, when fresh and reddish brown, when dry. Outer surface of the root is brown and striated. Flowers are bisexual and white in colour. Calyx is persistent and tubular, with conspicuous viscid glands. Fruits are green coloured, with sticky hairs when young and become dark brown when mature. Flowering occurs from September to November, while fruiting occurs from January to February.

**Distribution:** It grows wild in South India, West Bengal, and some parts of Madhya Pradesh and Chhattisgarh. In Gujarat it is distributed in Jamnagar, Junagadha, Barda hills and Girnar region.

**Climate and Soil:** Although it can be grown in a variety of soils, ranging from red laterite soil, with very little topsoil, to deep black soil. However, it prefers well drained/deep sandy loam to clayey loam soil with high organic content. In natural habitats, the plant prefers moist soil with high organic content and partially shaded locations. Open and sunny conditions are not favourable for its growth.

### Nursery technique

**Raising Planting material:** Stem cuttings of 10–15 cm length, having at least three nodes, can be obtained from mother plants in March–April to raise the stock, three to four months before planting in the field in July. These cuttings should be treated with 500 PPM of NAA (naphthalene acetic acid) to promote quick rooting. The maximum success rate of 80%–100% is obtained from the

basal cuttings and it reduces gradually towards stem apex. Plant propagation can be done throughout the year in a mist chamber. The prepared cuttings should be planted within 24 hours in raised nursery beds (15 cm) during rainy season and flat nursery beds during winter and summer. The beds of appropriate size should be made under partial tree shades. In mist chamber, the cuttings should be planted in trays filled with sand. Out of three nodes, one node must be buried in the soil/sand, as the roots would sprout from this node. The cuttings should be planted in rows with plant-to-plant distance of 5 cm and row-to-row distance of 15 cm in nursery (March–April). These beds should be irrigated regularly. The cuttings start taking root within one month of planting in nursery. Seeds show poor germination and should be scarified or cut at the micropylar end before sowing. They are sown in March in polybags filled with equal amounts of sand, soil, and FYM. The seeds show about 70% germination in 10–12 days.

### **Main field plantation**

**Land preparation:** The field should be prepared by operating mould board plough once, followed by disc ploughing twice and levelling to obtain a uniform fine tilth.

**Transplanting and optimum spacing:** The rooted cuttings are planted in main field during July at a spacing of 50 x 25 cm. About 80,000 rooted stem cuttings or seedlings are required for planting in 1 hectare of land.

**Fertilizers:** FYM 10 MT/ha; N:P:K @ 80:80:40 kg/ha; N supplied in 3 doses 1<sup>st</sup> basal dose of 20 kg at the time of transplanting, 2<sup>nd</sup> and 3<sup>rd</sup> dose of 30 kg each after 60 days and 120 days of transplanting.

**Weed control:** As and when needed (Mostly 4 weeding).

**Irrigation:** Irrigation is required every week during winter months and in every 4-5 days in summer months.

**Diseases and pest control:** The plants get infested with semi-looper larvae and Bihar hairy caterpillar, which defoliate the plant heavily during active growth period. These also eat buds and young shoots and can be controlled by spraying Malathion at the rate of 2 ml/liter of water twice at an interval of 15 days when they appear on the crop.

**Crop maturity and harvesting:** Plant attains maturity in 10–12 months after transplanting.

**Post-harvest management:** The roots should be dug out during a clear, sunny day, so that they can be shade-dried. The field may be irrigated before harvesting for easy digging. The field should be deep ploughed with mould board plough to expose the roots, which should be collected immediately. After digging, the roots must be washed in clean water, dried till they have 10%–13% moisture, and cut into pieces of length of 5–7.5 cm. Cleaned and dried roots must be packed in airtight polybags for storage.

**Yield:** Dry root yield varies from 1000 - 1200 kg per hectare.