



**FACULTY OF AGRICULTURAL SCIENCES AND ALLIED INDUSTRIES**

**Rauvolfia -Importance, chemical composition-origin, distribution, area, production, climate and soil requirements, propagation techniques, planting and after care, intercropping, nutritional requirements, plant protection, harvesting and processing**

### Importance and chemical composition

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- Sarpagandha (*Rauvolfia serpentina*) commonly referred to as serpent wood, belongs to the family Apocynaceae
- It is also known as Candrabhaga, Chota chand, Serpentina root & Chandrika and is one of the most important native medicinal plants of India.
- The roots of sarpagandha have a 400 years history of use in treatment of snake bite, insect stings, nervous disorders and psoriasis.
- About 30 alkaloids are known to exist in this plant.
- The most important are rescinamine, deserpidine, reserpine, serpentine, ajmaline, ajmalicine and rauvolfinine.
- The total alkaloid content varies from 1.7 to 3% of the dried roots.

- The drugs and the alkaloids obtained from the plant are used in allopathic system in the treatment of hypertension and as a sedative or tranquilizing agent.

### Origin and distribution

- Sarpagandha is indigenous to the moist, deciduous forests of south East Asia including Myamnar, Bangladesh, Sri Lanka, Malaysia and the Andaman Islands.
- In India, it is found in the central regions like Uttar Pradesh, Bihar, North Bengal, parts of Western Ghats and Assam.
- **Area & production:** There is no commercial cultivation of Rauvolfia in India, and the entire demand is met by import.

### Varieties

- Jawaharlal Nehru Krishi Vishwa Vidhyalaya, College of Agriculture, Indore released '**RS-1**' for commercial cultivation. The RS-1 culture gives 50-60% seed germination even after storing it for seven months and the yield of air dried root gives upto 25 q/ha, contain 1.641 to 2.94% of total alkaloid.

### Soil

The plant requires slightly acidic to neutral soils for good growth with medium to deep well drained fertile soils. The ideal pH for this crop is from 4.6-6.2. Clay-loam to silt-loam soils, rich in organic content are suitable for its commercial cultivation.

### Climate

Sarpagandha can be grown under a wide range of climatic conditions. A climate with a temperature range of 10-30°C seems to be well suited for this plant. It grows well in frost-free tropical to sub-tropical situations under irrigation.

### Propagation

Sarpagandha can be propagated by seeds and also by vegetative means like root cuttings, stem cuttings, leaf cuttings and root stumps.

## **Seed propagation**

Seed propagation is the best method for raising commercial plantation. Seed germination in Sarpagandha is highly variable. It is reported to vary from 5 to 30 percent even when only heavy seeds are chosen for sowing purpose. Light and heavy seeds can easily be separated by simple water floatation. Germination of heavy seeds during May-June after soaking them in water for 24 hours was 20-40 per cent and 62.77 per cent germination was recorded in freshly collected heavy seed lot. In all, 6 kg of seeds are sufficient to raise one-hectare plantation.

In Maharashtra and Madhya Pradesh, April end, in West Bengal first week of May or little later, and in Jammu & Dehradun during third week of May are found to be most suitable time for sowing seed in the nursery. The nursery is prepared by raised beds of 10 x 10 m dimension under partial shade made up of one-third of well matured FYM and leaf mould, and two-thirds amount medium of silt-loam soil. About 500 sq m seed bed area is sufficient for raising seedlings enough for planting one hectare land. The seeds sown, 2-3 cm apart in rows in shallow furrows during April end. The furrows are then covered with a fine mixture of soil and FYM. Keep the beds just moist by light irrigation. Germination starts after 15-20 days and continues up to 30 to 40 days.

## **Root cutting**

Nearly 5 cm long root cutting are planted during spring season closely in nursery beds containing well manured FYM, sand and saw-dust. The beds are kept moist through watering. The cuttings begin to sprout within 3 weeks. These can be planted in field during rainy season after 8 to 10 cm rains are received; the seedlings are transplanted at 45 cm row to row and 30 cm plant to plant distance. In this manner, an estimated 100 kg of root cuttings are found sufficient for planting one hectare area.

## **Stem cuttings**

Hard wooded stem cutting measuring 15 to 22 cm are closely planted during June in the nursery beds where continuous moisture is maintained. After sprouting and giving out roots, these plants are transplanted in the main field at given spacing.

## **Root stumps**

About 5 cm of roots, intact with a portion of stem above the collar, are directly transplanted in the field having irrigation facilities.

## **Transplanting**

Seedlings of 40-50 days, which have 4-6 leaves, are ready for transplanting. Well decomposed FYM@ 25 -30 t/ha is added during land preparation. The seedlings are

transplanted in the furrows. About 15 cm deep furrows are dug at a distance of 45cm. A spacing of 30 cm between the plants should be maintained.

## **Manures and fertilizers**

Application of 25-30 tonnes of well decomposed FYM at the time of land preparation and 10kg N, 60 kg P<sub>2</sub>O<sub>5</sub> and 30 kg K<sub>2</sub>O per hectare as a basal dose. Later two equal doses of N, each of 10kg/ha in moist soil is given at 50 days and 170 days after planting.

## **Irrigation**

Sarpagandha, if grown in areas which receive rainfall of 150 cm or above well distributed throughout the growing season such as in Assam and Kerala, can be raised and rain-fed crop under subtropical conditions. It needs regular irrigation where temperature rise high combined with low rain fall during rainy season. It is suggested that 15 to 16 irrigations, amounts to irrigation at 20 days interval in summer and at 30 days interval in winter.

## **Weeding**

The sarpagandha field should be kept relatively weed-free in the initial period of growth. This means giving two to three weedings and two hoeings in the first year where sole crop is taken or 5-6 weeding where intercrops in sarpagandha are practiced.

## **Intercropping**

It is possible to grow intercrops in Sarpagandha plantations particularly where good irrigation facilities are available. Soya beans and onions or Soya bean and garlic can be intercropped in Sarpagandha plantations.

## **Pests and diseases**

### **Pests**

**Nematode:** Root knot appears as galls of various sizes, covering the root system. Application of 25 kg of 3G carbofuran or 20kg of 10G phorate granules per hectare will control the nematode.

**Pyralid caterpillar:** It feeds on tender leaves, causing defoliation of the plant. It can be controlled by spraying 0.2% Rogar.

**Grub:** Attacks the seedlings about 2cm below the hypocotyl resulting in

their drying up. To control the attack of grubs, mix phorate granules with the soil at the time of nursery preparation.

## **Diseases**

Leaf spot: Dark brown coloured spots on the upper surface of the leaves and yellowish brown on the lower surface. Spray Mancozb @ 0.2%.

The other diseases are mosaic and die back.

The roots are harvested at 2-3 years after planting i.e., from 18 months onwards. The roots are dug out in winter (December) when the plants have shed their leaves, are richer in total alkaloid content than the roots harvested in August. Care should be taken to keep the root bark intact as the bark constitutes 40-56% of the whole root and has a higher alkaloid content. At harvest the root may be found to go up to 40 cm deep in the soil.

After digging, the roots are cleaned, washed and cut into 12 to 15 cm pieces for convenience in drying and storage. The dry roots possess up to 8-10 per cent of moisture. The dried roots are stored in polythene lined gunny bags in cool dry place to protect it from mould.

## **Yield**

A yield of 2200 kg per hectare of air dried roots has been obtained from 2-year old plantation and 3300kg per hectare from 3 year old plantation, under irrigated conditions on sandy, clay loam soil.