Chapter-23
Cultivation of Sarpagandha (*Rauwolfia serpentina*) Medicinal plant

M. M. Dudhbhate
Department of Botany,
ACS College, Gangakhed Dist., Parbhani. (M.S.)
Email-mdudhbhate@gmail.com

Abstract:

Rauwolfia serpentina (L.) Benth. Ex Kurz. is commonly known as Sarpagandha. It is an important medicinal plant found in Indian subcontinent and south East Asian countries. The plant parts Root, stem and leaves contains Reserpine chemical used as a drug from pre- Vedic period in India. It is use for the treatment snake bite, Mental illness and hypertension reduces blood pressure. This important medicinal plant is declared as endangered plant hence essential to cultivate in large scale.

Key words - *Rauwolfia serpentina*, Sarpagandha, Reserpine etc.

Introduction

Rauwolfia serpentina (L.) Benth. Ex Kurz. is commonly known as Sarpagandha (Indian snakeroot). It is an important medicinal plant found in Indian subcontinent and south East Asian countries. Generally, it grows in the region with annual rainfall of 200 to 250cm at 1000 m altitude. The deep fertile soil with rich organic matter is favorable for growth of this plant. The major causes of declination of this plant species from natural habita are poor rate of seed germination, over exploitation and habitat loss. (Dey and De, 2010).

Fig: Sarpaghandha plant

Fig: Sarpaghandha seed

Fig: Sarpaghandha stem

Soil:

The Sarpagandha plant can be grown in different variety of soils, from sandy alluvial loam to red lateritic loam of stiff dark loam in its natural habitat. It prefers clay loam with a large percentage of humus. It does not grow well having pH 8 or above of soil. The favorable pH for growing this crop is from 4.6 to 6.2. Generally, the plant produces thicker roots in black, stiff loam soils than in heavy clayey or sandy soil. The large quantities of sand containing in soil, reduce the growth of the plants and become more susceptible to root and leaf diseases.

Climate:

Rauwolfia serpentina can be grown under a wide range of climate conditions. It flourished in hot, humid conditions and can be grown both in the sun and in partial shade. In its natural habitat, the plant thrives under the shade of forest trees. It prefers a tropical or sub-tropical belt having the benefit of monsoon rains, preferably the South-west. Localities in the Deccan Peninsula, which are with more equitable climate throughout the year as compared to the sub-Himalayan tracts are said to be more suited for a profitable cultivation of this plant. A climate with a temperature range of 10-30% seems to be well suited for this plant. The best areas for its growth are those which combine high rainfall with properly drained soil. Although it has been reported to grow naturally where rainfall is about 250 cm annually, it grows well in areas with a rainfall of even 500 cm or more. In low rainfall areas, the plant can be successfully cultivated, if irrigation is available during the drier months. Though the plant seems to be sensitive to water-logging, it can tolerate water for 2 to 3 days without too much damage. The plant sheds its leaves during the cold months in localities with severe winters. Frost kills the top tender, green twigs only and fresh shoots sprout up with the advent of spring from the thicker shoots which can withstand the frost.

Propagation:

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

Seed propagation:

Commercially, the plant is usually propagated by seeds, irregular and very low percentage of germination of seeds is the main difficulty in the propagation of Rauwolfia. The percentage of germination of seeds is quite variable, ranging from 10-60%. This is partly attributed to the adverse influence of the stony endocarp. Another serious factor is the absence of embryos, though the fruits may appear perfectly normal externally. This may possible by an effect of parthenocarpy.

The rate of germination however depends on the percentage of fully matured heavy seeds in a particular lot. Fresh seeds, collected from ripe fruits and immediately sown, show a higher percentage of germination (58-74%). The ripe seeds collected from the beginning of June to the end of October or even November and stored in airtight bins, retained their viability for about 6 months. The viability of the seeds decreased drastically with the increase in the interval of time between collection and sowing. The germination rate of the seed also differs under varying agro climatic conditions.

The seeds should be usually collected from September-February. Fruits mature between July-November. Only a few fruits ripen at a time and, if they are not collected immediately, they shed and are lost. Therefore, the collection of ripe fruits twice a week is necessary. While this is easy in case of plantation, collection from plants growing in the wild is both laborious and costly owing to their scattered distribution over large areas.

The fruits, after collection, are freed from their pulpy covering by rubbing them against old gunny bags or on rough flooring. The cleaned seeds are thoroughly dried in the sun and store in dry places or in airtight containers; a yield of 100-120 kg of clean

seeds can be obtained from one hectare of a 3 year old plantation. An adequate supply or seeds can also be obtained by raising the plants vegetative in compact areas, preferably by using stem-cuttings.

The sowing of the seeds directly in the field has not been successful and, hence seedling are raised in the nursery and transplanted into the field. The nursery should ideally be located in partially shaded areas with irrigation facilities. The land is cleared of weeds and ploughed to a depth of 30 cm. Raised beds are made, which should contain one third quantity of well rotted FYM and two thirds of fine soil. Seeds are sown in the middle of May. The seeds should be soaked in water overnight and the light seeds which float discarded. The seeds can be treated with Thiram at the rate of 3g/kg of seeds. About 5.5 kg of seeds sown in a 500 m2 area will yield seedlings sufficient to plant one hectare. The germination is gradual and the growth of the seedlings is slow. Germination stars after 15-20 days and continues up to 40-45 days after sowing. The nursery should be kept moist throughout the germination period.

Transplanting:

The seedlings of 40-50 days which have 4-6 leaves are transplanted. The seedlings are carefully dug out and the top root should be cut. They are then dipped in a 0.1% soil-borne fungus causing damping off disease. Well rotted FYM at 25-30t/ha is added during land preparation. The field is then divided into small plots for irrigation. About 15 cm deep furrows are dug at a distance of 45 cm. The seedlings are transplanted into the furrows, by making holes large enough to receive the seedlings along with the accompanying clump of earth. A sampling of 30 cm between the plants should be maintained. The seedlings are buried up to the first pair of leaves and soil around them is lightly pressed. Irrigation after transplanting is essential, and should be continued at regular intervals until the seedlings are established.

2: Vegetative propagation:

As collection of seeds from wild sources is both laborious and costly, vegetative propagation by root or shoot cuttings has been advocated for raising plantation which also quickly multiply the genetically superior clones.

1: By root cuttings:

Large tap roots with a few filly form lateral secondary rootlets are used. Cuttings of 2.5-5.0 cm length are planted in holes, at the beginning of the monsoon and are almost completed covered with earth, leaving only 1 cm above the surface. Nearly 50% of the root-cuttings sprout in about a month.

Trials have shown that under irrigated conditions, root cuttings of about 0.25 cm diameter planted during March-June gives a 50-80% success rate. About 100 kg of root cuttings are required to plan 1 ha. The high percentage of success obtained by root cutting makes it more preferable than propagation by seeds. However, the recovery of roots from them has been found to be not high as in plants raised from seeds.

Fig.: Roots of *Rauwolfia serpentina*

2: By root-stumps:

About 5 cm of root with a portion of the stem above the collar region is used for propagation has also been attempted. This method gives about 90-95% success, sometimes even 100% such plants transplanted in May-July into irrigated fields become well established by the end of September. This method has its limitation as only one plant can be raised from a single stump.

Fig.: Root-stumps of *Rauwolfia serpentina*

3: By stem cuttings:

Stem cuttings taken from woody twigs have also been tried as a source of propagation. Hard wood cuttings have been found better than soft wood cuttings. Cuttings of 15-22 cm length, with three internodes are the most suitable. Nearly 60-100% of rooting is obtained by treating hard-wood cuttings with indole acetic acid solution of 30ppm for 12 hrs and the treated cuttings root within 15 days. Stem cuttings planted in the nursery during the early monsoon (June) and kept moist until they sprout that gives about 40-65% success rate. Such cuttings, though start sprouting 3-4 days after planting, naturally strike roots mostly after about 75 days. Stem cuttings have been found less satisfactory than root-cuttings, since many of them do not root easily.

Fig.: Stem of *Rauwolfia serpentina*

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