Betelvine - A Green Gold

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Introduction

Betel vine or *pan (Piper Linn)* is an important, traditional and ancient crop of India. It is a perennial, dioecious, evergreen creeper grown in India. It is generally known as 'Paan' in Hindi in the subcontinent and by different names in the Asiatic region. The betel leaf occupies a significant place in everyday life of the Indian people. Other than its use in ethosocial rituals, chewing of the leaf or 'pan' as it is called is an ancient habit among all classes of people. The crop is highly labour-intensive and particularly suited to small holdings. Once established, it becomes a perennial source of employment and cash flow for day-to-day income of the farmers.

Betel vine *(Piper betel* Linn.) is a native of central and eastern Malaysia and has spread through tropical Asia and Malaysia. Now a days, it is an important cash crop in Andhra Pradesh, Assam, Bihar, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal. It's leaves are exported to Pakistan, Bangladesh, Indonesia, Malaysia, Burma and Thailand. In Karnataka, Chitradurga, Bellary, Uttara Kannada, Dharwad, Chikkamagalore, Hassan, Mysore, Shivamogga and Bangalore are the important districts.

Active compounds

The compounds present in the leaf and other parts are hydroxy chavicol, hydroxyl chavicol acetate, allypyrocatechol, chavibetol, piperbetol, methyl piperbetol, piperol A and piperol B. Phenol rich leaves of betelvine show high antioxidant activities.

Uses

The betel leaf is fairly rich in vitamin B and C and is supposed to be a tonic to the brain, liver and heart. Betel leaf chewing has beneficial role in oral hygiene. It clears the mouth and throat and helps digestion by encouraging salivation and neutralizing excess of acid by the lime eaten with it. It is the source of anti-cancer, anti-diabetic, cardiovascular, anti-inflammatory, anti-ulcer, anti-tumor, anti-microbial, anti-oxident, carminative, aphrodisiac, laxative, gastroprotective and wound healing. The leaves contain an essential oil which gives the aroma and pungency to the leaves.

Botany

The species *Piper betel* is a perennial dioecious dicotyledonous creeper with semi woody stem which climbs by short adventitious roots. Leaves are 5-20 cm long, broadly ovate to slightly coradate and offer unequal at the base, shortly acuminate, acute, entire with often an undulate margin, glabrous, yellowish to dark green, shining on both the surfaces; petiole is stout, 2.0 to 2.5 cm long.

The plant produces orthotropic (vegetative) and plagiotropic (reproductive) branches. Growth rates in terms of stem elongation, number of leaves and branch production are higher in vegetative branches compared to reproductive branches. Vegetative branches also produce leaves with higher petiole length and intermodal length. The

reproductive branches bear male or female flower in a plant. The male spikes arising singly from leaf base are long, cylindrical and wavy, measuring 54-90 mm in length with a stalk length of 23-30 mm. The female spikes also arise singly from the axil and are short, stout, cylindrical and creamy-white to light orange in colour.

The spikes measure 40-55 mm in length with a stalk measuring 19-26 mm. Individual flowers are small, sessile, 5-7 lobed with 3-5 stigmas. During maturation, irregular swelling called node sites are formed on the fleshy fruits and their number varies from 5 to 7. The mature fruits possesses 2-20 spherical to oval, smooth surfaced seeds.

Important betel vine cultivars

1. Andhra Pradesh - Karapaku, Chennor, Tellaku, Bangla and Kalli Patti

2. Assam- Assam Patti, Awani pan, Bangla and Khasi Pan

3. Bihar - Desi Pan, Calcutta, Paton, Maghai and Bangla

4. Karnataka - Kariyale, Mysoreale and Ambadiale

5. Kerala - Nadan, Kalkodi and Puthukodi

6. Madhya Pradesh -Desi Bangla, Calcutta and Deswari.

7. Maharashtra - Kallipatti, Kapoori and Bangla (Ramtek)

8. Orissa-Godi Bangla, Nova Cuttak, Sanchi and Birkoli.

9. Tamil Nadu -Pachai Kodi and Vellaikodi

10. Uttar Pradesh - Deswari, Kapoori, Maghai and Bangla

11. West Bengal - Bangla, Sanchi, Mitha, Kali Bangla and Simurali Bangla.

Varieties

Karpurakodi, Kallarkodi, Revesi, Karpuri, SGM 1, Vellaikodi, Pachaikodi, Sirugamani 1, Anthiyur kodi, Kanyur kodi, Bidan pan, Bangla type, SGM-1, SGM-2, are under cultivation

Climate

Betel vine requires tropical climate for its luxuriant growth. The favourable conditions for it better growth is shady place with high humidity. It grows well where the rainfall is high (2250-4750 mm) and up to an elevation of 1,500 m MSL.

Soil

It is generally grown on different types of soils-heavy clayey loam, literate and sandy loam. However, soil with good organic matter and drainage system is best-suited for its cultivation. It requires pH ranges between 7-7.5. Avoid saline and alkaline soils which is not support the growth of the plants.

Propagation

Betel vine is propagated through cuttings having 3-5 nodes planted in such a manner that, 2-3 nodes are buried in the soil. A single node cutting with a mother leaf is also planted. Cuttings of the apical and middle portions of the vine are also used for planting. Cuttings are generally made from mature stem and it is collected from 2-3 years old plantations. Dipping of cuttings in 50 ppm NAA and IBA solution has been shown to increase the root formation and vigour of the crop.

Beetle vine is cultivated under fast-growing plants which provide support as well as shade. Under artificially-created shed known as *Boroj, Bareje* etc., it is also cultivated. Besides, mixed cropping with areca nut, coconut, jackfruit and mango is followed on a limited scale.

Construction of Bareja/ Boroj

Bareja are normally made on raised slightly slopy land. It is constructed with locally-

available materials-bamboo, jute sticks, straw etc. Its shape may be square or rectangular with a height of 2-2.5m. Usually a wide passage (0.5-1.0m) is provided inside along the wall of the bareja. The walls and top of the bareja are covered with thatching material like leaves of coconut, wild date palm, sugarcane, straw, grass and jute stick. It should be constructed near a source of irrigation. The site must be at a higher level than the adjoining area. There must be a slope in all directions for a quick drainage of excess water.

Raising of support plant in open cultivation

Plants of *Sesbania grandiflora, S. sesban, Erythrina variegata* and *Moringa oleifera* are raised to provide support and shade. They are sown in 45-60cm rows at least 45 days before planting the cuttings of betel vine. The proper wind break, quick growing freely branching and non competing crops are to be raised all along the border of the betel vine garden. Coconuts, jack fruit, casurina, silver oak are grown for this purpose.

Land preparation

Land is prepared well by 4-5 ploughings. It should be raised by 5-10 cm from the adjacent areas. It is done by applying soil collected from ponds or tanks. The land is raised with proper gradient on both sides for quick drainage of excess water. Before use, the soil should be pasteurized by solarization technique. Then it is irrigated, pulverized and levelled. Afterwards, beds of suitable size (15cm high and 30cm broad) are prepared.

Planting

The onset of monsoon is ideal time of planting. But where support plants are used, the planting may be done up to October-end. Nearly 40,000-75,000 cuttings are used for hectare where support crop is used, whereas 1,00,000-1,20,000 cuttings/ha are grown in bareja (closed) system of cultivation. Rooted cuttings raised in nursery are also planted. The planting season varies from state-to-state and even place-to-place.

The sets begin to sprout and creep along in a month after planting. Trail the creeper to the supporting tree by tying the vines at an interval of 15-22.5 cm with the help of the banana fibre. When they come in contact with the supporting tree strike advantageous roots which help them to climb further, attend trailing of vines for 15 to 20 days depending upon the rapidity of the growth of the vines.

Row spacing	Vines/hectare	
	Single vine	Double vine
20 cm	50,000	1,00,000
30 cm (1 ft)	30,000	60,000
45 cm (11/2 ft)	22,500	45,000

Intercultural operation

- **Training of the live standards:** Before the establishment of vines, the side branches of Agathi trees up to a height of 2 m are removed for early creeping of the vines.
- **Training of the vines :** Training is done by fixing the vine at intervals of 15 to 20 cm along the standards loosely with the help of banana fibre. Training is done at every 15 - 20 days interval depending upon the growth of vines.
- **Lowering of the Vines :** When the vines reach a height of 3-4 m in one year's time, the vigour of the vine to produce normal size leaves will reduce. At this time, they need rejuvenation. This is achieved by lowering the vines down to the ground level at least once a year.

Betel vine is a crop demanding frequent irrigation. Wherever providing regular irrigation is not possible, burry a large portion of the exposed vine in the soil. Attend to the lowering of the vines either in the commencement of monsoon or at the end of the monsoon.

Summer is the best time for lowering the vines. Before lowering do harvest all the leaves. Untie the vines from bottom upwards, coiled up carefully leaving 1 or 2 feet length of top shoots, then burry in a small trench dug at the base of supporting tree.

Lowering is done during March-April (1 time) in Uttar Pradesh, Madhya Pradesh and Bihar, during May-June in Andhra Pradesh; during January-February or April-May in Tamil Nadu and 3-5 times in West Bengal and Orissa. In West Bengal and Orissa, after every lowering stem is covered with loose soil brought from outside. In open system, soil is dug and stem is coiled and lowered and thereafter covered with soil

Irrigation

Betel vine requires high soil moisture. Frequent light irrigation is necessary depending upon the season. Irrigation should be need-based. The flood irrigation should be avoided. Since over irrigation or excess water causes wilting of plants, proper drainage is essential during rainy season.

Intercrops

To get additional income, often many growers are cultivating intercrops, such as cucurbits, coccinia, chillies, ginger, banana, drumstick, brinjal, bendi *etc*., in North India. But, it is not common in other states.

Weeding

The plots of betel vine should be kept free from weeds. Two to three manual weeding is done.

Plant protection

Pests

1. Scale insects : Select scale-free vines. Spray Spray NSKE 5 % or Chlorpyriphos 20 EC 2 ml/lit when one or two scales are noticed on the basal portion of the stem/leaves. Direct the spray solution to the basal portion of the vines.

2. Mites : Mites can be controlled by spraying Wettable sulphur 50 WP @ 1 g/lit

3. Mealy bugs : Mealy bugs can be controlled by spraying Dimethoate 30 EC 2ml/ lit. Concentrate the spray towards the collar region.

4. Nematode

- Application of Neem cake at 1 t/ha or shade dried Calotropis leaves @ 2.5 t/ ha can be applied to soil for controlling the nematode populations.
- Soil application of *Bacillus subtilis* (BbV 57) or *Pseudomonas fluorescens* @ 10 g / vine for the control of root knot nematode and quick wilt of betel vine

Diseases

1. Phytophthora Wilt

- Select well matured (more than 1 year old) vines free from pest and diseases.
- Soak the vines for about 30 minutes in *Streptocyline* 500 ppm or Bordeaux mixture 0.5 %.
- Remove the affected vines away from the garden and burn them.
- Drench Bordeaux mixture 0.25% in basins formed around the vine at monthly intervals starting from October – January, three times soil drench and six times spray from June - July.
- During winter season avoid frequent irrigation.
- Application of *Trichoderma viride* @ 5 g/vine.

2. Bacterial leaf spot, blight and bacterial stem rot

Spray Streptocycline @ 400 ppm + Bordeaux mixture @ 0.25% at the time of first disease symptoms appear. Continue spraying at 20 days intervals. Always spray the chemical after plucking the leaves.

3. Anthracnose

Spray 0.5% Bordeaux mixture after plucking the leaves after the first appearance of the symptom. The variety Karpoori is susceptible to the disease.

4. Powdery mildew

Powdery mildew can be controlled by spraying 0.2% Wettable sulphur after plucking the leaves.

Harvesting

Mature leaves are plucked along with a portion of petiole. They are plucked by hand without any aid. However, in certain areas iron nail is used to facilitate plucking. In Karnataka and Tamilnadu, leaves are plucked from side shoots. In south India, comparatively tender leaves are preferred in the market. After plucking, they are washed thoroughly and made into bundles according to the prevailing custom of the area. On an average, about 60-80 lakh leaves are harvested annually from one hectare garden.

Grading and packaging

Harvested leaves are washed, cleaned and graded according to their size and quality. Then leaves are packed after cutting a portion of the petiole and rejecting the damaged leaves. All growers do not grade betel leaves. The picked leaves are sorted into different grades according to size, colour, texture and maturity. After that, they are arranged in numbers (the number varies from place-to-place) for packing. Grading and packing of leaves are very specialized jobs. For packing mostly bamboo baskets are used and in many places straw: fresh or dried banana leaves, wet cloth etc. are used for inner lining to maintain turgidity of leaves. Leaves can be kept fresh by sprinkling water and wrapping wet cloth, up to 5-6 days.

Usually betel leaves are used for chewing as fresh unprocessed. But in certain areas, leaves are subjected to processing known as bleaching or curing. There is a good, demand for such leaves which fetch higher prices in the markets. Bleaching is done by successive heat treatments at 60°-70°C for 6-8 hour.

Conclusion

Betelvine cultivation is profitable to the farmers even now a days it become the most popular mixed crop in arecanut. Demand for betelvine is increasing day by day in village and in the urban area. Bareja system of cultivation is like creating home for betel vine. This has created opportunity to cultivate betelvine in the nontraditional area. Hence there is more scope for the cultivation of the crops. At the same time special efforts should be made on characterization of most of the available landraces to release as new and improved varieties and also pest and disease management in betelvine.

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