

Full Length Research Paper

Distribution, conservation and folk uses of Vaibidang (*Embelia ribes* Burm. f.)

Rama Shankar¹, G. S. Lavekar², Sourabh Deb³, B. K. Sharma⁴ and M.S.Rawat⁵

¹Ayurveda Regional Research Institute, Itanagar, India-791111.

²Central Council for Research in Ayurvedic Science, New Delhi- 110058, India.

³Department of Forestry and Biodiversity, Tripura University, Suryamaninagar, Tripura, India.

⁴Department of Microbiology, Tripura University, Suryamaninagar, Tripura, India.

⁵National Medicinal Plants Board, Chandralok Building, Janpath, New Delhi, 110001, India.

Accepted 15 June, 2020

Vaibidang (*Embelia ribes* Burm. f.) is a red listed climbing shrub found in the semi-evergreen to evergreen forests of India, Sri Lanka, Malaysia and China, whose fruits are used in a large number of Ayurvedic formulations. It is traditionally used as analgesic, antipyretic, antibacterial, antifertility and anthelmintic in different parts of India. The dosage of traditional medicine prepared from this herb varies from region to region. Ripening and timely harvesting are also an important factor for the potency of this herb. Introducing fully mature seeds for raising planting materials is only an accessible way of its propagation.

Key words: Traditional, Myrsinaceae, ayurvedic, embelin, Arunachal Pradesh.

INTRODUCTION

Vaibidang is a Sanskrit name of *Embelia ribes* Burm. f. (Myrsinaceae), which is an important medicinal plants belonging to family Myrsinaceae. The plant is a scandent shrub, whose fruits are used in a large number of Ayurvedic formulations. This shrub is slender branched with elliptic-lanceolate and gland-dotted leaves. The fruit is globular and wrinkled, varying in colour from dull red to nearly black; a short pedicel is often present; the pericarp is brittle enclosing a single seed covered with a membrane. Flowers are dull white in colour with violet red fruits. Mature fruits turn brown or black. Root is deeply penetrating in the soil and takes help of trees for their climbing habit. In North East region, it is commonly distributed in Arunachal Pradesh, Meghalaya and Mizoram in the altitudinal zone of 500 to 2500 msl. It is a red listed climbing shrub found in the semi-evergreen to evergreen forests of India, Sri Lanka, Malaysia and China (Guhabakshi et al., 2001). The species is also reported to be vulnerable in the Western Ghats of Tamil Nadu and Karnataka states of India and at lower risk in Kerala state

(Ravikumar and Ved, 2000). The plant is locally called as Biakol-lata (Assamese), Baberang (Hindi), Biranga (Bengali), and is recorded from Itanagar, Kimin, Hunli, Dibang Valley, Nechephu and Dirang areas (West Kameng district), Joram, and Hija areas near Hapoli in Lower Subansiri district of Arunachal Pradesh. The species was also reported from upper Assam and from Cherapunji and Jowai areas of Khasi/Jaintia hills, and Mao areas of Manipur, Kawnpui - Aizawl, Serchhip areas of Mizoram in both high and low altitudes of north east India. It was also found that there are some morphological variations in leaf characters among the species collected from different altitudes.

MATERIALS AND METHODS

The study is purely based on exploration of different forest areas in North eastern India as well as interaction with traditional healers to know about different uses of *E. ribes* in their traditional healing practices. Trials on germination of seeds in different conditions were undertaken for examining the earlier statements regarding the cultivation of *E. ribes*. Pharmaceutical use of fruits and other part of the plant was explored from literature and from various pharmaceutical products where fruits of *E. ribes* are used in compound formulation. During exploration, status and systemic

*Corresponding author. E-mail: rshankar58@gmail.com.

identity of the plant was established which in turn was followed by the characterization and distribution of the highly demanded medicinal plant for pharmaceuticals. The methodology for use of plant drug against particular disease was recorded. To study the possible means for cultivation, both vegetative and seed germination trials were made. For vegetative propagation, stem cuttings of different age groups were taken in first instance. After getting only shoot development without root initiation by treating the stem cuttings with gibberelic acid-3, stem cuttings of basal region of stem with attachment of few rootlets was taken. For seed germination, both immature red coloured and mature brown coloured seeds were taken under the study. Counseling for the conservation of plant of *E. ribes* was made by involving local people by providing approximate possible methodology in field for conservation and sustainable use of drug parts. Voucher specimens were prepared for authentic records by matching with the authentic samples kept in the Herbarium of Botanical Survey of India, Eastern Circle, Shillong. Voucher specimens were deposited in the Herbarium of Ayurveda Regional Research Institute Itanagar (Acronym- arri).

RESULTS AND DISCUSSION

Medicinal uses

The plant is an ingredient of about 75 traditional ayurvedic drug formulations. Dried fruits of the plant are the main source of an ayurvedic drug. The dosage of traditional medicine prepared from this herb varies from region to region. Ripening and timely harvesting are also an important factor for the potency of this herb.

The plant contains embelin, quercitol and fatty ingredients, an alkaloid, christembine, tannins and minute quantities of a volatile oil (Krishna and Verma, 1941). Embelin occurs in golden yellow needles insoluble in water and soluble in alcohol, chloroform and benzene. It is reported to be effective against tapeworm but not against roundworm or hookworm. Embelin dyes silk and wool from an alcoholic solution. The dark colored fatty oil is reported to be similar to linseed and rapeseed oil in its properties. The plant is reported as analgesic, antipyretic (Atal et al., 1984), antibacterial (Narang et al., 1961), antifertility (Seshadri and Venkataraghavan, 1981) and anthelmintic (Chopra et al., 1966) in different parts of India. In North East India, *E. ribes* is used for liver disorder and for removal of worms from subtropical region of Arunachal Pradesh. Sinha (1996) and Mahanti (1994) reported this plant from Manipur and Mizoram as anthelmintic, astringent, carminative and stimulant used in constipation as purgative, fever and skin diseases. Root bark is used for cough and diarrhoea, and young leaves are used for abdominal pain (Anonymous, CCRAS, 1999). Mahanti (1994) added the use of *E. ribes* for scorpion sting and snake bite.

The pharmacological and clinical investigations by various workers gave promising results about its antifertility activity without any side effects (Mitra, 1995; Anon, 2002). Different medicines prepared from this plant product are Vaibidang Churna (classical ayurveda for

worm repellent), Abana (cardiac disorders), Diak of (cough care), Gasex (gastri care), Geriforte (geri care/old aged management), Herbolax (laxative), Koflet (cough care), Mentat (nervine management), Mentat syrup, Purim (blood purification), blood purifier capsules and syrup, dental cream, anxocare, Appetonic forte Vet, Appetonic Vet, Geriforte Aqua, Geriforte Vet, etc.

Identity and cultivation

It was reported that the cultivation of *E. ribes* is difficult, hence the conducting of different experiments on various economic mode of cultivation, that is, seed germination, vegetative cultivation by stem cutting, basal stem cutting with some root pieces in medicinal plant garden of Ayurveda Regional Research Institute, Itanagar. During the period of experiments made on various economic aspects of cultivation accessible for farmer's field for a period of five years, it was observed that maturation of fruits in one bunch takes place at an interval of certain period. Accordingly, it was found that the seed germination in case of fully mature seed has about 90% viability, and introducing fully mature seeds for raising planting materials is the only accessible way of propagation (Table 1 & 2). Generally, all seeds of the plants do not mature at the same time, and maturation starts from the apical towards bottom region. It was observed that rooting does not take place in the stem cuttings of different age groups. Whereas stem cuttings of base of stem where few rootlets are intact, develops more roots. In case of seed germination trials, only fully mature seeds having brown black colour initiate germination. Results of vegetative trials and seed germination are given in Table 2. The confusion regarding its cultivation and regenerations starts due to its differentiation and segregation of mature and immature seeds. The species can also be cultivated through vegetative means, and for that, single root of the plant is sufficient for its multiplication but without root its propagation is just impossible. Hence, it is not worth reporting that the regeneration of this plant is poor or not easily cultivated. This plant can give 80 to 90% viability if it can be cultivated in a proper technique and only with matured seeds. Raghu et al. (2006) mentioned that embryos are small when present and most of the seeds are abortive. Therefore, specific habitat conditions are required for its survival and growth. Identity of the plant was confirmed as some market samples were not genuine drug material. To strengthen the cultivation part of the study various experiments were made in the agroclimatic condition of the state of Arunachal Pradesh where plant naturally occurs (Figure 1).

Wrongly collected samples are also found in the markets, as many of the market samples examined and do not contain Embelin, either due to wrong identity or due to collection of immature fruit drugs. Such types of

Table 1. Characteristics of *E. ribes* found in North East India.

S/N	Parameter	Observation
1	Type	Dioecious woody climber
2	Habitat	Liana
3	Distribution	Itanagar, Kimin, Hunli, Dibang Valley, Nechephu, Dirang, West Kameng, Joram and Hija areas near Hapoli in Lower Subansiri district of Arunachal Pradesh. The species was also reported from upper Assam and Khasi/Jaintia hills
4	Flowering/fruiting season	March - May fruiting initiates during July and mature during November to December.
5	Immature fruits	
6	Mature fruits:	
7	Local Name	Biakol-lata (Assamese); Baberang (Hindi); Biranga (Bengali)
8	Trade name	Kala vaivding
9	Price	Rs. 110 - 160/kg
10	Embelin content (%)	2.3 - 3.1%
11	Occupancy (km ²)	10-500
12	Density	1-5/100 ha
13	Polpulation decline	(%): >50
14	Status	Rare
15	Threat	Habitat loss, immature harvest time
16	Cultivation practice	Seed germination, vegetative cultivation by stem cutting, basal stem cutting
17	Seed germination	80 - 90% with mature seeds
18	Phyto-constituents	Embelin, embolic acid and rapanone
19	Medicinal products	Vaibidang Churna, Abana, Diak, Gasex, Geriforte, Herbolax, Koflet, Mentat, Mentat syrup, Purim, Anxocare, Appetonic forte Vet
20	Major activity	Anti-helminthic, anti-tumour, bronchitis, mental disorders, jaundice, anti-fertility, analgesic, antibacterial, anti-inflammatory and antioxidant
21	Annual requirement in Indian markets	Approx. 5 - 8 tons

anomalies are not only with *E. ribes* but also with several other drugs which are under screening. External morphology of the plant growing in different altitudinal range varies in certain features without any scientific terminology. While conducting experiments on propagation of the plants collected from temperate and alpine regions in institute's medicinal garden established in tropical region (450 msl), it was observed that when plants from higher altitude are cultivated in lower altitudinal range it grows well but with gradual change in morphological features and forms the features of intermediary stage of the two climatic zone plants. Leaf found in low altitudinal range is broader and shorter than the plants growing on high altitude. Fruit characters in lower hills up to 800 msl are greenish and turn brown on maturity whereas the fruits in Alpine areas are red in colour which turns brown on maturity. On cultivation of

higher altitude plants in the range of 500 msl, leaves gradually become broader.

Conservation

E. ribes plays an important role in Ayurvedic medicine as well as traditional medicine preparation in North East India. Nowadays, several medicinal pharmaceuticals trade its fruits from North East India for preparing different products. Poor people of remote villages in this region collect and exploit this plant from forests area for monetary benefits. The main threat of this plant is its unsustainable and indiscriminate harvesting for commercial purposes. Habitat loss, Jhum cultivation, forest fire and agriculture expansions are also some factors for its decrease in population. On the other hand, the

Table 2. Cultivation experiment on vegetative propagation and seed germination practices of *E. ribes*.

S. No.	Type of Experiment	No. of samples under study	Results	
			Period of observation (1 month)	Period of observation (2 months and above)
1	Stem cutting with full mature stem	100	No root initiation as well as foliage development takes place at different interval of time	stem cuttings get dried
2	Shoot cuttings with young leafy branches	100	No root initiation as well as foliage development takes place at different interval of time	Shoots get dried
3	Mature stem cuttings after treatment of Gibberellic Acid- 3	100	Foliage develops No rooting was observed	Foliage and single young shoot was initiated and dries later on No rooting was observed
4	Young shoot with treatment of Gibberellic Acid- 3	50	Foliage persists and new foliage initiates Rooting does not takes place	Only foliage persists later dries Rooting does not take place
4	Mature brown Seed selected for germination	1000	< 875	Seedlings developed
5	Random collection of seeds (Red and brown)	1000	>250	Seedlings developed



Figure 1. (A) Seedling of *Embelia ribes*; (B) Flowering of *E. ribes*; (C) fruiting of *E. ribes*.

regeneration from seedling of this plant is also very poor. While conducting market survey, fruit of this plant was found to be traded from Arunachal Pradesh via Assam to other parts of India. Hence, it is a matter of concern how this plant can be preserved and conserved. So, the government should take initiative for conserving this prioritized species, and emphasize more research and survey of wild population for evaluating the status of this plant in North East India. Development of *in vitro* propagation may play an important role in conserving this

species.

ACKNOWLEDGEMENTS

Authors are thankful to the Chief Executive Officer, National Medicinal Plants Board, Department of AYUSH, Government of India for financial assistance. Thanks are also due to Dr. S. K. Sharma, Advisor (Ayurveda), Department of AYUSH, Ministry of Health and Family

Welfare, Government of India for different technical support.

REFERENCES

- Atal CK, Siddique MA, Zutshi VA (1984). Non-narcotic, orally effective, centrally acting analgesic from an ayurvedic drug. *J. Ethnol. Pharmacol.* 11(3):309-317.
- Chopra RN, Nayar SL, Chopra IC (1966). *Glossary of Indian Medicines*. CSIR Publication, New Delhi p.106.
- Guhabakshi DN, Sensarma P, Pal DC (2001). *A lexicon Medicinal Plants of India*. Calcutta, India, Naya Prakashan, Calcutta pp.135-136.
- Krishna S, Verma KS (1941). *Embelia ribes*. *Indian Forest Bulletin*: N. S. No. 102.
- Mahanti N (1994). *Tribal ethnobotany of Mizoram*. Tribal studies of India series T 171. Inter India Publication, New Delhi p.64.
- Narang GD, Garg LC, Mehta RC (1961). Preliminary studies on antibacterial activity of *E. ribes* (Myrsinaceae). *J. Vet. Anim. Husband. Res.* 5(1):73-79.
- Raghu AV, Geetha SP, Martin G, Balachandran I, Ravindran PN (2006). Direct shoot organogenesis from leaf explants of *Embelia ribes* Burm. f.: A vulnerable medicinal plants. *J. For. Res.* 11:57-60.
- Seshadri C, Venkataraghavan S (1981). Effect of aqueous and alcoholic extract of *E. ribes* on liver plasma and reproductive organs in male rats, a preliminary study. *Indian J. Pharmacol.* 13(1):88.
- Sinha SC (1996). *Medicinal Plants of Manipur*, Mass and Sinha, Manipur Cultural Integration Conference, Imphal p.69.