

## Embelia ribes Burm F. (Vai Vidanga)- An Overview

Sandeep Rout<sup>1</sup>, Gyanranjan Sahoo<sup>2</sup>, Deepayan Padhy<sup>3</sup>, Udit Nandan Mishra<sup>1</sup> and Ajay Kumar Prusty<sup>3</sup>

<sup>1</sup>Faculty of Agriculture, Sri Sri University, Cuttack, Odisha, India

<sup>2</sup>Krishi Vigyan Kendra, Odisha University of Agriculture and Technology, Angul, Odisha, India

<sup>3</sup>Department of Entomology, M.S. Swaminathan School of Agriculture, Centurion University of Technology and Management, Paralakhemundi, Gajapati, Odisha, India

Email: sandeeprou1988@gmail.com

### Abstract

The huge scandent shrub *Embelia ribes* Burm F. belongs to the Myrsinaceae family and is found across India. False black pepper or Vai Vidanga are two common names for it. *E. ribes* are found in India's central and lower Himalayas, Arunachal Pradesh, Assam, Bengal, Odisha, Andhra Pradesh, and Madhya Pradesh; it grows in semi-evergreen and deciduous forests at altitudes of 1,500 meters. Embelin, unstable oil, fixed oil, sap, tannin, and phenolic acids are all found in the berries of the *Embelia ribes* plant. It's used to treat antibacterial, anti-fertility, anti-protozoal, stomach problems, lung illnesses, constipation, indigestion, fungal infections, mouth ulcers, sore throats, pneumonia, heart disease, and obesity, as well as analgesic, anti-inflammatory, and antioxidant properties. The seed can be kept in gunny bags after harvesting in a dry, low-moisture environment.

**Keywords:** Ayurvedic, pharmacological, phenolic, shrub.

### Introduction

“Vai Vidanga” is the popular name for *Embelia ribes*. False black pepper or white-flowered *Embelia* are two common names for it. It is a medicinal plant that belongs to the Myrsinaceae family. It's one of the most popular Ayurvedic herbs for strengthening the body's natural gastrointestinal defenses. According to Ayurveda, it supports the digestive fire and removes natural toxins from the GI tract, blood, and lymph. Vidanga also aids digestion and helps to avoid constipation. It also has specific pharmacological properties, such as a centrally acting non-narcotic orally effective analgesic activity. It has a distinct core site of action than naloxone and is not antagonistic to it. As a result, it is a highly essential plant examined in depth later (Harish *et al.* 2012).

It's commonly known as false black pepper, White-flowered *Embelia*, Vidanga, or Vai Vidanga are all names for *Embelia ribes*, plant. Vidanga is one of Ayurveda's most potent anti-parasitic medicines. False black pepper gets its name from the fact that it looks like pepper. It's a medicinally useful big scandent shrub (woody climber). Nicolas Laurens Burman first described it in his 1768 work *Flora Indica*. It is readily available across India. *E. ribes* is one of 32 medicinal plant species certified by the Medicinal Board of India, New Delhi, as significant for large-scale cultivation due to its commercial worth. Table 1 shows the aroma evaluation of *Embelia ribes* (Krishnaswamy *et al.* 1980).

**Table 1. Palatability Assessment of *Embelia ribes* Fruits**

|               |                |
|---------------|----------------|
| <b>Size</b>   | 2.4-4 mm       |
| <b>Colour</b> | Blackish brown |
| <b>Shape</b>  | Sub globular   |
| <b>Odour</b>  | Divergent      |

|                |          |
|----------------|----------|
| <b>Texture</b> | Crumpled |
| <b>Taste</b>   | Sharp    |

(Source: Sudani *et al.* 2011)

### Importance of Species

As one of the most significant medicinal herbs, it primarily contains therapeutic benefits and vital medicinal characteristics that treat various ailments in our bodies. Table. 1 discusses the Ayurvedic features of *Embelia ribes*.

**Table 2. Ayurvedic properties of *Embelia ribes***

|                           |                        |
|---------------------------|------------------------|
| <b>GUNA</b> (Quality)     | Laghu, Ruksha, Tikshan |
| <b>RASA</b> (Taste)       | Katu, Kashay           |
| <b>VIPAK</b> (Metabolism) | Katu                   |
| <b>VIRYA</b> (Potency)    | Ushan                  |
| <b>PRABHAV</b> (Impact)   | Krimighan              |

(Source: Asadullah, 2011)

The ayurvedic system of medicine has long used *Embelia ribes* in different forms such as churna, asava, aristha, lauha, and taila. Vai Vidanga's fruits are effective in treating headaches, rhinitis, bleeding, epilepsy, and sleeplessness. One of the active components in the medication, embelin, is said to have the ability to colour silk and woollen textiles (Table. 2).

### Benefits for Farmers (Kumar *et al.* 2021)

- Seeds are used to grow *E. ribes*, and ripening and harvesting are also key factors in the herb's effectiveness.
- Seed germination has around 90% viability in completely developed seeds, and introducing fully ripe seeds for raising planting materials is the only accessible means of propagation.
- Seeds are immediately sowed in the field at an optimal spacing of 1.0 x 1.0 meter.
- There are no significant diseases or pests found.

### Morphology

- It's a large, scandent bush with long branches; thin, pliable, linen roman shades internodes, and long branches. The stem is white grey in colour, speckled with intercellular spaces, and measures 45-72 cm in diameter at maturity.
- Lenticels are strewn throughout the bark.
- Lanceolate leaves are 6-14cm long and 2-4cm wide.
- Coriaceous leaves are 5X3 cm long, elliptic, obtusely acuminate, whole, glabrous on both sides, shiny above, with a round or sharp base and many primary nerves.
- Petioles are glabrous and margined.
- Fruits are globular, 2.4-4.0 microns in thickness, smooth, and tasty, with a hairy texture.
- Fruit is usually a grey black colour, although it may also be a dull red colour.
- Flowers are tiny, greenish-yellow, and borne in panicle racemes that are slack.
- Sepals are connate, widely triangular, ovate, and ciliate, and the calyx is minute.
- Petals are five and unattached, while stamens are five but shorter than petals.
- The month of February is when the flowers bloom.

## Packages and Practices (Shailija *et al.* 2021)

### (a) Climate and soil suitable for cultivation

- The production of this crop necessitates a tropical or subtropical environment, with medium-dark, well-drained soils being the ideal choice.
- Temperatures of 18°C to 35°C are also optimal for harvest, with average rainfall ranging from 700 to 1500 mm.

### (b) Propagation material

- *E. ribes* is propagated through seeds and cuttings.

### (c) Agro-techniques (Mohammad *et al.* 2020; Rout *et al.* 2020)

- **Site Pre-treatment and Chemical Application for Vegetative Growth:** During June and July, the crop is produced by planting seeds directly in the field. The field is ploughed thoroughly and then harrowed to get a fine tilth and weed-free soil. It is suggested that organic manure (FYM) be applied at a rate of 5-10 t/ha.
- **Appropriate Distance and Implanting:** Seeds are immediately planted in the field at a spacing of 1.0 X 1.0 meters.
- **Intercultural procedure:** Weeding, protective watering, support, and staking are examples of inter-culture operations that should be performed on a regular basis as needed.
- **Disease and Pest Control:** There are no significant diseases or pests found. In the event of a significant infestation, however, bio-control methods must be used.
- It is suggested that organic manure (FYM) be applied at a rate of 5-10 t/ha.

## Uses

### Phyto Constituents (Zimomi *et al.* 2019)

- *Embelia ribes* berries incorporate embelin, unstable oil, fixed oil, sap, tannin, and phenolic acids, for example, caffeic corrosive, vanillic corrosive, chlorogenic corrosive, and cinnamic corrosive, among others.
- 4.33 percent embelin, potassium embelate, 2, 5-dihydroxy, 3-undecyl-1,4-benzoquinone, daraprim, quercitol, fatty components, vilangin, and other chemicals are found in the berries of *Embelia ribes*.

### Important Therapeutic Uses (Syed *et al.* 2011)

- This versatile plant is used to treat a wide range of ailments, although it is most commonly used to treat worm infections. Its fruit is anti-helminthic and tonic to strengthen, according to Acharya Sushrut.
- To expel excess Vata dosha (Vata Dosha is made up of the characteristics of the elements ether and air.) Our energy and mobility, as well as nerve impulses, are all controlled by Vata. Vata manifests itself in-breath, speech, circulation, and digestion. Vai Vidanga is utilized to remove Vata from the gut.
- Its paste is used to treat infections on the skin.
- Cough and diarrhoea can be treated with an infusion of the roots.
- It is used to increase rasdhatvaagni, which accelerates the body's metabolism and aids in removing excess fat.
- This herb's fruits have antibacterial properties against *Staphylococcus aureus* and *E. coli*.

- Vidanga is a tonic and energy booster used in Ayurveda.
- Vidanga has been shown to help with anorexia and digestive fire.
- *Embelia ribes* fruits are said to help with headaches, rhinitis, bleeding, epilepsy, and insomnia.
- Embelin also has strong anti-fertility, antipyretic, and antibacterial properties.
- One of the traditional treatments for getting rid of tapeworms was to mix the fruit powder with milk and then take a purgative.
- Vai Vidanga is used to treat TB and chronic cough.
- It's also utilized as a fat burner, which means it helps you lose weight.
- It's used to treat toxicity from snake bites.
- It is also indicated for a variety of dental problems.
- Vidanga fine powder is applied to the nose to stop it from bleeding excessively.
- This plant is used to relieve constipation because of its laxative properties.
- The astringent leaves of this plant are used to heal sore throats and mouth ulcers.
- This plant treats diabetes by acting on the medhadhatu.

### Nutraceutical Values

1. **Anti-cancer activity:** Embelin is used to diminish tumor size and prevent the movement of serum enzymes including acid phosphatase, -glutamyltransferase, lactate dehydrogenase, aldose, and others from rising in rats with experimental fibrosarcoma. Embelin affects glucose and amino acid metabolism in tumor-bearing mice.
2. **Anticonvulsant activity:** Embelin, given intraperitoneally at doses of 2.5, 5, and 10 mg/kg body weight, reduces seizures caused by electroshock and pentylenetetrazol in a dose-dependent manner. A significant reduction in motility demonstrated CNS depressive impact. According to the findings, embelin exhibits anticonvulsant properties in both grand mal and petit mal epilepsy.
3. **Antioxidant property:** The degrees of pancreatic superoxide dismutase, catalase, and glutathione in streptozotocin (at measurements of 40 mg/kg, intravenously as a solitary portion) caused diabetic rodents are decreased when a fluid concentrate of *Embelia ribes* is given orally at dosages of 100 mg/kg and 200 mg/kg body weight. In streptozotocin-prompted diabetic rodents, its cancer prevention agent movement shields the pancreatic - cells from misfortune.
4. **Analgesic activity:** Embelin is a centrally acting non-narcotic analgesic that may be taken orally. It has a distinct core site of action than naloxone and is not antagonistic to it. Because of its great oral effectiveness, therapeutic index, and lack of abstinence syndrome, it is more tolerable than morphine. Naloxone is known to block the action of narcotic analgesics mediated by -receptors.
5. **Anti-spermatogenic activity:** For 15 or 30 days, male albino rats were given daily subcutaneous injections of *Embelia* at a dosage of 20 mg/kg body weight, which inhibited:
  - a) epididymal motile sperm count,
  - b) Indicators of fertility, such as pregnancy success.
  - c) The activity of glycolysis and energy metabolism enzymes. These modifications are reversible. When embelin is added to epididymal sperm suspensions, it inhibits sperm motility and glucose metabolism enzyme activity in a dose- and duration-dependent manner.

### Harvest Management

- **Plant Growth and Processing:** After 5-6 months of sowing, the crop matures, and fruiting begins in October-November when the fruits were picked and stored after shade drying.
- **Phytochemical Screening:** *Embelia ribes* seeds contain 2.5–3.1 percent embelin, 1.0 percent quercitol, 5.3 percent fatty components, and alkaloid schistembine, a resinoid, tannins, etc trace amount of volatile oils.
- **Yield:** The crop yield is 190-200 kg seeds per hectare.

**Post-Harvest**

- The storage of raw ingredients and packaging conditions has a critical influence on the effectiveness of formulations.
- Certain medicines are only available during certain seasons. Therefore we must restore them for future use.
- Soil and other undesirable elements contaminate raw herbs gathered from the field.
- Before being stored or used in formulations, they are processed (cleaning and drying).
- The most straightforward processing (primary processing) crude medicines is drying, which allows them to be stored.
- To get the most out of *Embelia ribes* and keep it for a long time, it must be appropriately processed.
- Natural drying is a standard method for drying Vidanga, particularly in locations where Vidanga maturity and harvesting coincide with the start of the dry season and the phytochemicals are not photosensitive.
- Natural drying is limited by its reliance on favorable weather conditions.

**Storage**

- A study of the drying and storage circumstances of Vai Vidanga fruits found that drying under varied conditions and storage containers has a significant impact on the quality of the fruits/ seeds.
- Fruits of Vai Vidang can be safely stored in low-cost moisture-proof containers, such as HDPE bags, for up to six months with 12 percent moisture and minimal quality loss. Gunny bags and marking bags are the least suitable for storage because they absorb moisture quickly, affecting biochemicals and material quality.

**Commercial Products**

- Plant Vai Vidanga creates relatively impure liquids, semisolids, or powders that are only meant to be used orally.
- Vidanga Powder is an anti-parasitic and anti-inflammatory pure plant extract.

***Embelia ribes* components and their use have been mentioned:** Extraction in the pharmaceutical business refers to separating medicinally active plant or animal tissues from inactive or inert ingredients using chosen solvents in traditional extraction techniques. Plants create relatively impure liquids, semisolids, or powders that are only meant to be consumed orally or externally. Table. 3 displays the data for *Embelia ribes* extracts that have been reported (Panigrahi *et al.* 2021).

**Table 3. Testified Excerpts of *Embelia ribes***

| S. No. | Extracts                 | Uses                                      |
|--------|--------------------------|---|
| 1      | Methanolic extract       | Modulatory action of acetylcholinesterase |
| 2      | Aqueous- Ethanol extract | Anthelmintic                              |
| 3      | Methanol extract         | Avoid pregnancy 75% of the time           |
| 4      | Ethanol extract          | Hepatoprotective, Antifertility           |
|        |                          | Uterine weight levels                     |
|        | Butanol extract          | Antifertility                             |
| 5      | Butanol extract          | Antifertility                             |
|        | Benzene extract          | Antifertility 51%                         |
| 6      | Benzene extract          | Antifertility 51%                         |
|        | n-Hexane extract         | Anthelmintic                              |

|    |                          |   |
|----|--------------------------|---|
| 7  | Petroleum ether extract  | Tapeworm, (but not round/hook) Prevent pregnancy<br>75% |
| 8  | Aqueous- Ethanol extract | No Antifertility, 37% Anthelmintic                      |
| 9  | Aqueous- Ethanol extract | No Antifertility, 37% Anthelmintic                      |
|    | Fresh juice              | Decongestant, soothing, and cathartic                   |
| 10 | Fresh juice              | Decongestant, soothing, and cathartic                   |
|    | Butanol extract          | No Antifertility, 37% Anthelmintic                      |
| 11 | Butanol extract          | Insecticidal activity                                   |
|    | Ethyl acetate extract    |   |
| 12 | Hexane extract           | Antifertility   |
| 13 | Fresh juice              | Decongestant, soothing, and cathartic                   |
| 14 | Powdered fruit           | Antifertility   |
| 15 | Milk extract             | Digestive & upper respiratory infection                 |
| 16 | Aqueous extract          | Hypolipidemic Anthelmintic                              |

(Source: www.ijpsr.com)

**Quality aspect** (Sahoo *et al.* 2020)

- Vidanga seeds are best used after a year of storage.
- In North-East India, *E. ribes* is used in Ayurvedic treatment as well as traditional medicine making.
- Several medical pharmaceuticals now trade fruits from North East India for the preparation of various goods.
- The primary danger to this plant is unsustainable and indiscriminate commercial harvesting.
- Habitat loss, Jhum cultivation, forest fires, and agricultural expansions contribute to the population decline.
- The advancement of in-vitro propagation may be critical in the conservation of this species.

**Conclusion**

The medicinal woody climber *Embelia ribes* Burm F belongs to the Myrsinaceae family. *Embelia ribes* contains embelin, which has antibacterial, antifertility, antiprotozoal, constipation, antifungal, mouth ulcer, sore throat, pneumonia, obesity, analgesic, anti-inflammatory, antioxidant, anthelmintic, antidiabetic, anticonvulsant, anticancer, anti-hyperlipidemic, wound healing, and molluscida properties. However, based on the research conducted, it can be concluded that this plant should be handled with caution to avoid any unintended side effects and that additional applications should be investigated. In this high-value medicinal plant, further study on propagation and high-quality planting material is required.

**Reference**

1. Harish, G.U., Vijay, Danapur., Renuka, Jain., Villoo, Morawala Patel.(2012). Endangered Medicinal Plant *Embelia ribes* Burm.f.-A review. Pharmacognosy Journal. 4(27): 6-19.
2. Krishnaswamy, M. and Purushothaman, K.K.(1980). Anti-fertility properties of *Embelia ribes*. Indian Journal of Experimental Biology.18(6):638-639.
3. Kumar, M., Prakash, S., Radha Kumari, N., Pundir, A., Punia, S., Saurabh, V., Choudhary, P., Changan, S., Dhumal, S. et al.(2021) Beneficial Role of Antioxidant Secondary Metabolites from Medicinal Plants in Maintaining Oral Health. Antioxidants. 10:1061.

4. Mohammed, S. S., Nayak, D. K., & Rout, S. (2020). Assessing medicinal plants biodiversity in and around Bhubaneswar, Odisha, India, *Ind. J. Pure App. Biosci.* 8(6), 420-424.
5. Panigrahi, S., Rout, S. and Sahoo, G.(2021). Ethnobotany: A strategy for conservation of plant. *Annals of R.S.C.B.25* (6): 1370-137.
6. Rout, S., Beura, S., Nayak, S., & Kar, S. (2020). Influence of Gibberellic Acid (GA3) Different Concentrations on Seedling Growth of Bael (*Aegle marmelos* L.), *Ind. J. Pure App. Biosci.* 8(4): 125-128.
7. Sahoo, G., Wani, A.M., Satpathy, B., Rout, S.(2020).Traditional Medicinal Plants of Odisha. *Research & Reviews: A Journal of Pharmacognosy.* 7(3): 7–10.
8. Shailja Choudhary, Hemlata Kaurav, & Gitika Chaudhary. (2021). Vaibidang (*Embelia ribes*): A Potential Herbal Drug in Ayurveda with Anthelmintic Property. *International Journal for Research in Applied Sciences and Biotechnology.* 8(2): 237-243.
9. Sudani R J, Akbari B V and Vidyasagar G.(2011). Pharmacogenetic and preliminary phytochemical investigation of *Embelia ribes* Burm f. *International Journal of Pharmaceutical & Biological Archives* 2011; 2: 648-651.
10. Syed Asadullah, Ramandang and Rajasekharan: Pharmacognosy of *Embelia ribes* Burm F.(2011).*International Journal of Research in Pharmacy and Chemistry.* 4: 1236-1251.
11. Zimomi, A.H., Kukreja,K., Debbarma,R., Khare, N. and Rout, S.(2019). Comparative study of chemical variants in *in vitro* and wild-grown root extract of *Valleriana wallichii* DC. *International Research Journal of chemistry.*24:1-14.