Establishing the correct botanical identity of Śivaliṅgī plant in India: A critical analysis based on various literatures

Acharya Balkrishna, Amita Singh, Rama Shankar, Rajesh Kumar Mishra, Anupam Srivastava, Bhasker Joshi and Abhilasha Chauhan

Abstract
The name Śivaliṅgī is used in Āyurveda against the two plants, named as Cayaponia laciniosa (L.) C. Jeffrey and Diplocyclus palmaus (L.) C. Jeffrey of family Cucurbitaceae. In appearance both the plants are having identical morphological characters with minor difference in the shape and size of leaf and seed characters, whereas according to Renner & Pandey, 2013, Cayaponia laciniosa (L.) C. Jeffrey is a local Jamaican endemic plant which is not found in India, but Diplocyclus palmaus (L.) C. Jeffrey is distributed all over India, Bhutan, China, Nepal, Pakistan, Thailand, South Japan, Sri Lanka, Philippines, Indonesia, Peninsular Malaysia, Papua New Guinea, NE Australia. So the study of Śivaliṅgī is focused on a comprehensive analysis of ancient Āyurvedic literatures, Research papers and authentic websites of plants. As per the morphology of seed, the plant Diplocyclus palmaus (L.) C. Jeffrey is more suitable and near to the Ayurvedic plant Śivaliṅgī however, as per various studies made on various aspects of medicinal uses of Cayaponia laciniosa (L.) C. Jeffrey has also been described in the name of Śivaliṅgī. Accordingly, the present review study based on literatures available, on traditional use, distribution, taxonomic identification, phytochemical studies, pharmacological actions and clinical trials, has been carried out and supports the name Śivaliṅgī for Diplocyclus palmaus (L.) C. Jeffrey as a drug for female infertility and other uses.

Keywords: Bryonin, Cayaponia laciniosa, Diplocyclus palmaus, Endemic, Infertility, Śivaliṅgī

Introduction
India is one of the richest sources of biodiversity in the world which is used as a live resource of the medicinal plants. Due to the availability of large number of traditional systems of healing since Vedic period the knowledge of utilizing these natural resources are increasing regularly. From time immemorial, human beings were depending upon the forests for food, shelter, clothing, ornamentation, religious beliefs and most importantly for health care. Different tribal communities have their own endemic system of treatment of ailments who are mostly residing in the forest areas and hilly terrains and they rely on these wild medicinal resources because, firstly lack of modern medical facilities, the effectiveness of their method of treatment without any side effects and their diverse knowledge of traditional method of treatment by the use of indigenous plants and also for basic healthcare for safety measures [1]. India has the huge reservoir of herbs used in various kind of treatment and formulations which are commonly used in Āyurveda, Unani, Siddha, Sowa Rigpa and Homoeopathy. India, around 25,000 effective plant-based formulations are practised in traditional and folk medicine used by over 1.5 million healing practitioners in India. Over 7800 manufacturing units are involved in the production of natural health care formulations and traditional plant-based formulations in India which have the annual demand of over 2000 tons of medicinal plant raw material every year [2].

Amongst these herbs Diplocyclus palmaus (L.) C. Jeffrey belonging to family Cucurbitaceae is distributed all over India, Africa, Indo-China and some parts of Australia. Its seeds are used for the treatment of female infertility in Ayurveda as Śivaliṅgī. It is a uterine tonic and improves the chances of conception in women suffering from infertility [3-5, 68]. In Ayurvedic System of medicines Śivaliṅgī is used along with Putrajivaka Bijja (Putrajiva roxburghii Wall.). Due to pollution, modern lifestyle and mental pressure on human beings the infertility problems are being prevalently increasing day by day in the entire world. Infertility records
vary from one region to the other in the world and it has been estimated to affect 8-12% couples worldwide. As per WHO records the cases of occurrence of primary infertility in India is between 3.9 and 16.8%. In the modern time people on its own turning to the traditional medicines, which are in use for over the centuries as a remedy for different ailments and Āyurveda comprises largest faith in this field [1].

In Ayurvedic and related literatures of India the plant of Śivaliñgī has been identified as Diplocyclos palmatus (L.) C. Jeffrey as well as Cayaponia laciniosa (L.) C. Jeffrey. *Diplocyclos palmatus* (L.) C. Jeffrey is the only species distributed all over India and is the actual Śivaliñgī of Āyurveda. In *Cayaponia laciniosa* (L.) C. Jeffrey has also been described in the various research papers, Ayurvedic and pharmacological literatures as Śivaliñgī. This problem came into existence due to wrong identification of the *Diplocyclos palmatus* (L.) C. Jeffrey by Linnaeus himself as *Cayaponia laciniosa* (L.) C. Jeffrey. Linnaeus erroneously equated synonyms of this plant with literature of a different genus and species from Asia [106]. *Cayaponia laciniosa* (L.) C. Jeffrey seems to be the correct name for the widespread West Indian, Central and South American plant hitherto known as *C. racemosa* (Mill.) Cogn. The Linnean epithet has long been erroneously applied to a widespread plant of the Old World tropics (India and neighbouring countries) in the combination *Bryonopsis laciniosa* (L.) Naud., for which species the correct name appears to be *Diplocyclos palmatus*. This erroneous use has resulted from Linnaeus’ wrong identification of this old-world species, which he knew at the time only from descriptions by Hermann, Boerhaave and Tournefort, with the plant he saw in cultivation at Hartekamp [107].

Occurrence of these two plants from the same family has developed immense scope for comparative studies on various aspects i.e. morphotaxonomy, phytochemical and pharmacological action studies as well as clinical trials to establish the two plants as the source medicine in similar action used in the name of Śivaliñgī. Accordingly, the required studies were made at various experimental level and the present communication deals with the review of all the studies conducted in past from time to time.

**Methodology**

The present study is focused on a qualitative and quantitative screening of various literatures like The Ayurvedic Formulary and Pharmacopoeia of India (API & API), Materia Medica, Medicinal plants used in Āyurveda, Ausdhanānārūgpavijnānam and peer reviewed Research papers from Google Scholar, Pub Med and other authentic websites by using keywords like Śivaliñgī, *Diplocyclos palmatus* (L.) C. Jeffrey, *Cayaponia laciniosa* (L.) C. Jeffrey, *Bryonia laciniosa* L., pharmacology, infertility, medicinal uses etc. Papers considered for evaluation till January 2021. The present paper deals with a comparative study of two medicinal plants *Cayaponia laciniosa* (L.) C. Jeffrey and *Diplocyclos palmatus* (L.) C. Jeffrey, which are called as Śivaliñgī in different areas of India according to various literatures are as following:

**Morphology of plants**

1. *Cayaponia laciniosa* (L.) C. Jeffrey
   **Family - Cucurbitaceae**

   **Genus etymology** - Name based on the block of Ge-speaking people of highlands of eastern Brazil, the Northwestern Ge, Northern Cayapo, Southern Cayapo and Suya [6].

   **Species etymology** - Derived from Latin word *laciniosa* means ‘jagged, fringed, and slashed, with many flaps’ [7, 8].

   **Common English Names** - Bryony [5, 9], Palmette diplocymes [10], Indian bryony [3, 11], Lollipop climber [12, 13], Lollipop plant [14].

2. *Hindi* - Babuputara [15], Bagiuriya [16-18], Ghargaru [16]

3. *Bilanja* [3, 15], Biguriya, Lingikaa, Linginee [3], Gargurullu [9]

4. *Gargumaru* [3, 18-21], Gargu-naru [3, 15, 22], Ishwaralingi [23]

5. *Isvaralinga* [10], Śivaliñgī [18, 23-28], Śivaliñgī [5, 10, 18]. Shiling [29], Śivaliñgī [13, 14, 18, 20, 21]

6. Shivaliñgani [18], Chawal [32, 33], Chawal [32, 33]

7. **Chattisgarhi** -curringhaupucki [23], Gujrat – Śivaliñgī [23], Malayalam – Nehoeaeka [16], Neohmaka [3, 19, 23], Marathi – Kavdoli [3], Kavadori, Kavale-cho-dole [16], Kawala [3, 19, 23], Kavale-chedole [22], Kavdali [3, 15, 18], Śivaliñgī, Vaduballi [3, 15, 18], Śivaliñgī [21], Sanskrit – Lingati [32], Bahuputara [32, 33], Šaivamallikā [32, 33], Lingasambhātā [32, 33], Devi [32, 33], Ćandā [32, 33], Śivaliñgī [33], Citraphalā [18, 33], Śayambhāthī [32], Lingī [32, 33], Paṇḍoli [33], Lingājā [32, 33], Āivālī [32, 33], Šivaliñgī [32, 33], Šivaliñgī [32, 33], Yākāpuṣpā [32, 33], Tutthī [32, 33], Kannada – Lingatondi (Kannada) [19].

**Botanical Description**


Herbs, stem branched, slender, grooved, glabrous; tendrils 2-fid. Leaves palmately 5 lobed, 8-12 cm long; lobes orbicular-ovate; denticulate, undulate, subcrenulate margins, upper surface scabrous, lower smooth; petioles 3-6 cm long. Flowers monoecious, 1-1.5 cm across, fasciculate cyme, greenish yellow. Male flowers; calyx tube 2-4 mm long, 3-6 mm across; lobes spreading, 1.5 mm long. Petals shortly papilllose, 4-10 mm broad; lobes ovate, apex acute. Stamens 3, free, inserted in the calyx tube; filaments short, 1-1.5 mm long; anthers ovate, 2 mm long, one unilocular and other bilocular. Female flowers; staminodes 3, short; ovary globose, 1.5-2 mm diameter, yellowish green; style slender; stigmas 3, papilllose. Fruits spherical 1.5-2 cm diameter yellowish green, 6-striped; seeds attenuate, scrobiculate, 4 mm diameter, grey or yellowish brown.

*Fl. & Fr. Cayaponia laciniosa*: August-December

**Distribution**

*Cayaponia laciniosa* is the native plant of Jamaica, North America.

2. *Diplocyclos palmatus* (L.) C. Jeffrey
   **Family - Cucurbitaceae**

   **Genus etymology** - Derived from Greek words *diplo* means ‘double’ and *ploos* means ‘circle; ring’; alluding to the tendrils [6, 33].

   **Species etymology** - Derived from Latin word *palmatus* means ‘with five or more veins arising from one point (usually on divided leaves), hand-shaped, palmate’ [7].

   **Common English Names** - Lollippoclimber [35-37], Marlebrine [35, 36], Nativebryony [35, 37, 38], Red-striped cucumber [35, 38], Striped cucumber [37], Hindi-Bankakra [35, 36], Bonakakra, Isvaralingi [35], Putloguli [36], Gujratī – Śivaliñgī [36], Tamil – Aivirali [35, 38], Aiviralkovai [35, 36], Iyveli [35, 36, 37], Iyveli [35], Sivalingakkay [35, 36], Shivalingakkay [35], Kannada – Angathondeballi [35], Limgatondeballi [35, 36], Lingakonde Balli [35, 36], Lingatondeballi [35, 36, 37], Mahaalinganballi [35, 36].
Maaninganaballi [35], Panchaguriya [35], Śivaliṅgi [35], Konkani – Karta [36], Malayalam – Aiviralikkova [35, 36], Neysatti [35], Neyyunni [35, 36, 38], Neyyurunj [35], Pambukodi [38], Sivalingakkaya [35, 38], Sivavalli [35, 38], Marathi – Kavdoli [35, 36], Mahadevi [35, 38], Shivlinge [35, 36], Sanskrit – Apashtambhini [36], Chitraphala [36, 39], Lingaja [36], Linguiṇi [36], Shivavalli [36], Telugu- Lingadonda [35, 36, 38], Garhaawal- Put-loguli [39].

Botanical Description


Herb, perennial, climber. Stem several metres long, glabrous. Leaves scabrous; lamina 5-13 × 6.5-14 cm, cordate at base; lobes 3-5, lateral lobes usually shallowly 2-lobed, narrowly lanceolate-elliptic, sub serrate, acute to subacuminate. Male flowers 2-8, fascicles mixed with 0-4 female flowers; calyx lobes subulate, 0.5-1 mm long; corolla lobes ovate, 5-10 mm long, white to greenish yellow. Female flowers with pedicels 1-5 mm long; staminodes 1 mm long; ovary 3-4 mm long. Fruit 2-2.5 cm long, solitary or clustered, red, ellipsoidal, 7 longitudinal white stripes. Seed 5 mm long, ellipsoidal, beaked (Plate 1 & 2).

Fl & Fr. Diplocyclos palmatus: September- December

Distribution
Diplocyclos palmatus (L.) C. Jeffrey is distributed all over India, Bhutan, China, Nepal, Pakistan, Thailand, South Japan, Sri Lanka, Philippines, Indonesia, Peninsular Malaysia, Papua New Guinea, NE Australia.

Chemical composition
Cayaponia laciniosa (L.) C. Jeffrey: Whole plant contain Bryonin [3, 11, 17, 19, 40, 43], Goniothalamin [3, 43-46], Punicic acid [43, 45, 46], lipids [45, 47], Glucomannan; Arabino glucoman nan; Goniothalamin [43, 47-49] and Terpenoids, Triterpenoids, Anthroquinone, Polyphenols, Glycosides, Anthocyanins, Tannins, Coumarins, Emodins, Saponins, total Alkaloids, total Flavonoids, Lignin and Serpentine [50, 51]. Leaves: contain Steroids and Polyphenolic compounds. Vitamins and minerals include boron, calcium, chloride, carbon, copper, magnesium, manganese, molybdenum potassium, phosphorous, sodium, sulphur, sulphate, selenium, sodium, zinc [51, 52].

Fruits: contain reducing sugars, Terpenoids, Triterpenoids, Aminoacids, Anthroquinone, Polyphenols, Glycosides, Anthocyanins, Tannins, Coumarins, Emodins, Saponins, total Alkaloids, total Flavonoids, Lignin and Serpentine [53]. Phytochemicals especially Flavonoids and Polyphenols [54]. Oleic Acid; Hexanoic acid; 2-Ethylcyclohexanone; 2-Methyltetraocane; 2-Undecenal; 1, 2-Benzenedicarboxylic acid; Ascorbic acid 2,6-dihexadecanoate; Octadecanoic acid; (2E)-2-Decenal; Sulfurous acid; n-Nonaldehyde; 2-Hepten-3-...
ol; Decadienal, 3-Octenoic acid; 1-[2-(acetyloxy)ethyl]-3-oxooctyl acetate acetic acid 3-acetoxy-5-oxo-decyl ester; 9-Octadecenoic acid; 2H-Pyran-2-one, Z,Z-[4,15-Octadecadien-1-ol acetate; Z,Z-[4,15-Octadecadien-1-ol acetate (4Z,15Z)-4,15-Octadecadienyl acetate; 2(3H)-Furanone, dihydro-5-tetradecyl- gamma; Z,Z-[4,15-Octadecadien-1-ol acetate (4Z,15Z)-4,15-Octadecadienyl acetate; Octadecanoic acid, Stearic acid; 2H-Pyran-2-one, tetrahydro-6-tridecyl-Octadecanoic acid; Oleic Acid 9-Octadecenoic acid (Z) DELTA; 2(3H)-Furanone, 5-dodecylidihydro-Hexadecanoic acid; 1- (+)-Ascorbic acid 2,6-dihexadecanoate; Diethyl Phthalate 1,2-Benzenedicarboxylic acid, diethyl ester; Acetic acid, 3- methylhept-3-yl ester; 9-Octadecenoic acid (Z)-octadec-9-enolic acid (9e)-9-Octadecenoic acid; Dimethyl phthalate 1,2-Benzenedicarboxylic acid; 1-[2-(acetyloxy)ethyl]-3-oxooctyl acetate acetic acid 3-acetoxy-5-oxo-decyl ester; Butyl 3-hydroxy-2-methylene-butanote Isobutylester; 3-Octenoic acid trans-4,5-Epox-(E)-2-decenal; 2-Undecenal Undec-2-enal 2-Undecen-1-2-methyltetracosane; 2-undecenal, e-(2e)-2-undecenal; Decadienal; 2,4-decadienal, (e,e)- (2e,4e)-2,4-decadienal; Nonanoic acid calcium palergone; 2-decenal, (e)- (2e)-2-decenal; Cyclohexanone, 2-ethyl- 2-Ethylcyclohexanone; 2-Octenoic acid Oct-2-enoic acid; Octanoic acid; Nonanol; 2-Hepten-3-ol, 4,5-dimethyl; Sulfurous acid, hexyl heptyl ester; Hexanoic acid Caproic acid [54]. Seed oil contains Punicic acid [3, 11, 25, 43, 44, 55].

**Diplocyclos palmatus** (L.) C.Jeffrey: Whole Plant contain Bryonin [56] and Fatty acid [57]. Fruits contain Chlorogenic acid, Gallic acid and Protocatechic acid [58]. Seed oil contains Punicic acid [59]. (Plate 3 & 4)

![Plate 3: Chemical Compounds Structures of *C. lasiniosa* and *D. palmatus* on the basis of various texts](image-url)
Pharmacological action and medicinal uses: According to ancient ayurvedic and various modern scripter’s both plants used to treat various disorders. (Table 1, 2 & Table 3) (Figure 1 & Figure 2)

Table 1: Comparative study of Pharmacological Action of Cayaponia laciniosa (L.) C. Jeffrey and Diplocyclos palmatus (L.) C.Jeffrey on the basis of various texts

<table>
<thead>
<tr>
<th>Pharmacological Action</th>
<th>Cayaponia laciniosa (L.) C. Jeffrey</th>
<th>Diplocyclos palmatus (L.) C.Jeffrey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute toxicity study</td>
<td>The acute toxicity study of alcoholic extract of Bryonia laciniosa L. was investigated that the drug was found to be nontoxic [59].</td>
<td>-</td>
</tr>
<tr>
<td>Analgesic and antiarthritic activity</td>
<td>The analgesic activity of methanol leaves extract of Bryonia laciniosa L. showed significant analgesic activity [60].</td>
<td>Ethanol extract of Diplocyclos palmatus (L) C. Jeffrey seeds reported analgesic, and antiarthritic activities [61].</td>
</tr>
<tr>
<td>Androgenic activity</td>
<td>The ethanolic extract of seeds of Bryonia laciniosa L. was evaluated for androgenic activity on male Albino rats and showed inhibitory effects on hypothalamo-pituitory gonadal axis [62].</td>
<td>-</td>
</tr>
<tr>
<td>Anti-asthmatic activity</td>
<td>70% alcoholic extract of Bryonia laciniosa L. increased the anti-asthmatic activity [59].</td>
<td>70% alcoholic extract of Diplocyclos palmatus (L) C. Jeffrey reported Antiasthmatic effects [63].</td>
</tr>
<tr>
<td>Anti-cancer/ Anti-tumor/ Cytotoxic activity</td>
<td>The methanol extract of Bryonia laciniosa L. exhibited significant antitumor and antioxidant activity in vivo [64].</td>
<td>70% alcoholic extract of Diplocyclos palmatus (L) C. Jeffrey increased the anticonvulsant activity [63].</td>
</tr>
<tr>
<td>Anti-convulsant activity</td>
<td>70% alcoholic extract of Bryonia laciniosa L. increased the anticonvulsant activity [59].</td>
<td>-</td>
</tr>
<tr>
<td>Anti-diabetic activity</td>
<td>The methanolic leaf extract of Bryonia laciniosa L. was evaluated for antidiabetic activity through its hypolipidemic effect in alloxan induced diabetic rats [43].</td>
<td>Antidiabetic activity recorded in Diplocyclos palmatus in streptozotocin induced diabetic mice [65].</td>
</tr>
<tr>
<td>Anti-inflammatory activity</td>
<td>The chloroform extract of Bryonia laciniosa L. exhibited significant anti-inflammatory activity [66].</td>
<td>Ethanol extract of Diplocyclos palmatus (L) C. Jeffrey seeds Anti inflammatory activities in animal models [61].</td>
</tr>
<tr>
<td>Anti-fertility activity</td>
<td>The ethanolic extract of seeds of Bryonia laciniosa L. was evaluated for anti-fertility activity [62].</td>
<td>-</td>
</tr>
<tr>
<td>Anti-microbial activity</td>
<td>Bryonia laciniosa L. showed weak antibacterial and significant antifungal activity against a wide range of gram positive and gram negative bacteria and fungi [67].</td>
<td>Ethanol extracts of leaf and stem parts of Diplocyclos palmatus through well diffusion method shows Antimicrobial activity [68].</td>
</tr>
<tr>
<td>Anti-oxidant activity</td>
<td>The methanolic extract of Bryonia laciniosa L. showed antioxidant activity [54].</td>
<td>Fruit extract reported Diplocyclos palmatus (L) C. Jeffrey as a noval antioxidant [69].</td>
</tr>
<tr>
<td>Anti-proliferative effects</td>
<td>-</td>
<td>Seed extracts of Diplocyclos palmatus (L) C.Jeffrey exhibited remarkable inhibitory effect toward the growth of MCF-7 with IC50 61.43±0.05 mg/ml [70].</td>
</tr>
<tr>
<td>Anti-pyretic activity</td>
<td>The methanol extract of the leaves of Bryonia laciniosa L. showed significant antipyretic activity [42].</td>
<td>-</td>
</tr>
<tr>
<td>Antivenom and Antidote activity</td>
<td>-</td>
<td>Leaves paste of Diplocyclos palmatus with betel leaves reported Antivenom and Antidote activity [68].</td>
</tr>
<tr>
<td>Mosquito larvicidal activity</td>
<td>The gonothalamin, isolated from the Bryonopsis laciniosa (L.) Naudin was investigated for mosquito larvicidal activity against the larvae of the mosquito, Culex quinquefasciatus say as a mosquitocide [49].</td>
<td>-</td>
</tr>
<tr>
<td>Mosquitocidal activity The crude extract of Bryonopsis laciniosa (L.) Naudin whole plant exhibited mosquitocidal activity against Culex quinquefasciatus [71].</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

Plate 4: Chemical Compounds Structures of C. lasiniosa and D. palmatus [105]
### Table 2: Competitive study of Medicinal uses of *Cayaponia laciniosa* (L.) C. Jeffrey and *Diplocyclos palmatus* (L.) C.Jeffrey on the basis of various texts

<table>
<thead>
<tr>
<th>Name of disorders</th>
<th><em>Cayaponia laciniosa</em> (L.) C. Jeffrey</th>
<th><em>Diplocyclos palmatus</em> (L.) C.Jeffrey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abscesses</td>
<td>The paste of leaves is applied for the treatment of abscesses [4].</td>
<td></td>
</tr>
<tr>
<td>Adenitis</td>
<td>The plant is used for the treatment of adenitis [33].</td>
<td><em>D. palmatus</em> is recommended in the treatment of adenitis [55, 56].</td>
</tr>
<tr>
<td>Ague</td>
<td>Various parts of the plant are used for ague [55, 66, 72].</td>
<td>Plant is used to treat ague [55, 56].</td>
</tr>
<tr>
<td>Animal bite</td>
<td>Whole plant is used for the treatment of snakebite from saw-scaled viper (21, 55, 72-74).</td>
<td></td>
</tr>
<tr>
<td>Asthma</td>
<td>Leaf, stem, fruit and seeds are used for the treatment of asthma [42, 66, 72].</td>
<td></td>
</tr>
<tr>
<td>Adenopathy</td>
<td>Leaf, stem, fruit and seeds are used as potent medication in adenopathy [66, 72].</td>
<td></td>
</tr>
<tr>
<td>Alzheimer’s disease</td>
<td>Traditionally, leaves and roots can bind to mercury for the treatment of Alzheimer’s disease [3].</td>
<td></td>
</tr>
<tr>
<td>Boils</td>
<td>The paste of leaves is employed in boils [9, 20, 36, 77].</td>
<td></td>
</tr>
<tr>
<td>Biliousness</td>
<td>Whole plant is used for the treatment of bilious attack [10, 16, 17, 18, 20, 40].</td>
<td></td>
</tr>
<tr>
<td>Burns</td>
<td>The tender twig extract is used for healing burns [4, 74].</td>
<td></td>
</tr>
<tr>
<td>Bronchitis</td>
<td>Leaf, stem, fruit and seeds are used as potent medication in bronchitis [54, 66, 72].</td>
<td></td>
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<tr>
<td>Cancer</td>
<td>Fruits are used for the treatment of stomach swelling or tumour [54, 55, 64].</td>
<td></td>
</tr>
<tr>
<td>Carbuncle</td>
<td>The plant is applied topically for the treatment of carbuncles [4, 40, 55, 72].</td>
<td></td>
</tr>
<tr>
<td>Cephalgia</td>
<td>-</td>
<td>Plant is used to alleviate cephalgia [55].</td>
</tr>
<tr>
<td>Conception Promotor</td>
<td>In Folk medicine, 45 seeds with jaggery are administered immediately after menstruation on 4 consecutive days or alternate days for 8 days to conceive [5, 4, 42]. Powered seeds from fruits are given to bring about conception in women [5, 40, 55], for 3 days after menstrual period to increase chances for pregnancy mostly by the Bhils [14]. The ripe fruits or 6-9 seeds are given to the woman for 5 days to bring about pregnancy [4, 79].</td>
<td></td>
</tr>
<tr>
<td>Colic</td>
<td>The plant is used to alleviate colic pain [55, 66, 72].</td>
<td></td>
</tr>
<tr>
<td>Colitis</td>
<td>The plant is used for the treatment of colitis [60].</td>
<td></td>
</tr>
<tr>
<td>Constipation</td>
<td>It is used for the treating convulsions in neurological disorders [4, 55, 66, 72].</td>
<td></td>
</tr>
<tr>
<td>Constipation</td>
<td>The plant is used to relieve constipation [16, 40, 41, 53].</td>
<td>One seed with spoonful of animal ghee is used in conception [61].</td>
</tr>
<tr>
<td>Diabetes</td>
<td>The leaves or fruits are given in case of diabetes to control blood sugar [4, 54] and diabetes mellitus [43].</td>
<td>It is used in leukorrhea and strengthens vaginal muscles [82] and milk sterility in women [83].</td>
</tr>
<tr>
<td>Drooling</td>
<td>The plant is used to reduce foaming at the mouth [55].</td>
<td></td>
</tr>
<tr>
<td>Dyemock</td>
<td>Extract of the young twigs is given along with a glass of hot goat milk at bedtime or at the morning as a dyemock [31].</td>
<td></td>
</tr>
<tr>
<td>Dyspepsia</td>
<td>Extract of the leaves is given twice a day, 1-2 teaspoonful each time to cure dyspepsia [31].</td>
<td></td>
</tr>
<tr>
<td>Dysmenorrhoea</td>
<td>In homeopathy, root tincture is employed in dysmenorrhoea [4, 41].</td>
<td></td>
</tr>
<tr>
<td>Dysentery</td>
<td>Plant is valued as remedy for diarrhoea and dysentery [4].</td>
<td></td>
</tr>
<tr>
<td>Earache</td>
<td>-</td>
<td>Fruit juice is poured in ear to alleviate ear ache [84].</td>
</tr>
<tr>
<td>Endometritis</td>
<td>The tincture of roots is used for an inflammation of uterus [11].</td>
<td></td>
</tr>
<tr>
<td>Febrifuge</td>
<td>Leaves and seeds are used as for the treatment of fever [34, 60, 70].</td>
<td></td>
</tr>
<tr>
<td>Flatulence</td>
<td>Bitter tonic from seeds or plant is used against flatulence [9, 16, 19, 24, 40, 41].</td>
<td></td>
</tr>
<tr>
<td>Gastro-intestinal disarray</td>
<td>-</td>
<td>Plant is used to treat flatulence, constipation, colic pain, stomach disorder and dysentery and intestinal worms [55, 63, 61, 82, 86].</td>
</tr>
<tr>
<td>General debility</td>
<td>-</td>
<td>Plant is used in the treatment of general debility [86].</td>
</tr>
<tr>
<td>Headache</td>
<td>The various parts of the plant are used to ameliorate headache [46, 55, 72].</td>
<td></td>
</tr>
<tr>
<td>Hepatic disorder</td>
<td>-</td>
<td>Plant is used to treat biliary attack and jaundice [56, 82].</td>
</tr>
<tr>
<td>Inflammation</td>
<td>Traditionally leaves and roots are mixed with mercury and applied topically against inflammation [1, 41, 87]. In inflammations, a bitter principle bryonin is extracted and applied externally [40]. Boiled leaves are eaten or tied on affected area [19, 20, 23, 78, 85]. Whole plant or fruits are used against inflammation [46, 54].</td>
<td>Plant is used to alleviate inflammation [56].</td>
</tr>
<tr>
<td>Impotency</td>
<td>Whole plant is used for the treatment of impotency [24, 66, 72].</td>
<td></td>
</tr>
<tr>
<td>Insect bite</td>
<td>Leaf juice applied on inflammation after scorpion sting [10] and a chemical goniothalmin</td>
<td></td>
</tr>
</tbody>
</table>
Table 3: Comparative study of plant part use, dosages and toxicity of Cayaponia laciniosa (L.) C. Jeffrey and Diplocyclos palmatus (L.) C. Jeffrey on the basis of various texts

<table>
<thead>
<tr>
<th>Plant Part</th>
<th>Cayaponia laciniosa (L.) C. Jeffrey</th>
<th>Diplocyclos palmatus (L.) C. Jeffrey</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Plant Part use</strong></td>
<td>Whole plant [11, 22, 93, 94], (panchang) [22, 94], leaves [3, 4, 9, 10, 20, 31, 55], twigs [31, 58], seeds [5, 4, 11, 24-26], roots [3, 4, 11, herb [9], flowers [93].</td>
<td>Leaves [27], Seed [27, 81], Fruit [88].</td>
</tr>
<tr>
<td><strong>Dosages</strong></td>
<td>45 seeds as a single dose [3, 11], Tincture of the subterranean part (Class C) [95].</td>
<td>Powder-3 to 6 g [96].</td>
</tr>
</tbody>
</table>
Powdered seeds are recommended for 3-5gms. Take 1 gram powder of Śivaliṅgī beej, 1 gram powder of Putrajivak giri with milk of mulching cow having a calf daily early morning before eating anything is recommended for increasing chances of conception. For promoting pregnancy, take seeds of the plant and make small pills with jaggery, or else take 2 pills twice in a day for half month or take 3 seeds or ripe fruits and chew or take ripe fruits of the plant and chew. Do this twice a day for half month.

Plant is toxic and stock poisoner.

Ayurvedic Properties and Action

*Cayaponia laciniosa* (L.) C. Jeffrey


**Karma** (action): Apatyakara-putrajanana; Prajasthapana; Rasayana; Balya; Sidhmahara; Vaatakaphajwara [30].

**Roghanata:** Bandhyatva [30]; Carmaroga; Jvara [30]; Adhmana [30]; Dourbalya [30].

According to *Bhavapraakasha*, the seeds of Śivaliṅgī (*C. laciniosa*) is taken with milk, promote the conception of a male child [11, 30]. It is reported to be foetid [33] and useful in Sidhmā [32]. Śivaliṅgī (*C. laciniosa*) cleanses and nourishes the Artavavaha Shrotas [13].

**Diplocyclos palmatus** (L.) C. Jeffrey

**Raspanchak:** Rasa: Katu, tikta [98].

According to Venkateshwarlu *et al*. *D. palmatus* is a known ayurvedic drug used as an aphrodisiac, tonic, leucorrhoea and as an antipyretic in Āyurveda [99]. The plant shows different properties like foetid smell (durgandha), thermogenic (Tapakara), anti inflammatory (Shotha rodhi), alterative, depurative and tonic & rejuvenative (rasayani) and useful in vitiated conditions of Vata & Pitta doshas, cough, flatulence, skin diseases, inflammations and general debility and also useful in sidhma kushta (A type of leprosy) [98].

**Discussion and Conclusion**

After going through the literature, it is found that both the plants are similar in morphological appearance i.e. herb, annual, scandent monoecious with minute difference in shape and size of leaf, leaves 5-lobed, membranous, scabrid above, smooth or so beneath, denticulate or sub serrate in *C. laciniata*, leaves 3-lobed, cordate, at base, upper surface being punctuate, lobes acute or subacuminate at apex, entire or distantly serrate in *D. palmata*. Corolla being broadly campanulate, 5-partite; segments greenish yellow, ovate,
acute, pubescent in *C. laciniosa* and yellow, campanulate, 5-partite, stamens 3, free; one anther 1-locular, 2 anthers 2 locular, loculi linear, slightly flexuose in *D. palmate*, seeds are being many, subpyriform, with raised projections on either side, margin strongly belted without partition wall in *C. laciniosa* and many, ovoid, smooth attenuate, conspicuously belted with partition wall in *D. palmata* cause the major differences in both the plants.\[100\]

Śivaliṅgi is mentioned in old treatise like Rajanighantu, Nigantu aadarsh and Shaligram nighantu. The description of Shivlingi is not found in The Ayurvedic Formulary of India (AFI) and Ayurvedic Pharmacopoeia of India (API). According to some literatures like *Indian Materia Medica*, Aushadhopyayogi *Ayurvediya Vanaspati Kosh*, Aasadhnamurupavijnanam, *Medical plants used in Ayurveda*, *A Scientific Review on Śivaliṅgi Beej (Bryonia laciniosa): A Mystical Ethno-Medicine for Infertility*, the name Śivaliṅgi has come into existence in the name of *Bryonia laciniosa* L. [8, 69, 101,103], where as after thoroughly checking the taxonomic literature it was found that this plant is endemic to Jamaica and it does not exists in India [106, 107]. Few authors considered *Diplocyclos palmatus* as synonym of *Bryonia laciniosa* [63], which is taxonomically not possible because both the plants are separate species as clarified in the introduction part.

Shantha *et al.* considered *Diplocyclos palmatus* as the actual Śivaliṅgi [104] and Jeffrey (1962, 1971) [107, 108] and Renner & Pandey (2013) [106] gave taxonomic evidence in support of this view. The phytochemical constituent i.e. the presence of a common alkaloid bryonin which is said to be responsible for the clinical activity for the treating ailments support the use of *D. palmata* for the treatment of the related diseases against the name Śivaliṅgi, and the modern literature supports *D. palmata* as Śivaliṅgi [104].

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References


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86. Vardhana R. Medicinal and the economic plants. New Delhi, India: Shree Publishers and Distributors 2013,4v.


