



## Comparative morphology of *Tephrosia candida* (Roxb.) DC and *Tephrosia vogelii* Hook.f.

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### ABSTRACT

Morphological characters provide taxonomic evidence. Present investigation aimed at comparing morphological features of *Tephrosia candida* (Roxb.) DC and *Tephrosia vogelii* Hook.f. which are rare species of family Fabaceae. The former plant has been used for its insecticidal properties while the latter plant has noted medicinal value, pods and leaves are diuretic, expectorant, sedative, used for parasitic skin diseases, cough etc. Present study deals with comparative morphology to add taxonomic value.

**Keywords:** *Tephrosia*, morphology, Fabaceae.

**Introduction:** The genus *Tephrosia* Pers. of Fabaceae (Papilionoideae tribe Millettieae) comprises c. 345 species (Mabberley, 2008). Being one of the largest genera in the family Fabaceae (Geesink, 1984) it enjoys pantropical distribution. The genus is represented in India by 27 species and one variety (Sanjappa, 2010).

*Tephrosia candida* (Roxb.) DC. Is widely known species belonging to tribe *Millettieae*, of family *Fabaceae*. It is commonly known as *White Hoary Pea*. The leaves of *T. candida* are high in protein and are used as a fodder for livestock, the wood is used for fuel and there are many other uses of the plant's parts. It is cultivated as a mulch, green manure, nurse crop and windbreak (Orwa *et al.* 2009). It is planted as a shade tree in agroforestry systems (Nguyen and Thai, 1993) and as a nurse tree for commercial timber species, such as *Shorea robusta* in India (Krishnaswamy, 1956).

*Tephrosia vogelii* Hook.f. is a rare species of family Fabaceae. It is medicinally important species. Pods and leaves diuretic, expectorant, sedative, used for parasitic skin diseases, cough etc. Leaves used as an abortifacient, bactericide, emetic and purgative, molluscicide, for skin diseases, schistosomiasis; and weak infusion of the leaves taken as an anthelmintic; dry crushed leaves insecticide, against lice, fleas, ticks. Leaves and young stems fish and arrow poison (Quattrochhi U., 2012).

## Materials and Methods:

The plant specimens of *Tephrosia candida* (Roxb.) DC. were collected from Lumami, Near Nagaland University, Zunheboto (Nagaland) – 798627, Field No. 1032, Latitude N 23°45'12.50" , Longitude E 94°56'46.38", Altitude 875 m. While the plant specimens of *Tephrosia vogelii* Hook.f. were collected from area near Pullivasal Tea estate, Munnar, Kerala, field number 2021. Morphological characters were studied by using simple microscope and observations.

## Results and observations:

### I) Morphology:

**Tephrosia candida** (Roxb.) DC., Prodr. 2: 249. 1825; Wight & Arn. Prodr. Fl. Ind. Orient. 210. 1834; Hook.f. Fl. Brit. India 2: 111. 1876; Fyson, Fl. S. Ind. Hill stat. 158. 1932; Matthew, Mat. Fl. Tamilnadu Carnatic 198. 1981; Bosman & Haas, Blumea 21: 445. 1983. *Kiesera candida* (DC.) Reinw. Syll. Pl. Nov., 2: 11. 1828. *Kiesera sericea* Reinw. Syll. Pl. Nov., 2: 11. 1828. *Robinia candida* Roxb., Fl. Ind. 3: 327. 1832. *Xiphocarpus candidus* Endl. Gen. Pl. 1273. 1840; Zoll. & Mor. in Nat. en Geneesk. Arch. Neerl. Indie 3: 76. 1846.

**Vernacular Names:** English: *White Hoary Pea*, *hoang pea*; French: *indigo blanc*, *indigo sauvage*; Chinese: *bai hui mao dou*; Bangladesh: *bangara*, *bogamedula*; Brazil: *tefrósia*; French Polynesia: *requie'nie*; India: *boga medalo*, *boga-medeloa*, *kulthi*, *lashita*, *masethi*; Indonesia: *enceng-enceng*, *kapeping badah*, *poko tom*; Papua New Guinea: *pis pea*; Vietnam: *cot khi*.

Shrubs; branchlets wooly. Leaves *c.* 15 cm; rachis including the petiole upto 22.5 cm long with brown indumentums; leaflets 8-13 pairs, opposite, narrowly ovate or oblong-elliptic to narrowly obovate, 3-6 × 0.8-1 cm, glaucous green, chartaceous, rusty above, wooly below, base acute, margin entire, apex acute, mucronate, venation prominent below; petiole *c.* 2 cm; petiolule upto 3 mm; stipules subulate, 5 – 11 × 0.8 – 1.5 mm, caducous. Inflorescence of pseudoracemes or pseudopanicles, axillary or terminal, and leaf-opposed, *c.* 2.5 – 35.0 cm long; flowers in clusters of 5 – 13, 13.0 – 26.0 mm long; white, silky, with dark brown hairs on the outside; basal bracts few, leaf like, upper bracts narrowly triangular 2.2 – 6.0 × 0.6 – 2.0 mm, usually caducous; pedicel *c.* 1.5 cm. Calyx campanulate, tube 1.5 mm. Corolla white, exserted; standard orbicular or broadly ovate to obovate, 1 × 1.5 cm, sericeous, apex rounded to emarginated, acuminate, claw 1.0 – 5.0 mm long; wings obovate, 2 × 0.8 cm, glabrous, claw 1.0 – 4.4 mm long; keels 2 × 1 cm, glabrous; claw 1.5 – 5.0 mm long. Stamens 10, vexillary filament free at base, connate half way, other filaments alternately longer and shorter, staminal sheath *c.* 2 cm ; filaments *c.* 3 mm. Ovary 1.5 cm, stiff-hirsute; style up to 1 cm, pubescent, geniculate. Pod linear, 6.5 – 12.0 × 0.5 - 0.8 cm, green or brown, wooly, continuous within, apex slightly curved, 10 – 17 seeded. seeds ellipsoid, compressed, *c.* 2.56 mm, brown or greyish brown, strophiolate.

**Fl. & Fr.:** August - January.

**Distribution.:** India (Tropical Himalayas from Kumaon to Sikkim, Assam, Bihar, Gujarat, Karnataka, Manipur, Meghalaya, Rajasthan, Tamil Nadu, West Bengal), Sri Lanka, Nepal, Bhutan, Bangladesh, Burma, Malaysia, New Zealand, W Indies, USA (Hawaii Islands).

**Localities:** Near Nagaland University, Lumami, Dist. Zunheboto (Nagaland).

**Status:** Rare.

**Tephrosia vogelii** Hook. f., Fl. Niger 296. 1849; Sebast., Bull. Bot. Surv. India 2: 3. 1960. *Cracca vogelii* Kuntze, Revis. Gen. Pl. 1: 175. 1891.

**Vernacular Names:** English: Fish poison bean, Fish poison Tree, Vogel's Tephrosia; Portugese: *Tefrosia*; Spanish: *barbasco guineano*.

Soft, woody branched shrub or small tree, 0.5 – 4 m tall, with dense foliage, indumentums velvety-silky. Stems and branches tomentose with long and short white or rusty-brown hairs. Leaves arranged spirally, imparipinnate; stipules 10 - 22 × 3 - 3.5 mm, lanceolate, early caducous; rachis 5 - 25 cm long, including a petiole of 1 – 3 cm; including petiolule 2 -5 mm long; prolonged 2 – 7 mm; leaflets 11-29, narrowly elliptic to elliptic-oblong, up to 2.7 - 8 × 1 - 2 cm, base acute to obtuse, apex rounded to emarginate, venation most prominent on abaxial surface, silky tomentose. Inflorescence a terminal or axillary pseudo-raceme, 8-26 cm long, rusty tomentose; basal bracts leaflike, caduceous, ovate, acuminate, upto 12 × 9 mm; peduncle stout, at least 2.5 mm or as long as pseudo-raceme; flower 17- 26 mm; Fragrant when fresh, white, pedicel up to 23 mm long, pubescent; calyx brown tomentose, tube 4 mm, lobes 5 - 10 mm long, 2 upper lobes oblong, united almost to tip, rounded at apex; lateral lobes oblong, rounded at tip, upto 7 × 4 mm, lower lobe, narrow, boat-shaped, acute, upto 10 mm long. Standard white silky 24 - 35 mm, wings 20 - 28 mm and keels 20-28 mm, pubescent at margins; stamens 28-32 mm long; upper filament lightly attached, strongly dilated upto 2 mm, above the base; staminal sheath upto 19 mm; free parts 4 – 8 mm, anthers 1.7 mm long. Carpel 25 mm long, style 10 mm long, shortly pubescent on both sides, incurved at the tip. Pods linear, slightly turgid, 6.5 - 11 × 0.8 – 1.8 cm. Rusty brown tomentose, woolly to soft silky, 6 – 11 seeded. Seed ellipsoid to reniform, 5 – 7 × 3 – 5 mm, dark brown to black, smooth (Table-I) (Plate – I).

**Fl. & Fr.:** September – October.

**Exsiccata:** TAG, 2021, Munnar (Kerala).

**Distribution.:** India (Introduced in Tamil Nadu) - a native of tropical Africa.

**Localities:** Munnar (Pullivasal Tea Estate), Kerala.

**Status:** Occasional.

**Table I: Morphological Characters (Vegetative):**

	Characters	Observation in <i>T. candida</i> (Roxb.) DC	Observation in <i>T. vogelii</i> Hook.f.
Vegetative	Habit	Shrub	Shrub/small tree
	Plant Height	2.13 m	2.45 m
	Life Form	Erect	Erect
Leaflets	Surface	Smooth	Smooth
	Number	13 – 27	11 – 29
	Shape	Oblong-Elliptic	Elliptic-elliptic oblanceolate
	Dimensions (cm)	3.0 – 6.0 × 0.8 – 1.0	2.7 – 8.0 × 1.0 – 2.0
	Apex	Obtuse/Mucronate	Rounded – Emarginate
	Upper Surface	Rusty	Silky tomentose
	Lower Surface	Wooly	Dense silky tomentose
Stipules	Length (mm)	5.0 – 11.0	10.0 – 22.0
	Shape	Subulate	Lanceolate
	Apex	Acuminate	Acute
Stalk	Pubescence	Tomentose	Tomentose
	Petiole length (mm)	4.0 – 20.0	10.0 – 30.0
	Petiolule length (mm)	3.0	4.5

**Table II: Morphological Characters (Reproductive):**

	Characters	Observation in <i>T. candida</i> (Roxb.) DC	Observation in <i>T. vogelii</i> Hook.f.
Inflorescence	Length (cm)	19.0	26.0
	Position/Type	Axillary/terminal Pseudoraceme/ Pseudopanicule	Terminal/Axillary Pseudoraceme
	Peduncle (cm)	7.5	2.5
	No. of flowers	c. 13	c. 22
Bracts	Shape	Triangular	Ovate
	Pubescence	Silky	Silky
	Calyx Tube (mm)	8.5	4.0
Calyx	Upper Sepal (mm)	8.2	7.0
	Lower Sepal (mm)	8.6	10.0
	Teeth Shape	Campanulate	Oblong Boat shaped
	Apex	Acuminate	Rounded Acute
	Pubescence	Silky	Tomentose
Corolla	Colour	White	White
	Standard Size (mm)	10.0 × 15.0	30. × 12.5
	Standard Shape	Orbicular Broadly ovate-obovate	Orbicular
	Wing Size (mm)	20.0 × 8.0	26.0 × 9.6
	Keel Size (mm)	20.0 × 10.0	25.5 × 13.5
Androecium	Staminal Sheath Length (mm)	20.0	19.0
	Filament Length(mm)	3.0	8.0
	Ovary Length (mm)	15.0	25.0
Gynoecium	Style Length (mm)	10.0	10.0
	Style Pubescence	Pubescent	Pubescent
Pods	Size (cm)	11.0 × 0.7	10.5 × 1.5
	Shape	Linear	Linear
	No. of Seeds	10 – 17	6 – 11

	Size (mm)	3.0 × 2.0	7.0 × 5.0
<b>Seeds</b>	Shape	Ellipsoid	Ellipsoid-Reniform
	Colour	Greyish brown	Dark Brown - Black

**Conclusion:** In *T. candida* the filament is 3.0 mm while in *T. vogelii* it is 8.0 mm. *T. candida* has the peduncle of 7.5 cm while *T. vogelii* has 2.5 cm. Both plants have linear pods with 10-17 seeds in *T. candida* and 6-11 seeds in *T. vogelii*. Seeds are greyish brown in *T. candida* whereas they are dark brown-black in *T. vogelii*. These morphological features are of importance in distinguishing the two species.

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