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**Journal of Research in Indian Medicine**  
**An Official Publication of Bureau for Health & Education Status Upliftment**  
 (Constitutionally Entitled As Health-Education, Bureau)

JRIM

## COMPARATIVE PHARMACOGNOSTIC STUDY OF SENNA TORA LINN AND SENNA OBTUSIFOLIA LINN

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### ABSTRACT:

Chakramarda (*Senna tora* Linn.) is widely used in Ayurveda for the treatment of various disorders. *Senna tora* Linn. is often confused with *Senna obtusifolia* Linn. due to their morphological similarities. In present study, morphological and microscopic profiles were evaluated to differentiate these two species. Transverse sections of stems of these two species showed almost similar characteristics but on the basis of morphological characteristics, we can differentiate them with respect to their stems, leaves, flowers, pods and seeds.

**Keywords:** *Senna tora* Linn., *Senna obtusifolia* Linn., morphology, anatomy

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Website: <http://heb-nic.in/jrim>

Received on 01/01/2021

Accepted on 06/01/2021 © HEB All rights reserved

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**INTRODUCTION:**

In Ayurveda, seeds of Chakramarda (*Senna tora*) are used in various skin disorders<sup>1</sup>. It was observed that most of the material obtained from market as Chakramardabeej (seeds) for medicinal use consists of mixed seeds of *Senna tora* and *Senna obtusifolia*. It may be due to misidentification of these two species by collectors. Morphologically these two species closely resemble each other. *Senna tora* and *Senna obtusifolia* were previously known as *Cassia tora* and *Cassia obtusifolia* respectively. They were placed in the genus *Senna* by Irwin and Barneby (1982)<sup>2</sup>. Both species belongs to the subfamily Caesalpinioideae (Caesalpinaceae) of the family Leguminosae (Fabaceae) and found in wild as weed in India. *Cassia obtusifolia* L. and *Cassia tora* L. were described by Linnaeus<sup>3</sup> as two distinct species of the genus *Cassia* and as synonyms by Benth<sup>4</sup> and Hooker<sup>5</sup>. Morphological differences were described by many scientists<sup>6,7,8,9</sup>. Also, *Senna obtusifolia* and *Senna tora* are distinct in several phytochemical characters. Obtusin, obtusifolin, stigmaterol and Hystidine are present only in *Senna obtusifolia* and chrysoobtusin, Cyotine  $\gamma$ -hydroxyatginine and aspartic acid only in *Senna tora*<sup>10</sup>. In present study, along with morphological characteristics, transverse sections of stems of both species were observed.

**METHODOLOGY:**

Wildly occurring fresh samples of *Senna tora* and *Senna obtusifolia* were collected from Shevgaon, dist. Ahmednagar (Maharashtra). The material was separated into leaves, stems, flowers and fruits for macroscopic examination. For microscopic study, stems of 0.5cm in diameter were selected. Free hand sections of stems were carried out by razor blade and stained with safranin. Slides were observed under microscope (15× eyepiece and lenses: 5× & 10×)

**OBSERVATIONS AND RESULTS:****Morphological characteristics of *Senna tora* Linn. and *Senna obtusifolia* Linn.**

*Senna tora* L. and *Senna obtusifolia* L. are annual and bushy herbs, 0.5-2 m high. Stems are erect, nearly hairless and often profusely branched. In the field, *S. tora* can be distinguished from *S. obtusifolia* by the foetid smell.

**Leaves :**

	<i>Senna obtusifolia</i> Linn.	<i>Senna tora</i> Linn.
Phyllotaxy	Alternate	Alternate
Leaves	Pinnately compound , 8-12 cm long	Pinnately compound , 8-12 cm long
Stipules	1-2 cm long	1-2 cm long
Petiole	2-4.5 cm long	1.5-2 cm long

Leaflets	3 pairs, opposite, 2.5-4 cm long and 1-2 cm broad, increasing in size from the base to the apex of the leaf obovate-oblong, glaucous, Main nerves – 8-10 pairs	3 pairs, opposite, 2.5-4 cm long and 1-2.5 cm broad, increasing in size from the base to the apex of the leaf obovate-oblong, glaucous, Main nerves – 8-10 pairs
Rachis	Grooved	Grooved
Glands on rachis	Only one gland on rachis between lowest pair of leaflets	Total two glands on rachis, each between two lowest pairs of leaflets

**Table 1: Morphological characters of leaves of *S. Obtusifolia* & *S. tora***



*Senna obtusifolia*



*Senna tora*



\**Senna obtusifolia*



\*\**Senna tora*



*Senna obtusifolia*



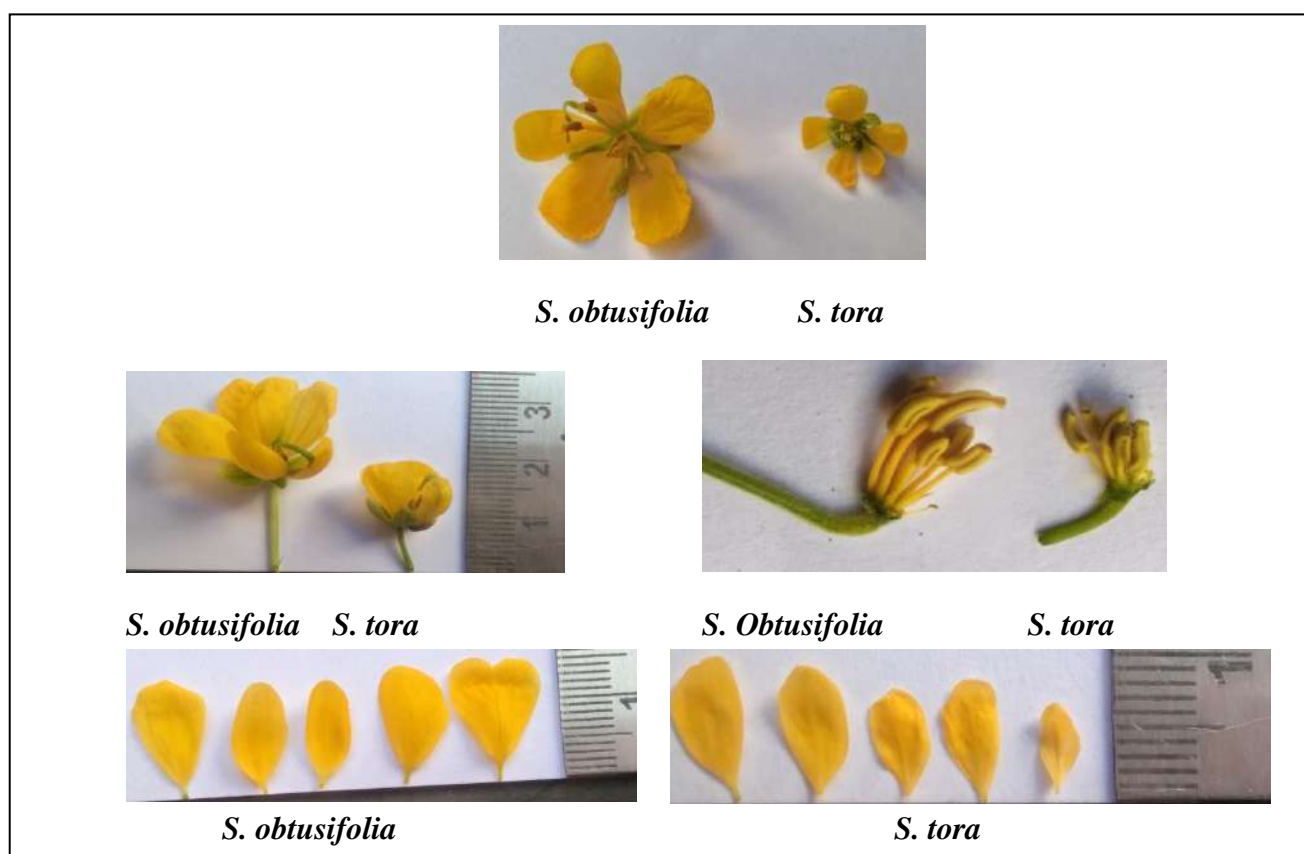
*Senna tora*

\* *Senna obtusifolia* - Only one gland on rachis between lowest pair of leaflets.

\*\**Senna tora* - Total two glands on rachis, each between two lowest pairs of leaflets.

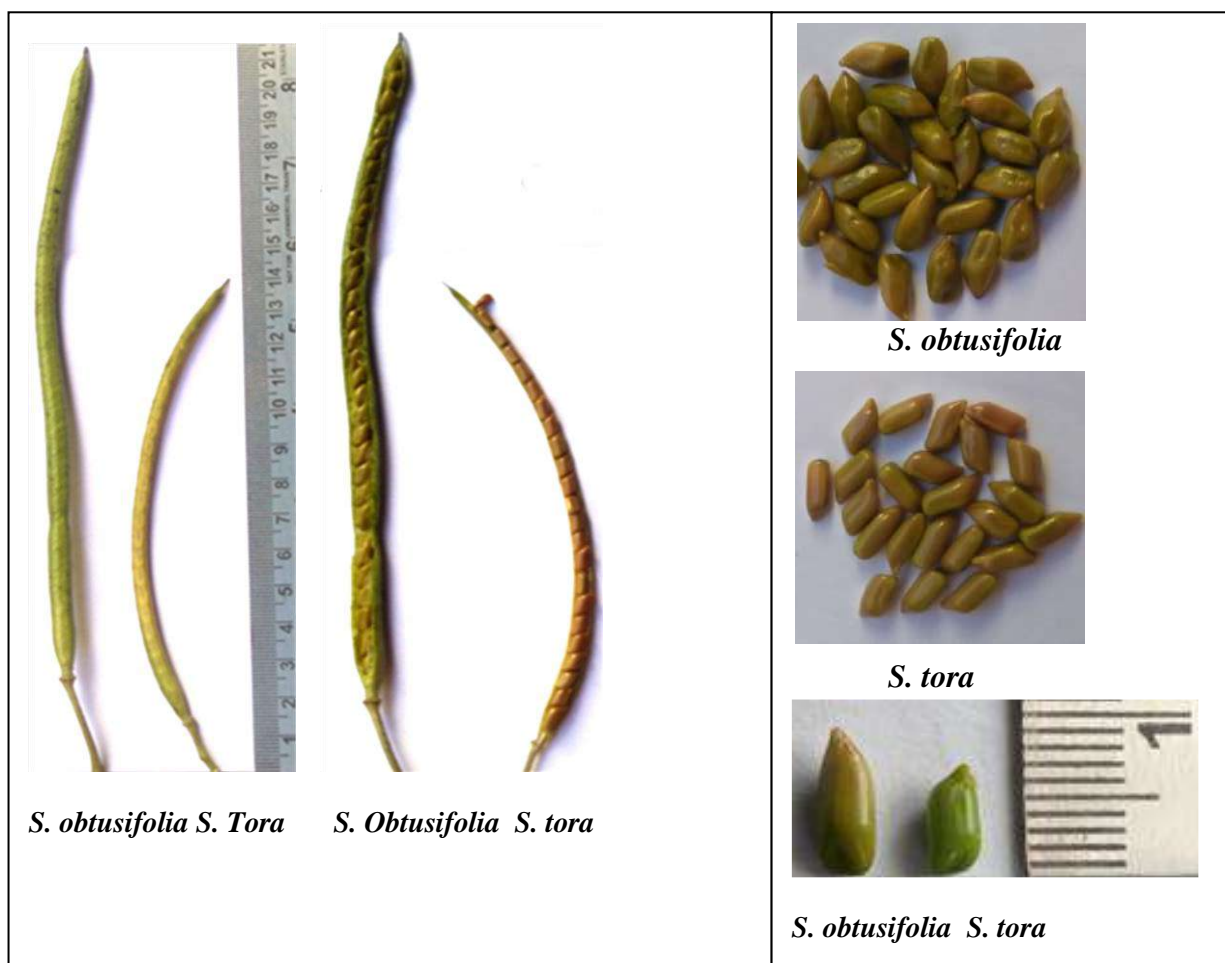
**Flowers :**

	<i>Senna obtusifolia</i> Linn.	<i>Senna tora</i> Linn.
Flowers	Solitary or in pairs, in leaf axils	Solitary or in pairs, in leaf axils
pedicels	1.5-2.5 cm long	1 cm long
Calyx	Glabrous, ovate, acute, segments 6 mm long	Glabrous, ovate, acute, segments 5 mm long
Petals	5, bright yellow, subequal, 12 to 15 mm to long, standard truncate and 2 lobed, other entire	5, yellow, subequal, largest 8 to 10 mm long, standard petal 2 lobed, other entire
Stemens	10, upper 3 reduced to minute staminodes, remaning 7 perfect, subequal	10, upper 3 reduced to minute staminodes, remaning 7 perfect, subequal
Anthers	three large beaked anthers	truncated tips

**Table 2: Morphological characters of flowers of *S. obtusifolia* & *S. Tora*****Fig-2 Flowers of *S.obtusifolia* & *S. tora***

**Pods and seeds:**

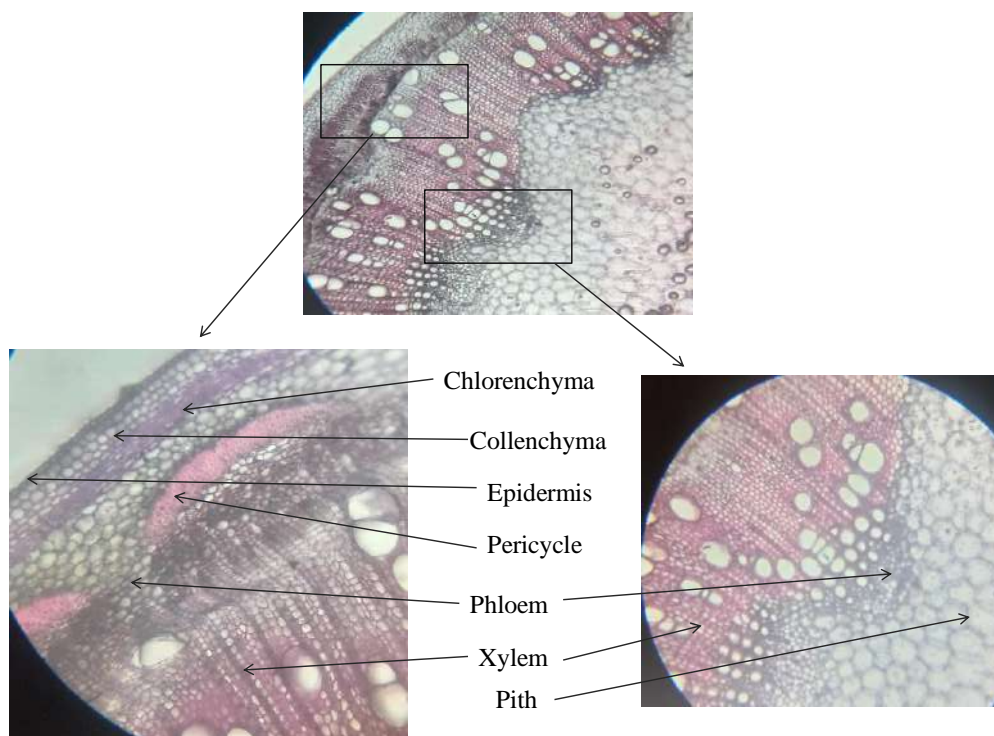
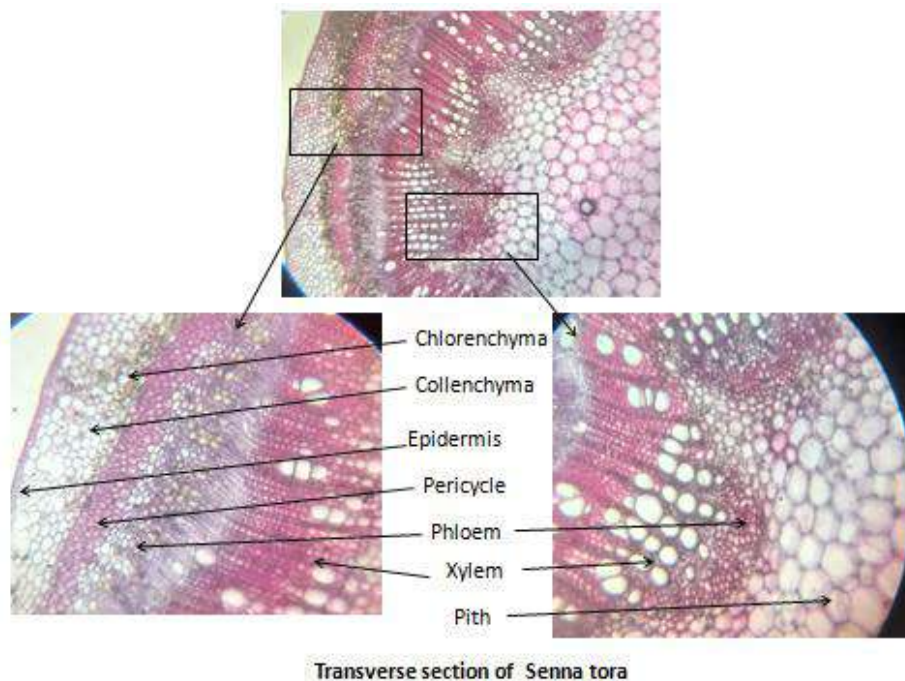
	<i>Senna obtusifolia</i> Linn.	<i>Senna tora</i> Linn.
Fruiting pedicels	2-3 cm long	1-1.5 cm long
Pods	20-25 cm by 0.5 cm, subterete, transversely reticulate, sutures broad	8-10 cm by 0.5 cm, subtetragonous, much curved when young, not reticulate, the sutures very broad
Seeds	30-35, rhombohedral, 5mm long	25-30, rhombohedral, with the long axis in the direction of pod
Areole on side of seed	narrow transverse (0.3-0.5 mm)	broad longitudinal (1.5-2.0 mm)
Seed testa	slightly muricated and not distinctly veined	not muricated but is distinctly veined

**Table 3: Morphological characters of Pods & Seeds of *S. Obtusifolia* & *S. Tora*****Fig-3 Pods & Seeds of *S. Obtusifolia* & *S. tora***



### Transverse section of *Senna tora* and *Senna obtusifolia* stem

**Stem:** Stem consists of single layer of epidermis. Following epidermis there is cortex composed of 5-7 layer of thick walled collenchymas cells & 4-5 layers of photosynthetic parenchyma / chlorenchyma. Beneath the cortex there is ring of continuous pericycle (sclerenchyma) composed of 4-6 layers of slightly thick walled lignified fibers. Pericycle fibers appear to cap the vascular bundles. Vascular bundle is open and collateral Central part of T.S. is occupied by pith consisting of parenchyma cells.



**DISCUSSION:**

Morphologically these two species closely resemble to each other with respect to appearance of herb, alternate phyllotaxy, 3 pairs of leaflets, colour & appearance of the flowers & number of stamens etc. But there are some prominent distinguishing characteristics, on the basis of which these two species can be differentiated. They are as follows. Foetid smell only present in *Senna tora* herb. Length of petiole is 1.5-2 cm in *S. tora* while 2-4.5 cm in *S. obtusifolia*. There are two glands on rachis in *S. tora* & one in *S. obtusifolia*. Length of pedicel is 1cm in *S. tora* & 1.5-2.5cm in *S. obtusifolia*. Length of largest petal is 8-10 mm in *S. tora*, whereas 12-15 mm in *S. obtusifolia*. In *S. tora* all 10 anthers are with truncated tips while in *S. obtusifolia*, out of 10 anthers 7 are with truncated tips & 3 are with large beak. Length of fruiting pedicel is 1-1.5 cm in *S. tora* while 2-3 cm in *S. obtusifolia*. Length of pod is 8-10 cm in *S. tora* while 20-25 cm. in *S. obtusifolia*. Numbers of seeds are 20-25 in *S. tora* & 30-35 in *S. obtusifolia*. Areole on side of seed is broad, longitudinal in *S. tora* whereas narrow, transverse in *S. obtusifolia*; seed testa is not muricated in *S. Tora* & slightly muricated in *S. obtusifolia*. In microscopic study transverse sections of *S. Tora* & *S. Obtusifolia* stems shows almost similar characteristics. Epidermis, cortex (chlorenchyma & collenchyma), pericycle, vascular bundles (open & collateral type) and pith are present from outer to inner side.

**CONCLUSION:**

Morphologically *Senna tora* & *Senna obtusifolia* can be differentiated on the basis of foetid smell, number of glands present on rachis, length of petioles, pedicels & pods, shape of anthers, number of seeds in a pod & characteristics of seeds. Microscopically there is no any significant difference between characteristics of transverse sections of *S. Tora* & *S. obtusifolia* stem.

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