

## **Addition of some species of *Senna* Mill. (Leguminosae) to the Flora of Manipur, India**

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### **Abstract**

Manipur is biodiversity rich state in north-eastern India. The extensive field exploration of Manipur leads to the addition of five species of *Senna* Mill. (Leguminosae) to the flora of Manipur which were not reported earlier.

**Key words:** New report, *Cassia*, Manipur.

### **INTRODUCTION**

Till date IUCN has recognized **35** biodiversity Hotspots in the world (Mittermeier & al. 2004), of these 4 are covering Indian territory namely Western Ghats and Sri Lanka, Himalaya, Indo-Burma and Sundaland that includes Nicobar group of islands (Khandekar & Srivastava 2014). The state of Manipur [covered by Indo-Burma Hotspot] is rich in biodiversity is situated in the Biogeographical Region 8 (North East Zone). It is bounded by Nagaland to the north, Mizoram to the south and Assam to west; Myanmar lies to its east. Its flora and fauna are depleted at higher rate than the other region of India (Singh 2016). It is blessed with diverse biological species of domesticated and wild type of plants and animals. The plant habitats are very different type due to several land forms and altitude in Manipur (Singh 2016). During the extensive field survey in Manipur, five species of the genus *Senna* Mill. have been reported for the first time, which were not reported earlier in the existing list of flora of Manipur (Singh & al. 2000).

*Cassia* L. (Leguminosae: Caesalpinioideae) is a very large genus comprising of 500 – 600 species (Willis 1973). It is one of the twenty-five largest genera of dicotyledonous plants which occur naturally in the tropics around the world (Boonkerd & al. 2005). Recently, Irwin and Barneby (1981) have raised the genus *Cassia* L. *sensu lato* to the level of subtribe and elevated previous subgenera to generic rank *viz.* *Senna* Mill. and *Chamaecrista* Moench under the tribe *Cassiinae*. During extensive field survey, 5 species of genus *Senna* are newly reported for the Manipur state

*Flora of Manipur* (Vol. I) (Singh & al. 2000) recorded ten species of the genus *Cassia*, namely *C. alata* L. [= *Senna alata* (L.) Roxb.], *C. bicapsularis* L. [= *S. bicapsularis* (L.) Roxb.], *C. didymobotrya* Fresen [= *S. didymobotrya* (Fresen.) H.S.Irwin & Barneby], *C. fistula* L., *C. floribunda* Cav. [= *S. floribunda* (Cav.) H.S.Irwin & Barneby], *C. hirsuta* L. [= *S. hirsuta* (L.) H.S.Irwin & Barneby], *C.*

*mimosoides* L. [= *Chamaecrista mimosoides* (L.) Greene], *C. nodosa* Buch.-Ham. ex Roxb. [= *Cassia javanica* subsp. *nodosa* (Roxb.) K.Larsen & S.S.Larsen], *C. occidentalis* L. [= *S. occidentalis* (L.) Link] and *C. tora* L. [= *S. tora* (L.) Roxb.]. Recently, Nanda & al. (2012, 2014), Sagolsem and Thongam (2014) added numbers of plant species to the existing list of Manipur flora. In the present study five species of genus *Senna* Mill. (Leguminosae: Caesalpinioideae) are reported for the first time to the flora of Manipur and are presented here with detailed description and phenology. Also, a key for the identification of species of the genus *Senna* so far recorded from Manipur is provided for their identification.

## METHODOLOGY

The extensive field survey to Manipur was conducted to exploit the different species of the genus *Cassia* L. All the voucher specimens were pressed and processed into mounted herbarium-sheets and were deposited in “BAMU” Herbarium of Dr. Babasaheb Ambedkar Marathwada University, Aurangabad. Morphological characters of all the species were studied and recorded. The collected plants were identified by referring relevant literature, namely Monograph on Indian subtribe Cassiinae (Caesalpinioideae) (Singh 2001); *Flora of Haryana* (Jain & al. 2000); *Flora of Maharashtra* (Sharma & al. 1996); *Flora of Manipur* (Singh & al. 2000); *Flora of Tamil Nadu* (Nair & Henry 1983); and *The Flora of British India* (Hooker 1890). For updated nomenclature www.theplantlist.org has been consulted.

## ENUMERATION

The five species newly recorded for the flora of Manipur state in Northeast India are enumerated below.

1. ***Senna intermedia*** (B.D.Sharma, Vivek. & Rathakr.) V.Singh in J. Econ. Taxon. Bot. 16 (3): 600. 1992. *Cassia intermedia* B.D.Sharma, Vivek. & Rathakr. in Proc. Ind. Acad. Sci. (Sec. B) 80: 301. F. 1-12. 1974. [PLATE- II, Figures E & E1]

Shrubs, 2.5 m tall, puberulous with age. Leaves hairy, 3.5-14.5 cm long with 3 – 5 pairs of leaflets. Lamina of leaflets ovate – elliptic, 1 – 9.5 x 0.6 – 3.5 cm, acute, base rounded; gland solitary present at base of petiole. Stipules 5-7 mm long, lanceolate, acuminate and hirsute. Corymbs axillary few flowered. Sepals boat shaped or ovate, hairy outside; petals yellow, 1.5 x 1.2 cm, obovate; fertile stamens 7, longer two 8 mm, filaments flattened, four 5.5 mm long, remaining one much smaller and narrow. Staminodes three. Pods 1.5 – 9.5 x 0.4 -0.6 cm long.

*Flowers & fruits:* August – April

*Exsiccata:* Indo-Myanmar friendship road, Tamu, Manipur, *Arvind S. Dhabe* 009776, dated 08.10.2017.

2. ***Senna pallida*** (Vahl) H.S.Irwin & Barneby in Mem. New York Bot. Gard. 35 (2): 531. 1982. *Cassia biflora* Vahl, Ecl. Amer. 3: 12. 1807; *Cassia biflora* L., Sp. Pl. 378. 1753. [PLATE- I, Figures A & A1]

Shrub, 2-3 meter tall. Leaves 5-14 cm long with 6-12 pairs of leaflets; lamina of leaflets oblong, 1-4 x 0.7- 1.2 cm, mucronate, base rounded and unequal. Gland absents. Petiole 1-2 cm long. stipules 5-12 mm long, linear-subulate, brown, glabrous. racemes axillary. Sepals yellow green, ovate. Petals bright yellow, ovate, 1-2 cm

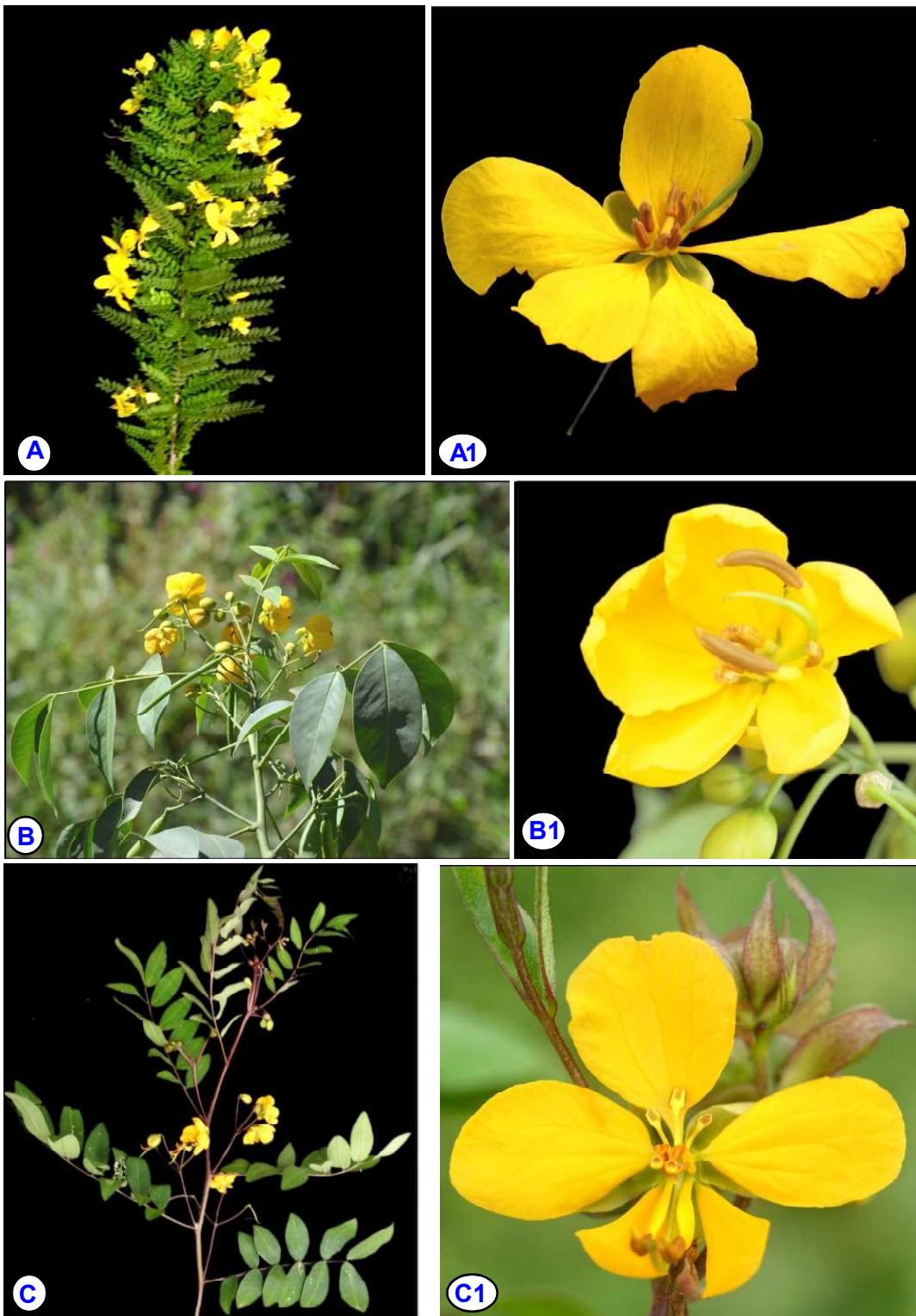


PLATE - I. Species of *Senna* Mill.: A & A1. *S. pallida*; B & B1. *S. semitrionalis*; C & C1. *S. sophora* var. *purpurea*

long. stamens 10, seven fertile, staminodes three, curved. Pods strap shaped, 7 x 0.3 cm, 10-20 seeded.

*Flowers & fruits:* August – January

*Exsiccata:* Senapati Road, Imphal, Manipur, *Arvind S. Dhabe 009770*, dated 07.10.2017.

3. *Senna septemtrionalis* (Viv.) H.S.Irwin & Barneby in Mem. New York Bot. Gard. 35 (1): 365. 1982. *Cassia septemtrionalis* Viv., Elench. Pl. Hort. J. Car. Denegro 14. 1802. [PLATE- I, Figures B & B1]

Shrub, 1-2 meter tall. Leaves bipinnate, 8-15 cm long with 3-5 pairs of leaflets. Lamina of leaflets ovate-lanceolate, 3.5-9 x 1.5-3.5 cm, base equal sided; glands present between all except upper pair; Petiole 1.5- 5 cm long; stipules 7 mm long, linear-lanceolate, glabrous, falcate. Corymbs axillary or terminal. Sepals 6-10 mm long, oblong-ovate, unequal. Petals yellow, 1-2 cm long, ovate, suborbicular. Fertile stamens 7, two shortly falcate on lower filament, four smaller, one very small and narrow. Staminodes three Pods 6-11 x 1-1.5 cm, linear-oblong, septate, 40-50 seeded.

*Flowers & fruits:* August – May

*Exsiccata:* Senapati Road, Imphal, Manipur, *Arvind S. Dhabe 009778*, Date: 07.10.2017.

4. *Senna sophera* var. *purpurea* (Roxb. ex Lindl.) V. Singh in J. Econ. Taxon. Bot. 16 (3): 600. 1992. *Cassia purpurea* Roxb. ex. Lindl. in Bot. Reg. t. 856. 1824. [PLATE- I, Figures C & C1]

Shrubs, 1-2 meter tall. Plant body tinged purple. Leaves pinnately compound, 4.5-9 cm long with 3-7 pairs of leaflets. Leaflets elliptic- lanceolate, 1.5 – 5.4 x 0.4 -1.3 cm long. gland solitary present below the middle on the petiole. Petiole 2-3 cm long. stipules caduceus. Inflorescence umbellet. Sepals 5-7 mm long, oblong-glabrous, petals yellow, 1-1.2 cm long. pods 4- 7 x 0-6.1 cm long.

*Flowers & fruits:* August- may

*Exsiccata:* Senapati Road, Imphal, Manipur, *Arvind S. Dhabe, 009791*, dated 08.10.2017.

5. *Senna sulfurea* (DC. ex Collad.) H.S.Irwin & Barneby in Mem. New York Bot. Gard. 35 (1): 78. 1982. *Cassia sulfurea* DC. ex Collad., Hist. Nat. Méd. Casses 84. 1816. *Cassia glauca* DC. ex Collad. In Hist. Nat. Med. Casses 84. 1816; *Cassia glauca* Lam., Encycl. Meth. 1: 647. 1785. [PLATE- II, Figures D & D1]

Shrubs, 2-4 meter tall. Leaves 15-25 cm long. Leaflets 5-7 pairs; lamina ovate-oblong, 4.5 -8.5 x 2-4 cm, mucronate, base rounded; glands cylindric, sub-clavate, present between each pair of leaflets except upper 1-2 pairs. Petiole 3-3.6 cm long; stipules linear, acute, dorsally one nerved, inflexed. corymbose raceme; sepals pale yellow, 3-5 mm long, obtuse; petals bright yellow, oblong, 2-3 cm long; stamens 10, all fertile. Pods 13-18 x 1.5 – 2 cm long, dark brown, linear, oblong, flat, 15-30 seeded.

*Flowers & fruits:* November – February

*Exsiccata:* Imphal City, Manipur, *Arvind S. Dhabe 009771*, dated 07.10.2017.

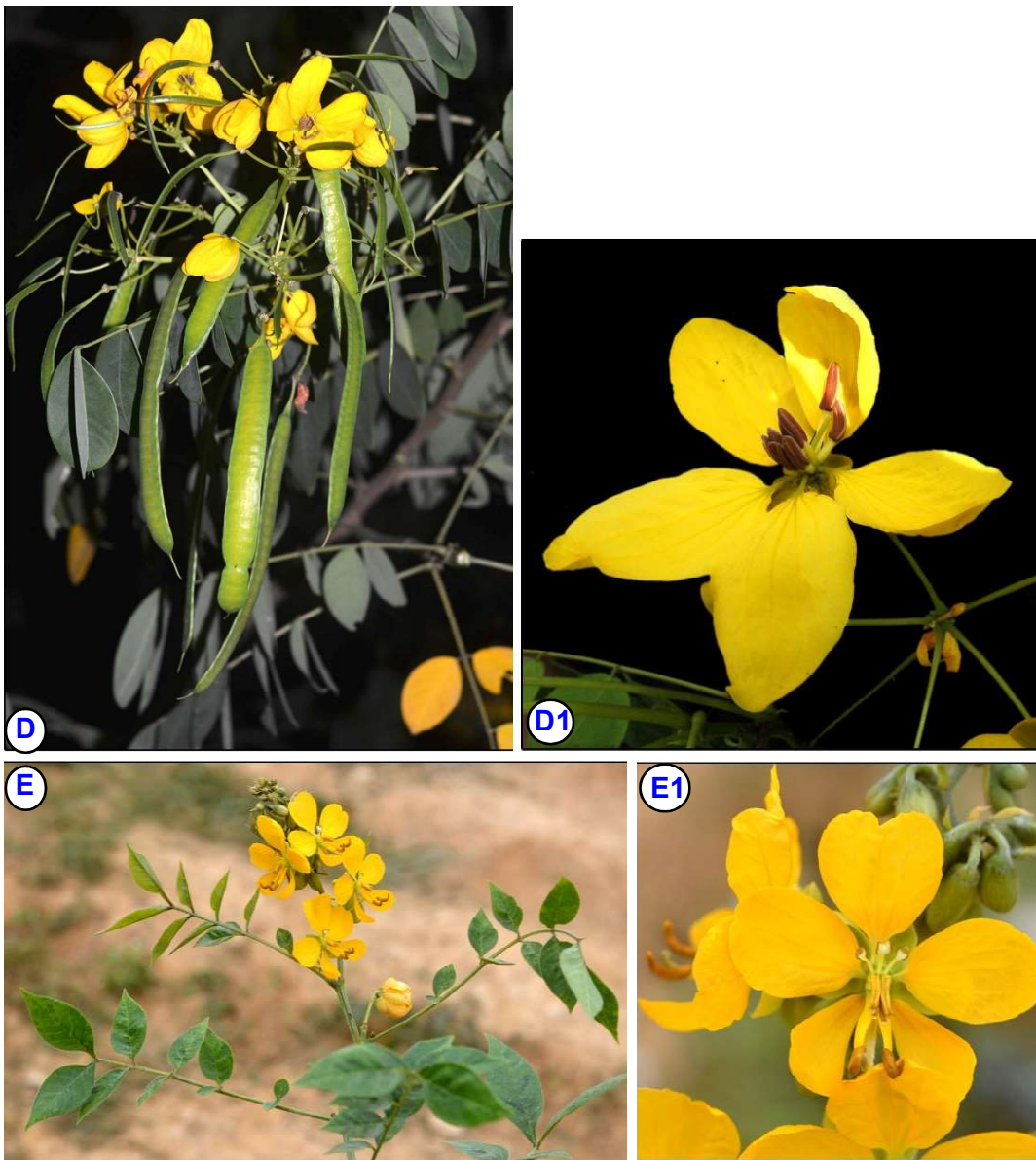


PLATE - II. Species of *Senna* Mill. (Contd.): D & D1. *S. sulfurea*; E & E1. *S. intermedia*

Key for the identification of Species of *Senna* from Manipur

- 1a. Shrubs or trees ..... 2
- 1b. Herbs or undershrubs ..... 10
- 2a. Plant densely hirsute ..... *Senna hirsuta*
- 2b. Plant not densely hirsute ..... 3
- 3a. Glands present at the middle of petiole ..... *Senna sophora*
- 3b. Glands present elsewhere .....4
- 4a. Fertile stamens 10 ..... *Senna sulfurea*

- 4b. fertile stamens 7 ..... 5  
 5a. Bracts brown ..... *Senna didymobotrya*  
 5b. Bracts yellow or green ..... 6  
 6a. Pods winged ..... *Senna alata*  
 6b. Pods not winged ..... 7  
 7a. Petals clawed ..... *Senna pallida*  
 7b. Petals not clawed ..... 8  
 8a. Stem zigzag ..... *Senna intermedia*  
 8b. Stem straight ..... 9  
 9a. Flowers in racemes; pedicel with ring of hairs at base ..... *Senna bicapsularis*  
 9b. Flower in corymbs; pedicel without ring of hair ..... *Senna septemtrionalis*  
 10a. Leaflet 3-5 pairs, bracts ovate, pods compressed, purple .. *Senna occidentalis*  
 10b. Leaflet 3 pairs, bracts linear, pods terete, greenish ..... *Senna tora*

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