



# *Crotalaria andamanica* (Fabaceae): A new species of rattle pod from Andaman and Nicobar Islands, India

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**ABSTRACT:** *Crotalaria andamanica* F. Saleem, L.J. Singh, & A. K. Pandey is described and illustrated as a new species from Andaman and Nicobar Islands, India. The habitat, ecology, distribution and conservation status are briefly discussed. The new species closely resembles with the species of the section Calycinae Wight & Arnott (1834), *C. acicularis* Buch.-Ham. ex Benth. and *C. prostrata* Rottler ex Willd. but differs in morphological characters like habit up to 150 cm, densely hairy, leaf 10–20 mm long, acute at apex, obtuse at base, ensiform stipule, 4–8 number of flowers per inflorescence, calyx equal, hairy, attenuate, standard obovate, apex retuse, pod elliptic.

**KEY WORDS:** Andaman, *Crotalaria acicularis*, *Crotalaria prostrata*, Fabaceae, new species, Taxonomy.

## INTRODUCTION

Andaman and Nicobar Islands (ANI) is one of the hotspots of biodiversity where recent plant explorations have resulted in discoveries of novelties in various plant groups (Singh 2014, 2017a,b, 2021, 2023; Singh *et al.*, 2014, 2021a,b; Singh and Singh, 2016; Naik and Singh, 2020; Naik *et al.*, 2020, 2023; Singh and Misra, 2020; Sivaramakrishna 2021a; Saleem *et al.*, 2023a,b).

The genus *Crotalaria* (Fabaceae) includes approximately 702 species (Danda *et al.*, 2016) widely distributed in tropical and sub-tropical regions of the world (Lewis *et al.*, 2005) with main distribution in Africa and Madagascar (Polhil, 1982; Le Roux *et al.*, 2013; Subramaniam and Pandey, 2014). In India, the genus is represented by 102 species, 03 subspecies, and 19 varieties and two formas (Ansari and Chauhan, 2020). Out of these, 10 species and the newly described species (*C. andamanica*) are found in ANI, most of them are from the tropical zone of the Andaman group of Islands (Ansari, 2008, Sanjappa, 2020; Sivaramakrishna *et al.*, 2021b; Saleem *et al.*, 2023).

*Crotalaria andamanica* F. Saleem, L.J. Singh & A. K. Pandey sp. nov. is described and illustrated from evergreen forest from South Andaman, ANI, and India. The new species is morphologically distinct from closely related *Crotalaria acicularis* and *Crotalaria prostrata*.

## MATERIALS AND METHODS

During the field explorations in the Andaman group of Islands, authors came across an interesting species from three different localities of Andaman and Nicobar Islands. The specimen appears to fit into the genus *Crotalaria* sect. *Calycinae* Wight & Arnott (1834). Based on the morphological characterization (Table 1), a new

species *C. andamanica* has been described and illustrated. Identification key for all the species of *Crotalaria* L. occurring in ANI along with a complete taxonomic description, taxonomic remarks, images for the new species, illustrations and note on its habitat is described. GPS coordinates were recorded using Sony Camera.

The morphological analysis and description of the new species are based on the examination of freshly collected and dry vouchers, in addition to flowers preserved in FAA (Formalin-Acetic Acid). The flowers were rehydrated in water with detergent and dissected to examine the minute details of the corolla under binocular microscope (Olympus SZ 61). A detailed comparison with the measurements of selected traits and characteristic features of the species is presented in Table 1. The most closely related species were identified based on previous revisionary and systematic studies (Lamarck, 1786; De Candolle, 1825; Roxburgh, 1832; Wight and Walker-Arnott, 1834; Dalzell and Gibson, 1861; Baker, 1876; Cooke, 1903; Fyson, 1915; Gamble, 1918; Sanjappa, 1991; Ansari, 2008; Le Roux *et al.*, 2013; Subramaniam *et al.*, 2013; Danda *et al.*, 2016; Rather *et al.*, 2018; Sanjappa, 2020; Naik and Singh, 2020, WCVL Legume database, 2021; Sivaramakrishna *et al.*, 2021; JSTOR Global Plants, 2023; Chinese Virtual Herbarium, 2023, Flora of Pakistan, 2023 and other online herbaria (B, BM, BR, B-WILLD, E, FI, FOB, G-DC, K, L, LINN, NYBG, P, TUB).

## Key to the species of *Crotalaria* in Andaman and Nicobar Islands

In ANI eleven species of *Crotalaria* have been reported including the new species (*C. andamanica* described here). A taxonomic key is provided for easy identification of *Crotalaria* species.

- 1. Leaves 3-foliate ..... 2
- Leaves simple ..... 3

**Table 1.** Comparison of morphological characters between *C. andamanica*, *C. acicularis* and *C. prostrata*

| Characters             | <i>C. andamanica</i>            | <i>C. acicularis</i>                         | <i>C. prostrata</i>            |
|------------------------|---------------------------------|--|--------------------------------|
| Habit                  | prostrate herb upto 150 cm long | diffuse or procumbent herbs upto 30 cm long. | prostrate herb upto 60 cm long |
| Stem surface           | hairy                           | pilose                                       | silky sericeous                |
| Leaf shape             | ovate to oblong                 | orbicular-oblong                             | oblong to lanceolate           |
| Leaf size              | 10-20 mm long                   | upto 20 mm long                              | upto 60 mm long                |
| Leaf apex              | acute                           | obtuse or rounded and mucronulate at apex    | obtuse                         |
| Leaf base              | obtuse                          | slightly oblique or rarely subcordate        | rounded                        |
| Stipule present/absent | present                         | present                                      | absent                         |
| Stipule shape          | ensiform, not reflexed          | lanceolate, reflexed                         | absent                         |
| Stipule surface        | hairy                           | no information on Literature                 | absent                         |
| No of flowers          | 4-8 flowered                    | 6-12 flowered                                | 2-4 flowered                   |
| Peduncle               | 4-10 cm long                    | 2-6.5(-10) cm long                           | 2-8 cm long                    |
| Pedicel size           | 1cm long                        | 2-3 mm long                                  | 1.5-2 mm long                  |
| Pedicel surface        | hairy                           | pilose                                       | sericeous                      |
| Bract shape            | lanceolate with broad base      | cordate-lanceolate                           | subulate                       |
| Bract size             | 4-5 mm long                     | 3-6.5 mm long                                | 1-2 mm long                    |
| Bract color            | light green                     | blackish to dark green                       | no Information in Literature   |
| Bracteole size         | 5 mm long                       | 1.5 mm long                                  | 1-2 mm long                    |
| Calyx equal/bilipped   | equal                           | bilipped                                     | bilipped                       |
| Calyx surface          | hairy                           | densely pilose                               | sericeous                      |
| Calyx size             | 3-4 mm long                     | 1.5 mm long                                  | 4-5 mm long                    |
| Calyx apex             | attenuate                       | acuminate                                    | acute                          |
| Standard petal shape   | obovate                         | rhomboid-orbicular                           | ovate-oblong                   |
| Standard petal size    | 5-6 mm long                     | 2.5-4.0 x 1.5-3.0 mm,                        | 3-5 mm long                    |
| Standard petal apex    | retuse                          | rounded                                      | emarginate                     |
| Wing petal size        | 4 mm long                       | 2.5-4.5 x 1-2 mm,                            | 3-4.5 mm long                  |
| Keel petal size        | 4 x 2 mm                        | 2.5-4.5 x 2-3 mm                             | 3.0-4.5 x 1.0-1.5 mm,          |
| Ovary surface          | sparsely hairy                  | glabrous                                     | glabrous                       |
| Ovary size             | 2 mm long                       | 2.0-3.5 mm long                              | 13 mm long                     |
| Pod shape              | elliptic                        | oblong                                       | linear-oblong                  |
| Pod size               | 6-8 mm long                     | 5-10 mm                                      | 10-20 mm long                  |
| Seed size              | 2mm diam                        | 1mm diam                                     | 1mm diam                       |

2. Herb, 0.75m high, seeds 2, grey-brown .. *C. willdenowiana* ssp. *vermae*  
 - Undershrub; 1-2 m high, seeds 40-50, olive green ..... *C. pallida*  
 3. Corolla longer with respect to the calyx ..... 4  
 - Corolla shorter/equal to the calyx ..... 6  
 4. Plants 1-2 m high, stipules not falcate, vexillum glabrous on dorsal surface, 12 seeds/pod ..... 5  
 - Plants 0.5 m high, stipules falcate, vexillum pubescent on the dorsal surface, one seed /pod ..... *C. nicobarica*  
 5. Leaves apex retuse; bracteoles below to calyx ..... *C. retusa*  
 - Leaves apex acuminate; bracteoles at middle of calyx .... *C. spectabilis*  
 6. Raceme lateral or leaf opposed ..... 7  
 - Raceme terminal ..... 8  
 7. Peduncles filiform, glabrescent, stipules caducous; flowers 1, rarely 2 ..... *C. stocksii*  
 - Peduncles not filiform, pubescent; stipules persistent, flowers 6-1 .. 10  
 8. Leaf up to 1-5 cm long; ..... 9  
 - Leaf 3-11 cm long; ..... *C. calycina*  
 9. Undershrubs; vexillum glabrous; pods upto 1.5 cm long ... *C. linifolia*  
 - Herbs, vexillum with few hairs at apex, pods upto 0.8 cm long ..... *C. nana*  
 10. Pods oblong, leaves orbicular-oblong, bilipped ..... *C. acicularis*  
 - Pod elliptic, leaves ovate, equal ..... *C. andamanica*

## TAXONOMIC TREATMENT

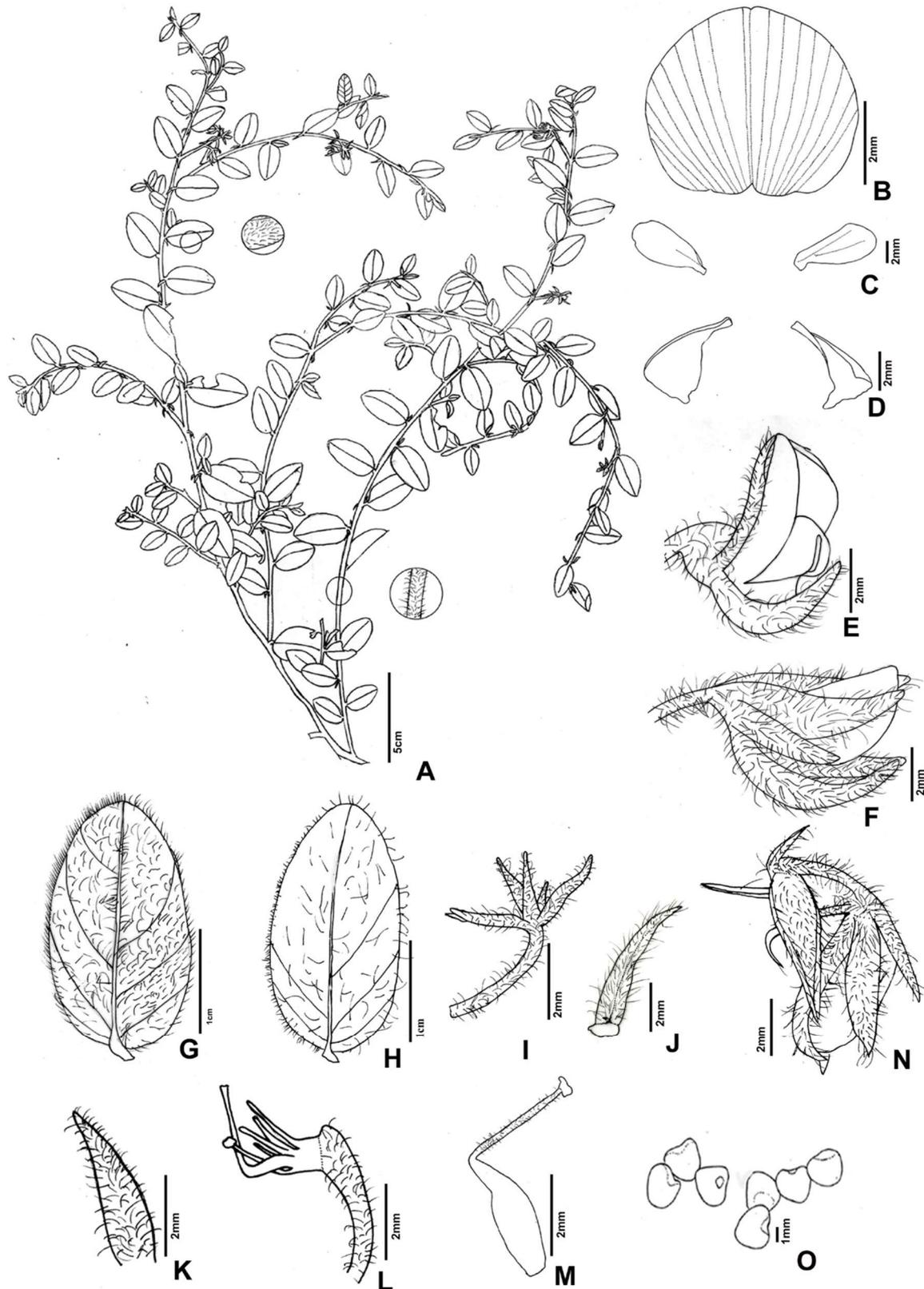
*Crotalaria andamanica* F.Saleem, L. J. Singh & A. K. Pandey, *sp.nov.*

Fig. 1-3

**Type:** INDIA. Andaman and Nicobar Islands, Middle Andaman, Tugapur, 12°50'40"N, 92°51'21"E. 21<sup>st</sup> December 2021, *Fouziya Saleem 35309* (holotype: PBL; isotypes: PBL; CAL)

**Diagnosis:** *C. andamanica* is morphologically similar to *C. acicularis* and *C. prostrata* but differs in morphological characters like habit up to 150 cm, densely hairy, leaf 10-20 mm long, acute at apex, obtuse at base, ensiform stipule, 4-8 number of flower per Inflorescence, calyx equal, hairy, attenuate, standard obovate, apex retuse, pod elliptic. The details of the characteristic differences between *C. andamanica*, *C. acicularis* and *C. prostrata* (Table 1).

**Description:** Prostrate herbs, up to 1.5 m high, hairy; **Stems** terete, much branched, hairy up to 3-4mm long. Stipules ensiform, not reflexed, hairy, upto 4mm. Leaves simple, up to 2 cm long; petioles 1 mm long; lamina ovate, oblong, oblique to rounded, obtuse at base, entire along margin, acute with mucronate tip at apex, coriaceous, hairy on both surfaces. **Inflorescence terminal** raceme, Flowers 4-8, 7-8 mm long; pedicels upto 10 mm long, hairy; peduncle 4-10 cm long. **Bracts** lanceolate with



**Fig. 1. *Crotalaria andamanica*:** A. Habit; B. Standard petal; C. Wing petals; D. Keel petals; E-F. Flower; G. Leaf (Dorsal); H. Leaf (Ventral); I. Calyx; J. Stipules K. Bracteole; L. Calyx with intact androecium and gynoecium; M. gynoecium showing Style and Stigma; N. Fruit; O. Seeds. (Illustration: Fouziya Saleem)



**Fig. 2. *Crotalaria andamanica*:** A. Habit; B. Standard petal; C. Wing petals; D. Keel; E-F. Flower; G. Leaf (Dorsal); H. Leaf (Ventral); I-J. Stipules; K. Stem with hairs; L. Calyx with intact androecium and gynoecium; M-N. Calyx; O. Geniculate Style and Stigma; P. Bracteole; Q-R. Pod; S. Seeds . (Photos: Fouziya Saleem)



**Fig. 3. *Crotalaria andamanica*: A. Habit; B. Flower; C-D. Pod.** (Photos: Fouziya Saleem)

broad base, 4–5mm long, opposite, ciliate margin, entirely hairy, light green. **Bracteoles** lanceolate, 5mm long, bottom of the calyx, margin ciliate, entirely hairy. **Calyx** 4 mm long, lobes 5-cleft, equally-lobed, ciliate margin, attenuate at apex, densely silky hairy. **Corolla** yellow, Standard 5–6 mm long, glabrous; obovate, retuse at apex; wings oblong, 4 × 2 mm long, glabrous, shortly ciliate along margins, without curved claw; Keels 5 × 4 mm long,

with spirally twisted beak; glabrous. **Staminal sheath** 6mm long; anthers 5 mm long. **Ovary** 2 mm long, sparsely hairy, ovules 3mm; style 3–3.5 mm long, sparsely hairy; stigma capitate, 2mm. **Pods** elliptic, 6–8 mm long, sessile; hairy, beaked at apex. **Seeds** 15–16, reniform, 2 mm diam, brown.

**Distribution, habitat and ecology:** The new species is known from three different localities of Andaman and



Nicobar Islands *i.e.* South and Middle Andaman group of Islands where it grows on open wastelands on gravelly soil in association with *Desmodium triflorum* (L.)DC., *Ipomoea* spp., *Mimosa pudica* L. *Cyperus* spp., *Chromolaena odorata* (L.)R.M.King & H.Rob.

**Flowering and Fruiting:** November-March.

**Etymology:** The new species has been named after the type locality.

**Preliminary conservation assessment:** During our preliminary field surveys conducted in the Andaman and Nicobar Islands, this species is known from three nearby sites where we observed about 50 mature individuals. Recent explorations carried out in the adjacent regions did not reveal any new populations. *C. andamanica* is under great pressure due to destruction of natural habitats, developmental activities and competition with invasive species. Hence, we propose the IUCN conservation status of *C. andamanica* as Data Deficient (IUCN, 2022) until further study.

**Note:** *C. andamanica* appears close to *C. acicularis* and *C. prostrata* in its general appearance like leaf shape, flower size, flower color and glabrous pod but it is markedly distinct by a combination of morphological characters of vegetative and floral parts as shown in Table 1.

**Additional specimens examined (Paratype):** Andaman and Nicobar Islands: South Andaman: Tirur (11° 43'06"N, 92° 36'41"E) 17.11.2022, Fouziya Saleem 35378 (PBL). Jirgatang (11°49'18"N, 92° 39'25"E) 10.03.2023, Fouziya Saleem 35391 (PBL).

## CONCLUSION

In the present study, *Crotalaria andamanica* F. Saleem, L.J. Singh & A. K. Pandey is described and illustrated as a new species and represents as new addition to the flora of ANI, India. The genus is represented by 11 species in ANI. Most of the *Crotalaria* species were recorded from Andaman group of Islands. Two species (*C. nicobarica* F. Saleem, L.J. Singh, S. Subramaniam & A. K. Pandey and this new species, *C. andamanica* F. Saleem, L.J. Singh & A. K. Pandey) and one subsps. *C. willdenowiana* subsp. *varmae* C.S.Reddy, Murthy, P.R.C.Prasad & V.S.Raju are endemic to ANI. Presence of simple leaves, spirally twisted beak of the keel, calyx more or less equal to corolla, sessile pod in the new species are suggest that it belongs to the section *Calycine* of the genus *Crotalaria*.

The range of type locality of this new species is in South Andaman (belongs to Andaman group of Islands), separated from Nicobar group of Islands by 10 degree channel. The newly discovered taxa and the closely allied species *C. prostrata* does not show similarity in geographical distribution as is not present in the same geographical location whereas *C. acicularis* is occurs in ANI. During field study it has been found that the species inhabits road sides and forest edges and usually in patches with moist and rocky soil in the Islands.

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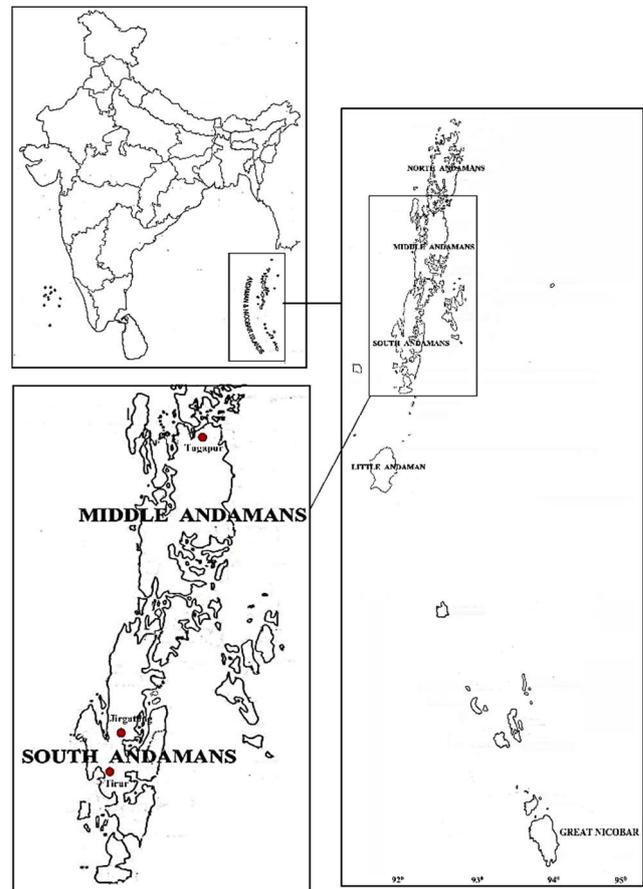


Fig. 4. Map of Andaman and Nicobar Islands showing Distribution of the newly described species *Crotalaria andamanica* sp.nov.

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