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# Checklist of the family Fabaceae in Gautam Buddha Wildlife Sanctuary, Bihar & Jharkhand

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## ABSTRACT

The Gautam Buddha Wildlife Sanctuary was notified as a Wildlife Sanctuary in 1976 and is situated in Gaya district of Bihar and Hazaribagh & Chatra districts of Jharkhand. The present study deals with the documentation of the family Fabaceae in Gautam Buddha Wildlife Sanctuary, Bihar & Jharkhand. The family is represented by 63 taxa and 42 genera in the Sanctuary of which *Pterocarpus marsupium* Roxb. is IUCN Red List species and *Vigna hainiana* Babu, Gopin. & S.K. Sharma is an endemic species. *Vachellia leucophloea* (Roxb.) Maslin, Seigler & Ebinger was also recorded as new record for Bihar state.

**Key words:** Bihar, Fabaceae, Gautam Buddha Wildlife Sanctuary, Jharkhand, legume.

## INTRODUCTION

The family Fabaceae commonly known as legume family is the third largest angiosperm family represented by about 770 genera and 19,500 species after Asteraceae and Orchidaceae mainly distributed in tropical and subtropical region of the World which is considered economically and ecologically important plant families (Lewis *et al.* 2005, Yahara *et al.* 2013). Its species are found in many habitat types and imparts significant role in ecosystems by nitrogen fixation (Yahara *et al.* 2013). Sanjappa (1992) documented 179 genera, 1152 species, 35 subspecies, 103 varieties and 7 forma of legumes from India of which 263 taxa were endemic to India. The family is characterised by the pod developing from a single carpel with marginal placentation (Sanjappa 1992). Singh *et al.* (2001) reported 92 genera and 336 taxa of legumes from Bihar. The family Fabaceae earlier comprises three sub-families namely Mimosoideae, Caesalpinioideae and Papilionoideae (=Faboideae).

Hutchinson (1973) recognized these three sub-families as independent families namely, Mimosaceae, Caesalpinioideae and Fabaceae. But, The Angiosperm Phylogeny Group (2014) recognised all three sub-families under broadly circumscribed Leguminosae or Fabaceae. Further, The Legume Phylogeny Working Group (2017) recognized six subfamilies namely, Caesalpinioideae (recircumscribed), Cercidoideae, Detarioideae, Dialioideae, Duparquetioideae and Papilionoideae based on molecular studies.

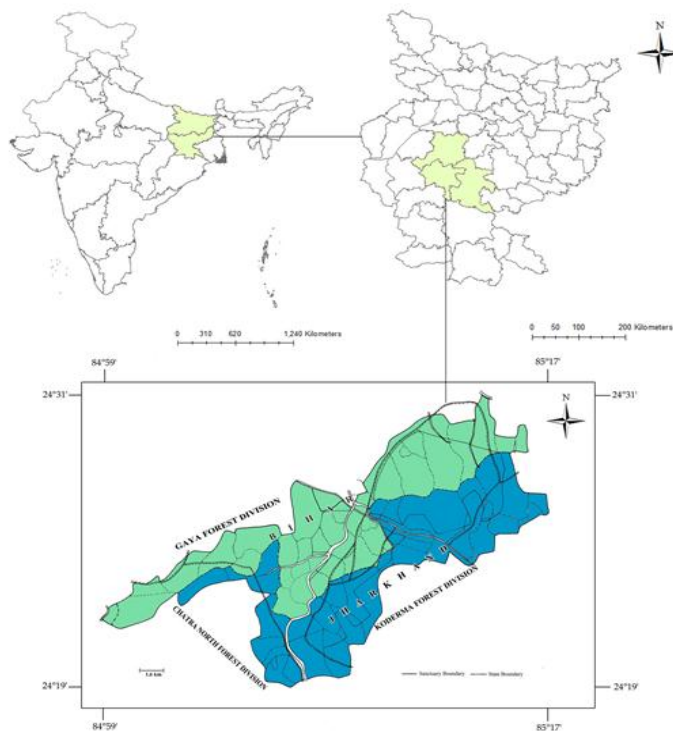
## MATERIALS AND METHODS

### Study area

The Gautam Buddha Wildlife Sanctuary (GBWLS) was notified as a Wildlife Sanctuary in 1976 and is situated in Gaya district of Bihar and Hazaribagh & Chatra districts of Jharkhand (Fig. 1). The Sanctuary lies between 24°19'–24°31' N and 84°59'–85°17' E and covers an area of 259.46 sq km of which 138.33 sq km in Bihar and 121.13 sq

km in Jharkhand. National Highway 2 bisects the Sanctuary into two unequal halves. *Mohane* and *Goari* are the principal rivers and there are many smaller perennial and seasonal rivers/streams/rivulets flowing through the Sanctuary. People living inside the Sanctuary belong to different communities/tribes, *Birhor*,

*Bhuinya*, *Ho*, *Kurmi*, *Mahato*, *Rajput*, *Santhal* and *Yadav*. The Sanctuary falls under Northern tropical dry deciduous forest, which has been further classified into two sub-types, namely Dry peninsular Sal forest and Northern dry mixed deciduous forest (Champion & Seth 1968).



**Fig. 1.** Location map of Gautam Buddha Wildlife Sanctuary, Bihar & Jharkhand.

### Data collection

The study was based on seven field tours to the Sanctuary from 2012 to 2015. Plants in flowers and fruits were collected and photographed during field tours. The standard herbarium technique was followed for processing of the collected specimens (Bridson & Forman 1998). Specimens were identified with the help of literatures (Prain 1903, Haines 1921-25, Babu et al. 1985, Sanjappa 1995, Ansari 2008, Bandyopadhyay 2014) and also compared with authentic specimens deposited at CAL. A set of voucher specimens duly labelled are deposited at CAL. The species are arranged in alphabetical order.

### RESULTS AND DISCUSSION

The Sanctuary is represented by 63 taxa and 42 genera belonging to the family Fabaceae (Table 1, Fig. 4-7). The life form composition is dominated by herbs with 23 taxa, followed by trees with 22 taxa, climber with 13 taxa and shrubs with 5 taxa (Fig. 2). *Pterocarpus marsupium* Roxb., IUCN Red List species and *Vigna hainiana* Babu, Gopin. & S.K. Sharma, an endemic species are documented from the Sanctuary. *Vachellia leucophloea* (Roxb.)

Maslin, Seigler & Ebinger was also recorded as new record for Bihar state (Kumar *et al.* 2018). Further, total number of genera and taxa in GBWLS, Bihar and India is also presented here (Fig. 3).

The common trees include *Acacia auriculiformis* A. Cunn. ex Benth., *Albizia lebbek* (L.) Benth., *Bauhinia purpurea* L., *B. racemosa* Lam., *Butea monosperma* (Lam.) Taub., *Senegalia catechu* (L.f.) P.J.H. Hurter & Mabb. and shrubs include *Mimosa rubicaulis* Lam. subsp. *Himalayana* (Gamble) H. Ohashi, *Phyllodium pulchellum* (L.) Desv. and *Senna alata* (L.) Roxb. *Aeschynomene indica* L., *Crotalaria albida* B. Heyne ex Roth, *C. pallida* Aiton, *C. prostrata* Rottler ex Willd., *Grona triflora* (L.) H. Ohashi & K. Ohashi, *Indigofera linifolia* (L.f.) Retz., *Pleurolobus gangeticus* (L.) J.St.-Hil. ex H. Ohashi & K. Ohashi, *Senna occidentalis* (L.) Link, *S. alata* (L.) Roxb., *S. tora* (L.) Roxb. and *Tephrosia purpurea* (L.) Pers. are the common herbaceous species. The common climbers found in the Sanctuary are *Abrus precatorius* L., *Butea superba* Roxb. ex Willd., *Cajanus scarabaeoides* (L.) Thouars, *Mucuna pruriens* (L.) DC., *Pueraria tuberosa* (Roxb. ex Willd.) DC. and *Spatholobus parviflorus* (Roxb. ex G. Don) Kuntze. Tree

legumes such as *Acacia auriculiformis* and *Senna siamea* (Lam.) H.S. Irwin & Barneby are generally planted in afforestation programme by the forest department and it has been observed that these tree species are naturalized. The invasive species includes *Acacia auriculiformis*, *Delonix regia*

(Bojer ex Hook.) Raf., *Gliricidia sepium* (Jacq.) Kunth, *Parkinsonia aculeata* L., *Peltophorum pterocarpum* (DC.) Backer ex K. Heyne, *Pithecellobium dulce* (Roxb.) Benth., *Senna alata*, *S. occidentalis*, *S. siamea*, *S. tora* and *Tamarindus indica* L.

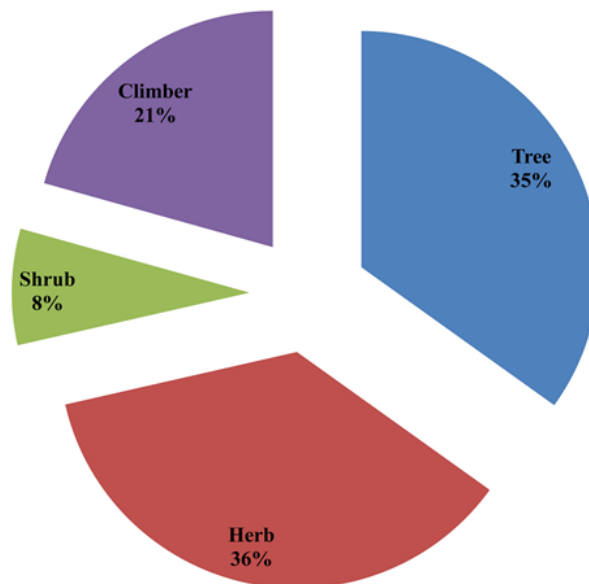


Fig. 2. Life form composition

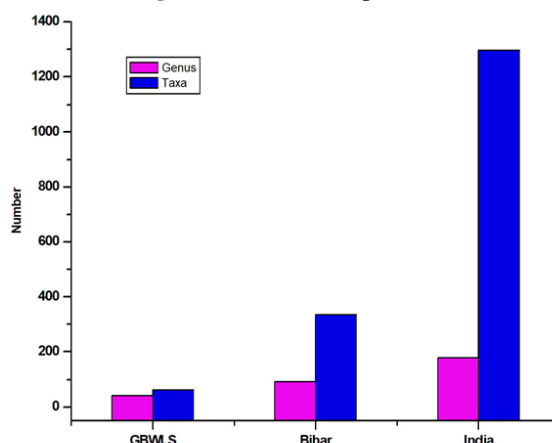


Fig. 3. Total number of genera and taxa in GBWLS, Bihar and India.

Table 1. Checklist of legumes in Gautam Buddha Wildlife Sanctuary, Bihar & Jharkhand.

| Sl. No. | Plants name                                     | Habit   | Fl. & Fr.  | Specimens examined (AK = Anand Kumar) |
|---------|---|---------|------------|---------------------------------------|
| 1.      | <i>Abrus precatorius</i> L.                     | Climber | Aug.-Mar.  | AK 57102, 57007                       |
| 2.      | <i>Acacia auriculiformis</i> A. Cunn. ex Benth. | Tree    | Aug.-May   | AK 57159                              |
| 3.      | <i>Aeschynomene indica</i> L.                   | Herb    | Sept.-Dec. | AK 57105, 63469, 57434                |
| 4.      | <i>Albizia lebbeck</i> (L.) Benth.              | Tree    | Apr.-Mar.  | AK 57168, 57439                       |
| 5.      | <i>Albizia odoratissima</i> (L.f.) Benth.       | Tree    | May-Feb.   | AK 63428                              |
| 6.      | <i>Alysicarpus heyneanus</i> Wight & Arn.       | Herb    | Oct.-Dec.  | AK 63563                              |
| 7.      | <i>Bauhinia purpurea</i> L.                     | Tree    | Sept.-Mar. | AK 57237, 63529, 63479, 63333         |
| 8.      | <i>Bauhinia racemosa</i> Lam.                   | Tree    | Mar.-Jan.  | AK 57125, 63358, 63351, 63414, 57417  |
| 9.      | <i>Butea monosperma</i> (Lam.) Taub.            | Tree    | Mar.-July  | AK 57321, 57279, 63433                |
| 10.     | <i>Butea superba</i> Roxb. ex Willd.            | Climber | Mar.-July  | AK 57249, 63434                       |

| Sl. No. | Plants name  | Habit   | Fl. & Fr.  | Specimens examined<br>(AK = Anand Kumar)    |
|---------|--|---------|------------|---|
| 11.     | <i>Cajanus scarabaeoides</i> (L.) Thouars  | Climber | Aug.-Nov.  | AK 57183, 57234                             |
| 12.     | <i>Cassia fistula</i> L.   | Tree    | Feb.-Apr.  | AK 57110, 63347                             |
| 13.     | <i>Chamaecrista absus</i> (L.) H.S. Irwin & Barneby  | Herb    | Aug.-Oct.  | AK 57145, 57507                             |
| 14.     | <i>Chamaecrista pumila</i> (Lam.) V. Singh   | Herb    | Aug.-Oct.  | AK 57047, 57337                             |
| 15.     | <i>Crotalaria albida</i> B. Heyne ex Roth  | Herb    | Sept.-Mar. | AK 57228, 63474, 63499, 63305, 57502, 63590 |
| 16.     | <i>Crotalaria pallida</i> Aiton  | Shrub   | Aug.-Mar.  | AK 57385                                    |
| 17.     | <i>Crotalaria prostrata</i> Rottler ex Willd.  | Herb    | Sept.-Mar. | AK 57404                                    |
| 18.     | <i>Crotalaria sessiliflora</i> L.  | Herb    | Sept.-Dec. | AK 57493, 57501                             |
| 19.     | <i>Dalbergia lanceolaria</i> L.f.  | Tree    | Apr.-June  | AK 57088, 57154, 57437, 63426               |
| 20.     | <i>Dalbergia volubilis</i> Roxb.   | Climber | Mar.-May   | AK 57271, 63320                             |
| 21.     | <i>Delonix regia</i> (Bojer ex Hook.) Raf.   | Tree    | Apr.-Aug.  | AK 57147                                    |
| 22.     | <i>Desmodium velutinum</i> (Willd.) DC.  | Herb    | Aug.-Jan.  | AK 57350                                    |
| 23.     | <i>Flemingia nana</i> Roxb. ex W.T. Aiton  | Herb    | Mar.-May   | AK 57195                                    |
| 24.     | <i>Gliricidia sepium</i> (Jacq.) Kunth   | Tree    | Feb.-Sept. | AK 63307                                    |
| 25.     | <i>Grona heterocarpa</i> (L.) H. Ohashi & K. Ohashi var. <i>strigosa</i> (Meeuwen) H. Ohashi & K. Ohashi | Herb    | Apr.-Nov.  | AK 57422                                    |
| 26.     | <i>Grona triflora</i> (L.) H. Ohashi & K. Ohashi   | Herb    | Oct.-Apr.  | AK 57189, 57557                             |
| 27.     | <i>Guilandina bonduc</i> L.  | Shrub   | Aug.-Apr.  | AK 57330                                    |
| 28.     | <i>Indigofera astragalina</i> DC.  | Herb    | Aug.-Nov.  | AK 57387                                    |
| 29.     | <i>Indigofera cordifolia</i> B. Heyne ex Roth  | Herb    | Aug.-Dec.  | AK 57175                                    |
| 30.     | <i>Indigofera linifolia</i> (L.f.) Retz.   | Herb    | Aug.-Mar.  | AK 57177, 57238, 63490, 57511               |
| 31.     | <i>Melilotus indicus</i> (L.) All.   | Herb    | Jan.-Mar.  | AK 63327                                    |
| 32.     | <i>Millettia extensa</i> (Benth.) Benth. ex Baker  | Climber | Dec.-May   | AK 57354, 63302                             |
| 33.     | <i>Millettia pinnata</i> (L.) Panigrahi  | Tree    | May-Feb.   | AK 63370                                    |
| 34.     | <i>Mimosa rubicaulis</i> Lam. subsp. <i>himalayana</i> (Gamble) H. Ohashi                                | Shrub   | Aug.-Nov.  | AK 57042, 63485                             |
| 35.     | <i>Mucuna pruriens</i> (L.) DC.  | Climber | Sept.-Apr. | AK 63480                                    |
| 36.     | <i>Ougeinia oojeinensis</i> (Roxb.) Hochr.   | Tree    | Feb.-June  | AK 57232                                    |
| 37.     | <i>Parkinsonia aculeata</i> L.   | Tree    | Sept.-Apr. | AK 57334                                    |
| 38.     | <i>Peltophorum pterocarpum</i> (DC.) Backer ex K. Heyne  | Tree    | Aug.-May   | AK 57172                                    |
| 39.     | <i>Phanera retusa</i> Benth.   | Tree    | Sept.-Feb. | AK 63593                                    |
| 40.     | <i>Phanera vahlii</i> (Wight & Arn.) Benth.  | Climber | Mar.-Apr.  | AK 63717                                    |
| 41.     | <i>Phyllodium pulchellum</i> (L.) Desv.  | Shrub   | Sept.-Mar. | AK 57436, 63558                             |
| 42.     | <i>Pithecellobium dulce</i> (Roxb.) Benth.   | Tree    | May-Feb.   | AK 63313                                    |
| 43.     | <i>Pleurolobus gangeticus</i> (L.) J.St.-Hil. ex H. Ohashi & K. Ohashi                                   | Herb    | Mar.-Oct.  | AK 57023, 57205, 63498, 57336               |
| 44.     | <i>Pterocarpus marsupium</i> Roxb.   | Tree    | July-Jan.  | AK 63597                                    |
| 45.     | <i>Pueraria tuberosa</i> (Roxb. ex Willd.) DC.   | Climber | Feb.-June  | AK 57276, 63312                             |
| 46.     | <i>Rhynchosia minima</i> (L.) DC.  | Climber | Sept.-Nov. | AK 57140                                    |
| 47.     | <i>Senegalia catechu</i> (L.f.) P.J.H. Hurter & Mabb.  | Tree    | Aug.-June  | AK 57018, 63652, 57402, 63418               |
| 48.     | <i>Senegalia megaladena</i> (Desv.) Maslin, Seigler & Ebinger  | Climber | Sept.-Feb. | AK 57151, 57274, 57503                      |
| 49.     | <i>Senegalia torta</i> (Roxb.) Maslin, Seigler & Ebinger   | Climber | May-Feb.   | AK 63566, 57523, 63420                      |
| 50.     | <i>Senna alata</i> (L.) Roxb.  | Shrub   | Sept.-Dec. | AK 57170                                    |
| 51.     | <i>Senna occidentalis</i> (L.) Link  | Herb    | Sept.-Dec. | AK 63698, 57505                             |
| 52.     | <i>Senna siamea</i> (Lam.) H.S. Irwin & Barneby  | Tree    | Sept.-Apr. | AK 57119, 57224                             |

| Sl. No. | Plants name  | Habit   | Fl. & Fr.  | Specimens examined<br>(AK = Anand Kumar) |
|---------|--|---------|------------|--|
| 53.     | <i>Senna tora</i> (L.) Roxb.   | Herb    | Aug.-Dec.  | AK 57063, 57504                          |
| 54.     | <i>Smithia conferta</i> Sm.  | Herb    | Sept.-Mar. | AK 57553, 63567, 63580                   |
| 55.     | <i>Spatholobus parviflorus</i> (Roxb. ex G. Don) Kuntze  | Climber | Aug.-Mar.  | AK 57361, 57508, 63322                   |
| 56.     | <i>Tamarindus indica</i> L.  | Tree    | Apr.-Feb.  | AK 63386                                 |
| 57.     | <i>Tephrosia purpurea</i> (L.) Pers.   | Herb    | Aug.-Apr.  | AK 57002, 63630                          |
| 58.     | <i>Tephrosia strigosa</i> (Dalzell) Santapau & Maheshw.  | Herb    | Aug.-Nov.  | AK 57045, 57370                          |
| 59.     | <i>Uraria picta</i> (Jacq.) Desv. ex DC.   | Herb    | Aug.-Sept. | AK 57123, 57363                          |
| 60.     | <i>Vachellia leucophloea</i> (Roxb.) Maslin, Seigler & Ebinger                                     | Tree    | May-Feb.   | AK 57171                                 |
| 61.     | <i>Vachellia nilotica</i> (L.) P.J.H. Hurter & Mabb. subsp. <i>indica</i> (Benth.) Kyal. & Boatwr. | Tree    | Aug.-Apr.  | AK 57328, 57160, 57500                   |
| 62.     | <i>Vigna hainiana</i> Babu, Gopin. & S.K. Sharma   | Climber | Aug.-Nov.  | AK 57078                                 |
| 63.     | <i>Zornia gibbosa</i> Span.  | Herb    | Sept.-Nov. | AK 63332, 57471                          |

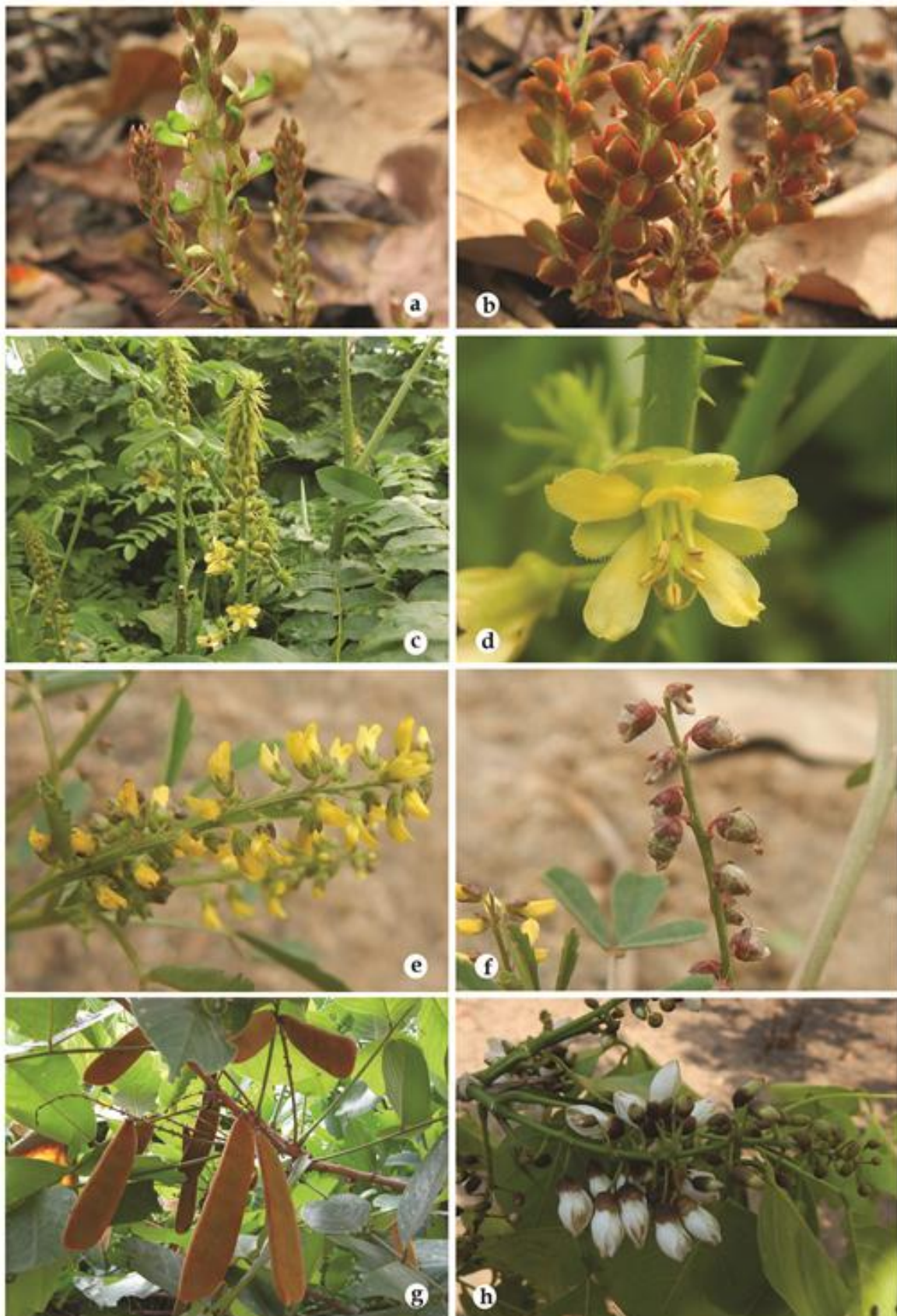
The uses of legume plants by the tribe inhabiting inside the Sanctuary were also documented during the present study. *Melilotus indicus* (L.) All., *Millettia extensa* (Benth.) Benth.

ex Baker and *Tephrosia purpurea* were used as medicinal plant by Birhor tribe while young leaves of *Bauhinia purpurea* were consumed as vegetable. The flowers of *Butea monosperma* were soaked in water to get red colour during the festival of *Holi*.



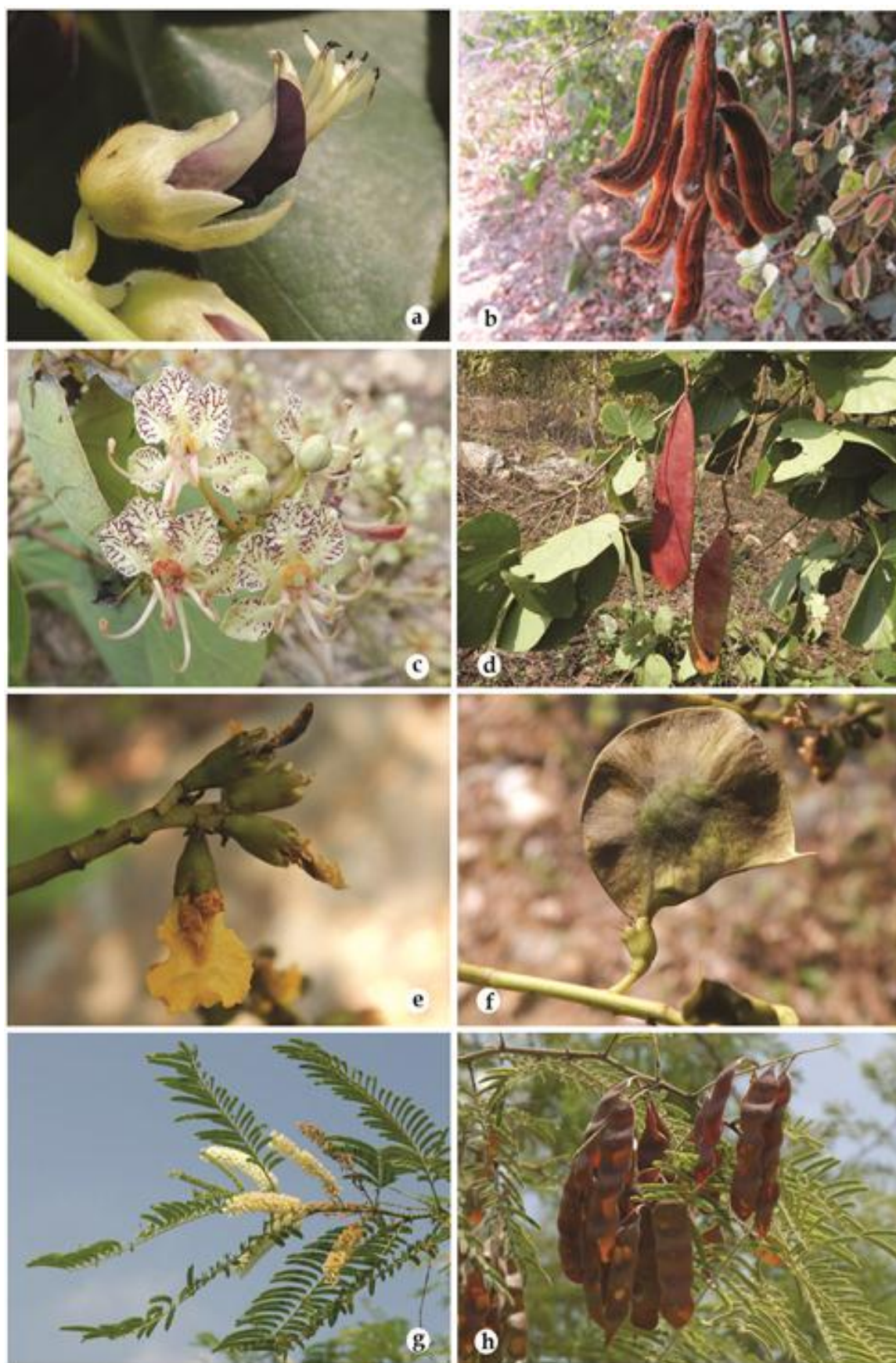
**Fig. 4.** a-b. *Abrus precatorius* L., c-d. *Alysicarpus heyneanus* Wight & Arn., e-f. *Butea monosperma* (Lam.) Taub., g-h. *Cassia fistula* L.





**Fig. 5.** a-b. *Flemingia nana* Roxb. ex W.T. Aiton, c-d. *Guilandina bonduc* L., e-f. *Melilotus indicus* (L.) All., g. *Millettia extensa* (Benth.) Benth. ex Baker, h. *M. pinnata* (L.) Panigrahi.





**Fig. 6.** a-b. *Mucuna pruriens* (L.) DC., c-d. *Phanera retusa* Benth., e-f. *Pterocarpus marsupium* Roxb., g-h. *Senegalia catechu* (L.f.) P.J.H. Hurter & Mabb.





**Fig. 7.** a-b. *Spatholobus parviflorus* (Roxb. ex G. Don) Kuntze, c-d. *Tephrosia purpurea* (L.) Pers., e-f. *T. strigosa* (Dalzell) Santapau & Maheshw., g-h. *Vigna hainiana* Babu, Gopin. & S.K. Sharma



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