TAXONOMIC STUDIES ON THE FAMILY LEGUMINOSAE JUSS. (=FABACEAE LINDL.) OF KOHIMA, MOKOKCHUNG AND MON DISTRICTS OF NAGALAND

Thesis

Submitted to

NAGALAND UNIVERSITY

In Partial Fulfilment of the Requirement for the Degree of

DOCTOR OF PHILOSOPHY IN BOTANY

By

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Registration No. Ph.D./BOT/00049

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ABSTRACT

Leguminosae (Fabaceae) is an economically important angiosperm family. It is the third largest family after Orchidaceae and Asteraceae. There are distributed in all biome of the world in different climatic conditions. Leguminosae family has a wide range of life forms of dwarf herbs, vines, lianas, shrubs, up to gigantic trees in tropical forest. The principle characters of the family to recognized is the pods or legume. The seeds called pulses provide high dietary proteins, carbohydrates, all micronutrient and benefits both Man and animals livelihood. Besides food and fodder, legumes are also an important source of medicine, dyes, resin, timbers, ornamental, and manure etc. Some Legume plants play a major role in fixing atmospheric nitrogen naturally in the soil, which is a unique feature. Leguminosae is traditionally divided into three sub-families; Mimosoideae, Caesalpinoideae and Papilionoideae. Based on molecular evidences also recognize Leguminosae as a monophyletic family, with three subfamilies. The Legume Phylogeny Working Group-LPWG (2017) proposed a six new sub-familial classification of Leguminosae. A recircumscribed sub-family were Cercidoideae LPWG. (Stat. nov.), Detarioideae Burmeist., Duparquetioideae LPWG. (Stat. nov.), Dialioideae LPWG (Stat. nov.), Caesalpinioideae DC., and Papilionoideae DC.

The present study was taken up to document the legumes species in Kohima, Mokokchung and Mon districts of Nagaland. The field exploration was conducted from the year 2017- 2023. Field survey was done intensively at frequent interval of time to catch up with the seasons. The specimen were collected randomly from variations of elevation, seasonal, wild and cultivated within the study areas. The region has a rich diversity of Leguminosae families. The wild species remain unknown and unexploited. So, documenting of this family will offer an alternative to meet the nutritional requirements for future sustainable production and also considering its values, it is very necessary to explore the richness of legumes in the wild. The specimens were collected in flowering and fruiting seasons. Geographical coordinates were collected for each species with GPS Garmin and locate the coordinates of species collected. The voucher specimens were collected from the field. The specimens were documented with proper characteristics in its natural conditions, habitat, habit, morphology, along with good photographs. Then undergo the poisoning method using formalin of 10%. The specimens were tightly pressed in a wooden frame with blotting paper or newspapers and keep it in room temperature. After 24 hours the blotting

papers/ newspapers were removed and spread out with new ones. The process was repeated till the specimens were completely dry and ready to paste. Herbarium preparation was done by following the standard protocols of Jain & Rao, 1977. The identification of plants specimen was done with the help of Floras of states and neighboring countries, floristic literature, taxonomic revisions, monographs and experts. Photographs were taken using Canon 1500D digital camera. Updated names or correct name of the plant species were determined using different Floras, Monographs, Revisionary work, research papers, and web databases like ILDIS, 2019, IPNI, 2023, World flora, and The Plant Lists etc. Classification of the family into 6 sub-families was done following the LPWG, 2017. The compilation of the subfamilies with its systematic keys on genus, species and variety level were done with taxonomic enumerations.

A total of 116 taxa were recorded with 113 species, 3 varieties, and 63 genera, classifying into subfamilies. Only 3 sub-families were observed. Papilionoideae has the highest record with 87 species, 2 varieties, and 48 genera, Caesalpinioideae with 23 species, 1 variety, and 14 genera, Cercidoideae with 3 species and 1 genus. In Kohima, 40 genera and 62 species, with 1 variety of Leguminosae, were recorded. Out of which sub-family Cercidoideae with 1 genus and 1 species, Caesalpinioideae with 4 genera and 4 species, and Papilionoideae with 35 genera and 57 species, 1 variety respectively. In Mokokchung, 24 genera with 30 species and 2 varieties were recorded, of which 8 genera with 12 species belong to Caesalpinioideae and 16 genera with 18 species belong to Papilionoideae. In Mon, 20 genera with 24 species were recorded, of which 1 genus and 2 species belong to Cercidoideae, 7 genera and 8 species of Caesalpinioideae, and 12 genera with 14 species belong to Papilionoideae The flowering and fruiting season of Leguminous species was mostly seen from August to November.

The wet temperate forest was found in higher elevation of 2500 m of Kohima district. The species found in this forest types were *Piptanthus nepalensis* (Hook.) D. Don, *Astragalus concretus* Benth., and *Parochetus communis* D. Don. A large number of Legume species was found in subtropical forest example, *Tephrosia purpurea* (L.) Pers., *Senna floribunda* (Cav.) H.S. Irwin & Barneby, *Meizotropis buteiformis* Voigt., *Erythrina arborescens* Roxb., *Apios carnea* (Wall.) Benth., *Chamaecrista mimosoides* (L.) Greene, *Crotalaria juncea* L., *Desmodium concinnum* DC., *Indigofera nigrescens* Kurz ex King & Prain, *Desmodium laxiflorum* DC., *Vigna radiata* (L.) R. Wilczek, *Hylodesmum repandum* (Vahl) H. Ohashi & R. R. Mill., *Pueraria peduncularis* (Benth.) Benth., *Pueraria tuberosa* (Willd.) DC. etc. The

species found in evergreen and mixed deciduous forests are *Clitoria mariana* L., *Pueraria montana var. Thomsonii* Benth., *Desmodium confertum* (DC.), *Desmodium heterocarpon* (L.) DC., *Flemingia macrophylla* (Willd.)O. Kuntze ex Merr., *Millettia pulchra* Kurz., *Abrus pulchellus* Wall. Ex Thwaites., *Crotalaria ferruginea* Benth., *Mucuna pruriens* (L.) DC., *Aeschynomene americana* L., *Crotalaria cytisoides* Roxb., *Crotalaria pallida* Aiton, *Codariocalyx motorius* (Houtt.) H. Ohashi, *Smithia ciliata* Royle., *Cajanus scarabaeoides* (L.) Thouars etc.

Mokokchung district has a vegetation of Northern Tropical semi-evergreen forest and sub-tropical broad-leaf forest. The lower elevations have patches of mixed deciduous forest or semi-evergreen forest from 150- 1000 m above sea levels. Some of the legume species collected from these areas are *Albizia chinensis* (Osb.) Merr., *Cassia javanica* L., *C. fistula* DC., *Dalhousiea bracteata* (Roxb.) Benth. *Mimosa pudica* L., *Senna tora* (L.) Roxb., *Archidendron Clypearia* (Jack.) Nielson, *Adenanthera pavonina* L. Legumes species collected from 1000- 1500 m were *Leucaena leucocephala* (Lam.) de Wit., *Crotalaria tetragona*l (L.) DC., *Tephrosia candida* DC. *Senna alata* (L.) Roxb. *Millettia pachycarpa* Benth., *Mucuna imbricata* Baker, *Tadehagi triquetrum* (L.) H. Ohashi, *Senna hirsuta* (L.) H.S. Irwin & Barneby, *Dalbergia stipulaceae* Roxb., *Desmodium triflorum* (L.) DC., *Callerya cinerea* Benth., *Derris robusta* Benth., *Spatholobus suberectus* Dunn. etc.

Mon district has a Northern tropical wet evergreen forest in parts of the district and a Northern sub-tropical broad leave wet hill forest. The legume species are collected from the altitudinal ranges between 100 - 1500 m. The species recorded in this region are *Entada phaseoloides* (L.) Merr., *Bauhinia variegata* L., *B. acuminata* L., *Ormosia robusta* Baker, *Desmodium sequax* Wall., *D. heterophyllum* (Willd.) DC., *Derris scandens* (Roxb.) Benth., *Hylodesmum podocarpum* (DC.) H.Ohashi & R.R. Mill., *Erythrina stricta* Roxb., *Parkia timoriana* (DC.) Merr., *Senna occidentalis* L., *Albizia procera* (Roxb.) Benth., *A. julibrissin* Durazz. *Robinia pseudoacacia* L., *Pachyrhizus erosus* (L.) Urb. etc.

The dominant genera recorded during the study are *Desmodium* with 11 species, *Crotalaria* with 8 species, *Senna* and *Vigna* with 5 species each, *Albizia* and *Pueraria* with 4 species each, *Bauhinia, Derris, Millettia* and *Mucuna* with 3 species each and *Caesalpinia, Mimosa, Cajanus, Canavalia, Dalbergia, Erythrina, Hylodesmum, Indigofera, Phaseolus, Shuteria* and *Tephrosia* with 2 species each respectively.

10 invasive plant species have been reported in the study areas. They are *Leucaena leucocephala* (Lam.) de Wit., *Mimosa diplotricha* var. *inermis* (Adelb.), *Mimosa pudica* L., *Senna alata* (L.) Roxb., *Senna hirsuta* (L.) H.S. Irwin & Barneby, *Senna occidentalis* L., *Senna tora* (L.) Roxb., *Aeschynomene Americana* L., *Crotalaria pallida* Aiton, *Pueraria Montana* var. *thomsonii* Benth. These species are widely distributed in degraded forest areas along the roadside or open wastelands in lower elevations ranging from 500 - 1020 m. The IUCN status of most Legumes species falls under Least Concern = LC; some species are 'Not Evaluated' = NE. *Albizia julibrissin* Durazz. are found to be vulnerable.

Cajanus cajan (L.) Milsp., *Canavalia ensiformis* (L.) DC., *Canavalia gladiata* (Jacq.) DC., *Crotalaria tetragona* Roxb. ex Andrews, *Glycine max, Lablab purpureus* (L.) Sweet, *Mucuna pruriens var. utilis, Phaseolus lunatus* L., *Phaseolus vulgaris* L., *Psophocarpus tetragonolobus* (L.) DC., *Vigna umbellata* (Thunb.) Ohwi & Ohashi, *Vigna unguiculata* (L.) Walp., and *Parkia roxbhurghii* (DC.) Merr. were widely cultivated in the study areas for pulses and vegetables and commercially available in the local markets.

There are wild legumes that are not commonly used but consumed by local native people within the study areas. For example, *Entada phaseoloides* (L.) Merr., *Bauhinia variegata* L., and *Leucaena leucocephala* (Lam.) de Wit. Many species of the Leguminosae family provide valuable timbers, ornaments, insecticides, medicines, and fibers. *Adenanthera pavonina* L., *Albizia spp., Bauhinia spp., Caesalpinia pulcherrima* (L.) SW., *Calliandra umbroso* (Wall.) Benth., *Cassia fistula* L., *Cassia javanica* L., *Delonix regia* (Bojer. ex Hook.) Rafin., *Leucaena leucocephala* (Lam.) de Wit., *Millettia pinnata* (L.) Panigrahi and *Senna alata* (L.) Roxb. was introduced through agroforestry for soil restoration, timbers, ornamental trees, landscaping, etc. Species like *sesbania bispinosa* (Jacq.) W. Wight, *Leucaena leucocephala* (Lam.) de Wit. also planted to provide green manure for crops.

Many wild and cultivated legumes of the region were known for their high medicinal properties; they were traditionally used or consumed by the people. These include *Acacia pennata* (L.) Willd., *Albizia procera* (Roxb.) Benth., *Bauhinia racemosa* L., *Bauhinia variegata* L., *Crotalaria pallida* Aiton., *Desmodium heterocarpon* (L.) DC., *Entada phaseoloides* (L.) Merr. *Erythrina stricta* L., *Leucaena leucocephala* (Lam.) de Wit., *Mimosa pudica* L., *Senna alata* (L.) Roxb., *Senna tora* (L.) Roxb., *Senna floribunda* (Cav.) H.S. Irwin & Barneby, and *Tephrosia candida* DC., etc.

There are many other valuable traditional uses of wild legumes. The species like *Millettia pachycarpa* Benth., *Dalhousiea bracteata* (Roxb.) Benth., *Acacia pennata* (L.) Willd. were used to stupefy fish. *Pueraria montana var. Thomsonii* Benth., *Mucuna pruriens* (L.) DC. Vines and lianas of many wild legumes were also used as fibers for making ropes.

Common tree species of legumes widely distributed in all study areas were *Bauhinia variegata* L. *and Albizia chinensis* (Osb.) Merr., *Albizia lebbeck* (L.) Benth, *Albizia procera* (Roxb.) Benth., *Archidendron clypearia* (Jack.) Nielson., *Cassia javanica* L., *Delonix regia* (Bojer ex Hook.) Rafin, *Parkia timoriana* (DC.) Merr., *Derris robusta* Benth., *Erythrina stricta* Roxb. Small trees or woody climbers commonly distributed were *Acacia pennata* (L.) Willd., *Entada phaseoiloides* (L.) Merr., *Calliandra umbrosa* (Benth.) S.R. Paul, *Leucaena leucocephala* (Lam.) de Wit., *Dalbergia pinnata* (Lour.) Prain, *Dalbergia stipulacea* Roxb. *Mastersia assamica* Benth., *Millettia pachycarpa* Benth., *Millettia pulchra* Kurz.

Legumes widely found as shrubs or herbs or wildly spreading as weeds are *Mimosa pudica* L., *Senna alata* (L.) Roxb., *Senna floribunda* (Cav.) H.S. Irwin & Barneby, *Senna occidentalis* L., *Senna tora* (L.) Roxb., *Abrus pulchellus* Wall. Ex Thwaites., *Aeschynomene americana* L., *Arachis hypogea* L., Milsp., *Crotalaria ferruginea* Benth., *Crotalaria juncea* L., *Crotalaria mysorensis* Roth., *Crotalaria pallida* Aiton, *Crotalaria tetragona* Roxb ex. Andrews, *Desmodium heterocarpon* (L.) DC., *Desmodium laxiflorum* DC., *Desmodium microphyllum* (Thunb.) DC., *Desmodium sequax* wall., *Flemingia macrophylla* (Willd.)O. Kuntze ex Merr., , *Mucuna pruriens* (L.) DC., *Pueraria montana var. Thomsonii* Benth., *Sesbania bispinosa* (Jacq.) W.Wight, *Shuteria involucrata* (Wall.) Wight & Arn. ex Walp., *Tephrosia candida* DC.

The present research work, "Taxonomic studies on the family Legumininosae Juss. (= Fabaceae Lindl. in Kohima, Mokokchung and Mon districts of Nagaland." has initiated to document the Legumes species in Kohima, Mokokchung, and Mon districts of Nagaland and provides a baseline data for references to any research taken up in the areas, students for understanding the floras in the localities and any individuals who are interested in the field of floras. It is also concluded that Leguminosae is also one dominant family in the study areas and recorded as the third dominant family in the state after Orchidaceae and Gramineae, as per the checklist of the flora of Nagaland.

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ABBREVIATIONS

Nom. alt.:	Nomen Alternativum
ICN:	International Code of Nomenclature
et. al.:	“and others”
LPWG:	Legume Phylogeny Working Group
APG:	Angiosperm Phylogeny Group
Stat. nov.:	Status novus
Ca.:	Circa (Latin)- Approximately
MCC Clade:	Mimosoideae- Caesalpinioideae- Cassieae Clade
ILDIS:	International Legume Database and Information Service
AMSL:	Above Mean Sea Level
M:	Meters
Sq. km.:	Square Kilometer
GIS:	Geographic Information System
GPS:	Global Positioning System
IPNI:	International Plant Names Index
IUCN:	The International Union for Conservation of Nature
Khm:	Kohima
Mkg:	Mokokchung
LC:	Least Concern
NE:	Not Evaluated
VU:	Vulnerable
Mar:	March
Apr:	April
Aug:	August
Sep:	September
Oct:	October
Nov:	November
Dec:	December

CHAPTER 1

INTRODUCTION AND LITERATURE REVIEW

INTRODUCTION

The Leguminosae or Fabaceae, commonly known as the legume, pea, or bean family, is a large and economically important family of flowering plants. It is the third largest land plant family, behind only the *Orchidaceae* and *Asteraceae*, with 770 genera and over 19,500 species (Lewis *et al.*, 2005, 2013; LPWG, 2013a). Economically, the Leguminosae family is second to Poaceae or cereal crops. The largest genera include *Astragalus* (over 2,400 species), *Acacia* (over 950 species), *Indigofera* (around 700 species), *Crotalaria* (around 700 species), and *Mimosa* (around 500 species).

Leguminosae is distributed throughout the world, growing in many different environments and climates. It ranges from wetlands to dry and cold deserts, tropical forests to alpine habitats, and from sea level to 7000 m in the mighty Himalayan Mountains. The species has a wide variety of life forms within its family, from dwarf herbs, vines, lianas, and shrubs to gigantic trees in tropical forests. Huge numbers are also important agricultural plants, including *Glycine max* (soya bean), *Phaseolus* (beans), *Pisum sativum* (pea), *Cicer arietinum* (chickpeas), *Medicago sativa* (alfalfa), *Arachis hypogea* (peanut), and *Glycyrrhiza glabra* (licorice); which are among the best-known members of Leguminosae. The principal character of the family to recognize is the pods, commonly known as legumes. The seeds, called pulses, provide high dietary proteins, carbohydrates, and all micronutrients and benefit both Man and animal's livelihood.

Legumes are considered to be one of the most economic importance among the Dicotyledonae (Harbone, 1994). They are second to cereals in providing food crops to the world. Legumes provide the most important resources of food, medicine, fodder, dyes, resin, and timbers, ornamental. Legumes are rich in proteins, providing highly nutritional food to the population. The common foods of legumes are beans (*Phaseolus*), soya (*Glycine max)*, lentils (*Lens culinaris*), peas (*Pisum sativum*), chickpeas (*Cicer arietinum*), etc., and many locally available legumes. Besides consumptions, legumes also yield fodders, as manures and forages,

for example, Lupin (*Lupinus*), Alfalfa (*Medicago*), Clover (*Trifolium*), etc. On a worldwide scale, legumes provide 22% protein, 32% fat and oil, and 7% carbohydrates in terms of human nutrition. In terms of livestock nutrition, they provide 38% protein, 16% lipids, and 5% carbohydrates (Werry and Gringac, 1989). The common bean has lately gained attention as a functional food due to its health benefits and human disease prevention. Its inclusion in diets is linked to reduced risks of obesity, diabetes, cardiovascular diseases, and colon, prostate, and breast cancer. Legumes are also utilized for ornamental purposes, timbers and fibers (*Delonix regia, Cassia fistula, Albizia, Acacia, Dalbergia, Crotalaria,* etc.), medicines, tannins and gums like *Senna, Mimosa, Derris, Indigofera* species, etc. The economic importance of legumes is likely to grow as per human uses and demands. The uses also will vary depending on the availability and knowledge of these plants in the region.

Micronutrients like nitrogen, phosphorous, and potassium are the major essential elements for plant growth. The Legume plants play a major role in fixing atmospheric nitrogen naturally in the soil, which is a unique feature. Some Legumes species convert atmospheric nitrogen into nitrogenous compounds, which are very useful for plants. The presence of root nodules in legumes and its symbiotic association with Rhizobium bacteria within root nodules play a vital role in the terrestrial ecological nitrogen cycle. And in return, the bacteria receive valuable carbon produced during photosynthesis. Thus the symbiotic relationship between the bacteria and the plants provides nitrogen fixation by many species of leguminous plants. Root nodulation was observed in subfamilies of Mimosoideae and Papilionoideae and rarely observed in Caesalpinioideae.

SYSTEMATIC POSITIONS

Leguminosae (nom. alt. Fabaceae) received its name from the early taxonomist from its fruit-legume characters. The name was conserved by the International Code of Nomenclature (ICN). Then another name Fabaceae, based on the type genus Faba, was proposed as an alternate name, and both names were acceptable as per Shenzhen Code Article 18.5 and 18.6 (Turland *et al*., 2018). The term "Faba" comes from Latin and appears to simply mean "bean." (Anonymous, 2017).

Leguminosae is traditionally divided into three sub-families; Mimosoideae, Caesalpinioideae, and Papilionoideae. At first, treatment of the family Leguminosae is done by De Candolle (1825). He subdivided the family into four suborders or (= subfamilies). They are Papilionaceae, Swartzieae (now joined in Papilionoideae), Mimoseae, and Caesalpineae. The system was elaborated by Bentham (1865) and recognized three major groups within Leguminosae. Taubert (1894), Engler (1964), Thorne (1976, 2000), Polhill & Raven (1981), and many workers also treated Leguminosae as one family with three subfamilies. However, many recent taxonomists (Hutchinson 1973, Takhtajan 1980 and Cronquist, 1981, Dahlgren 1989; Mabberly, 1997) prefer to treat sub-families as separate families– Mimosaceae, Caesalpinaceae, and Papilionaceae under the order Leguminales/ Fabales. Takhtajan, 1980 and Cronquist, 1981 even shared Leguminales as Fabales and Papilionaceae as Fabaceae. In this context, it is understood that the name Fabaceae is valid for the family sensu lato as well as for Papilionoideae upgraded as a family. (LPWG, 2013) further subdivided over 42 tribes which together comprise 751 genera circumscribing a total of 19,500 species. Its species can be recognized by its legume (fruit). Each sub-family can also be identified by its flowers.

The three sub-families or families classifications of Leguminosae (Fabaceae) are:

1. Mimosoideae or Mimosaceae
2. Caesalpinioideae or Caesalpinaceae
3. Papilionoideae or Papilionaceae (Faboideae or Fabaceae).

Mimosoideae DC. comprises 80 genera and 3,270 species in four tribes (Lewis *et al.* 2005), rather than the five tribes recognized in Mimosoideae (Bentham 1875; Elias, 1981) until recently. Some recent morphological and molecular datasets have supported the monophyly of the Mimosoideae (Chappill 1995; Käss & Wink 1996; Dayanandan *et al.* 1997; Lavin *et al.* 2005), characterized by regular (actinomorphic) flowers with valvate petals often fused at the base and compound pollen with porate apertures (Polhill *et al.* 1981; Guinet P. & Hernandez H.M. 1989). Chappill (1995) listed several morphological synapomorphies found in most (but not all) taxa in the Mimosoideae clade, including bipinnate leaves, abaxial position of the median petal, valvate petal aestivation, prominently exerted stamens, four celled polyads and absence of a stylar groove. However, Elias (1981) and Luckow *et al.* (2000) found that the Mimosoideae are not monophyletic due to uncertainty surrounding the relationships of some taxa of the

Dimorphandra group of Caesalpinioideae, and many other studies have found Caesalpinioideae to be paraphyletic (Käss & Wink 1996). The distinction between taxa in the Caesalpinioideae and Mimosoideae is not well defined, and further phylogenetic analysis is required to clarify this boundary (Luckow *et al.* 2005a). Mimosoideae were traditionally comprised of four tribes: Acacieae, Ingeae, Mimoseae, and Mimozygantheae.

Caesalpinioideae DC. (Caesalpinaceae), a subfamily is a heterogeneous group of plants. It includes 9 tribes that have more than 171 genera and over 2,300 species. Caesalpinioideae legumes are found throughout the world. This sub-family is more variable than the other groups. The leaves are usually divided into compound or bi-compound leaflets. Flowers also vary in symmetric form- bilateral to irregular. The sepals are found separate and imbricate, generally 5-separate imbricate petals, the upper one inside of the lateral petals in the bud. There are usually 10 stamens or less which are exposed. The fruit structure is diverse. Nodulation is less observed than in other sub-families. Many species are ornamental, too, for example, *Delonix regia, Bauhinia* species, *cassia* species, etc. The tribe Caesalpinieae was reported to possess a wide range of pharmacological activities, including anti-oxidant, anti-bacterial, anti-inflammatory, cytotoxic, anti-diabetic, antifungal, hepatoprotective, gastroprotective, analgesic, anti-arthritic, anti-filarial, antimalarial, anthelmintic, amoebicidal, diuretic, anti-psoriatic, anti-estrogenic, anti-fertility, wound-healing, anxiolytic, cardioprotective, immunomodulatory, anti-HIV activities. Thus, includes several plants with the potential for exploitation as a source for plant-based pharmaceutical products. The most popular ornamental and medicinal genera of this tribe are placed in *Caesalpinia* and *Peltophorum* (El- Nashar *et al*., 2015).

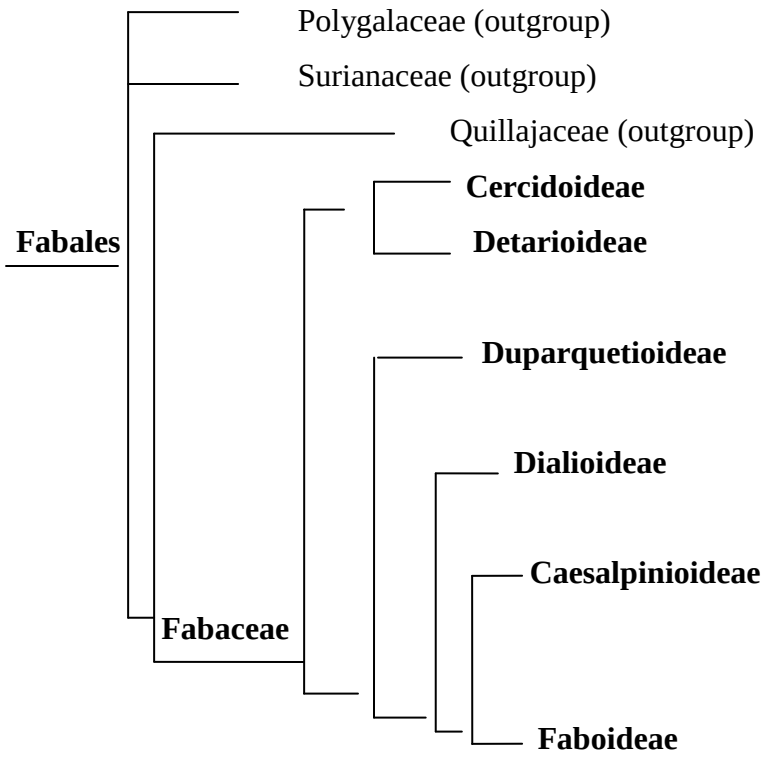
Papilionoideae DC. are estimated with 13,800 species, 478 genera, and 28 tribes is a legacy of their extraordinarily broad ecological and biogeographical range largely associated with diversifications in tropical rain forests, savannas, seasonally dry forests, and temperate regions worldwide (Lavin *et al.,* 2005; Lewis *et al.,* 2005; Schrire *et al*., 2005). The subfamily Papilionoideae (Alternatively Fabaceae Lindl.) is the largest and most advanced group in the Leguminosae family, and it has been classified by different workers into a variable number of tribes (De Candolle 1825; Bentham, 1865; Taubert 1892-1894; and Hutchinson 1973). The subfamilies range from small herbs, shrubs, lianas, or trees. It can be easily distinguished separately from Mimosoideae and Caesalpinioideae by numerous morphological attributes, including the papilionoid structure of the corolla, asymmetrical seeds, and ovate-elliptical

cotyledons. The flowers are papilionaceous- the posterior petal rose to form a flag ('standard'), the lower petals housing the stamens and gynoecium or neither papilionaceous nor pseudo-papilionaceous. Variation in this floral architecture has greatly influenced the taxonomy of the Papilionoideae. A high degree of floral connotation, especially of the staminal filaments and keel and wing petals, has traditionally marked the putative "advanced" papilionoid tribes (Polhill, 1981a). Papilionoideae are cosmopolitan in distribution. The family is economically very important, and it provides food, fodder, fibers, dyes, gums, resins, oils, and green manure. Some of the important species are peas (*Pisum*), lentils (*Lens*), peanuts (*Arachis*), beans (*Phaseolus, Vicia*), soybean (*Glycine*), etc. Ornamental species include *Wisteria, Lathyrus, Clitoria*, etc. Some important timbers are *Dalbergia, Robinia, Sophora*, etc.

Systematic considerations based on molecular evidence also recognize Leguminosae as a monophyletic family with three subfamilies (Doyle *et al*. 2003; Lewis & Schrire 2003; Wojciechowski 2003; Lewis *et al*. 2005; Shiupnov 2009; APG IV 2016; Judd *et al*. 2016).
Recent molecular-based phylogenetic studies (Bruneau *et al.* 2008; Bello *et al*. 2009, 2012; Sinou *et al*. 2009; Cardoso *et al*. 2012, 2013; Gagnon *et al*. 2013, 2016; Koenen *et al.* 2013; LPWG 2013a, b, 2017), however, made sweeping changes in the systematic of Leguminosae (Balan & Pradeep, 2021). The need for a new classification within the legume systematic community was started after the publishing of molecular phylogenies of the family (Käss & Wink, 1996; Doyle *et al*., 1997). An effort was made to initiate the new classification at the 6th International Legume Conference in Johannesburg, South Africa, in January 2013 (LPWG, 2017).

Fig. 1. The figures show the Cladogram of order Fabales (as per APG- IV, 2016 system).

The exact branching of different subfamilies is still unresolved.



The Fabaceae were placed in the order Fabales Bromhead. in nitrogen-fixing clade by most taxonomic systems (APG III, 2009, APG IV, 2016). The Legume Phylogeny Working Group - LPWG (2017) proposed six new sub-familial classifications of Leguminosae. A circumscribed sub-family

1) Cercidoideae Legume Phylogeny Working Group (Stat. nov.)
2) Detarioideae Burmeist.
3) Duparquetioideae Legume Phylogeny Working Group (Stat. nov.)
4) Dialioideae Legume Phylogeny Working Group (Stat. nov.)
5) Caesalpinioideae DC.
6) Papilionoideae DC.

Cercidoideae LPWG (Stat. Nov.) is represented with 12 genera and ca. 335 species. The species mostly occupies the tropical and warm temperate Northern Hemisphere. Trees, shrubs, or tendriled lianas, not arm, sometimes with prickles or stipular spine. The species can be identified with the features of leaf structures with unifoliolate or bifoliolate, palmate, or bilobed. The 12 genera are *Adenolobus* (Harv. Ex Benth. & Hook.f.) Torre & Hillc.; *Barklya* F. Muell.; *Bauhinia* L.; *Brenierea* Humbert; *Cercis* L.; *Gigasiphon* Drake; *Griffonia* Baill.; *Lysiphyllum* (Benth.) de Wit; *Phanera* Lour.; *Piliostigma* Hochst.; *Schnella* Raddi.; *Tylosema* (Schweinf.) Torre & Hillc.

Detarioideae Burmeist. reported 84 genera and ca. 760 species mostly found in tropical and sub-tropical. The species is mostly represented with trees or shrubs and rarely herbs. Examples of some genera are *Baikiaea* Benth, *Cynometra* L., *Hardwickia* Roxb., *Humboldtia* J.Vahl., *Saraca* L., *Tamarindus* L., etc.

Duparquetioideae LPWG (Stat. nov.) *Duparquetia* is a genus with a single species. *Duparquetia orchidaceae* Baill. distributed or native to tropical Africa. The species is a liana, climbing to the forest canopy.

Dialioideae LPWG (Stat. nov.) The subfamily has reported 17 genera and ca. 85 species. They are widespread throughout the tropics, America, Africa, Madagascar, South and Southeast Asia, South China, Australia, New Guinea, and parts of the Pacific Islands—trees or shrubs, and rarely herbs.

Caesalpinioideae DC. Caesalpinioideae, in its amended circumscription, reported 148 genera and ca. 4400 species. They are pantropical, extending from temperate to tropical: trees, shrubs, lianas, and herbaceous. The characters of leaves are commonly bipinnate or pinnate, mostly paripinnate and rarely imparipinnate.

Papilionoideae DC. It is the largest subfamily with 503 genera and ca. 14,000 species. Papilionoideae is cosmopolitan, and the species is considered the most economically important plant. Most of the cultivated varieties belong to this group.

In this new classification, the six subfamilies presented 765 genera and 19,581 species altogether. The Duparquetioideae subfamily is well-known and presented in Africa only. The major disadvantage of the six subfamily classifications is the abandoning of Mimosoideae. The traditionally recognized subfamily Mimosoideae is a distinct clade nested within the circumscribed Caesalpinioideae (Balan & Pradeep, 2021). As per the International Code of Nomenclature for algae, fungi, and plants (Melbourne Code, 2012), Caesalpinioideae DC. and

Mimosoideae DC. have equal priority, but Caesalpinioideae was chosen as the preferred name for the MCC clade. Because of its broader concept associated with Caesalpinioideae, it corresponds more inclusive to the MCC clade (LPWG, 2017).

Since legume has the potential to provide extensively to all populations, the study has been conducted since time immemorial, and records have been maintained. An international Legume Database and Information Service (ILDIS) was initiated at Royal Botanic Garden, Kew, UK, to list and store information on all legumes of the world. (Sanjappa, 1992).

OBJECTIVE AND PURPOSE OF THE PRESENT STUDY

Nagaland is one of the biodiversity hotspots of the world. Floristic work in the region is not explored to date. Some exceptional mention of floras of Nagaland or Naga Hills has been recorded in Flora of British India (J.D. Hooker 1872- 1879), Flora of Assam (Kanjilal *et al*., 1934- 1940), Angiosperms of Nagaland (Hynniewta, 1999) and some regional work or district floras by researchers like Flora of Mokokchung (Gurung, Ph.D. thesis unpublished, 1993), Flora of Zunheboto (Moaakum, Ph.D. thesis unpublished, 2011) and Diversity of flowering plants of Tuensang District (Dey, Ph.D. thesis unpublished, 2018). Major work has been established by the Botanical Survey of India, Eastern circle, Shillong in the North-east region. There is no proper taxonomy work or Floras of the state but with the advancement of technology, there has been much destruction leading to the loss of biodiversity. This will result in the extinction of valuable species. So, the taxonomic study of the Leguminosae family was taken up to document and preserved information on the values of legume species used traditionally and also to contribute to the Flora of districts and states in general.

Climatic changes is also a major effect on food crops, and with the over exploitations of the population, a huge pressure on demands for agronomic resources. It is a major threat to food security. Based on these issues, the studies and documentation of legume flora in the region will result in more information and could be a better feed to sustain the future generation.

Particularly, in Nagaland, very few species of Legumes have been domesticated, though it has been used in agricultural production since the earliest of civilizations. The region has a rich diversity of Leguminosae families in the wild. The wild species remain unknown and unexploited despite the rich biodiversity. So, documenting this family will offer an alternative to

meet the nutritional requirements for sustainable production, and there is an urgent need to revisit indigenous legumes to address second-generation problems and provide broader knowledge to the community. Therefore, the main aims and objectives of the present work are:

1. Field survey of the family Leguminosae in Kohima, Mokokchung, and Mon districts of Nagaland.

2. Identification and documentation of the collected species.

3. Photographic and herbarium documentation of the identified species.

4. Classification of the sub-families and compilation of these sub-families with systematic keys on genus, species, and variety level.

STUDY AREA

Nagaland is located in the Northeastern region of India, sharing the international border with Myanmar. The state lies between the geographical coordinates of 25^{o} 60’ and 27^{o}40’ North latitudes and 93^{o}20’ and 95^{o}15' East longitude. The state of Nagaland is covered by the vegetative growth of the evergreen tropical and subtropical forests, which occupies 8 62,930 hectares of land. The state falls under the Indian Himalayan region and is known as a biodiversity hotspot. The Inhabitants of Nagaland are almost entirely tribal, with distinctive cultures and dialects. There are 16 districts at present.

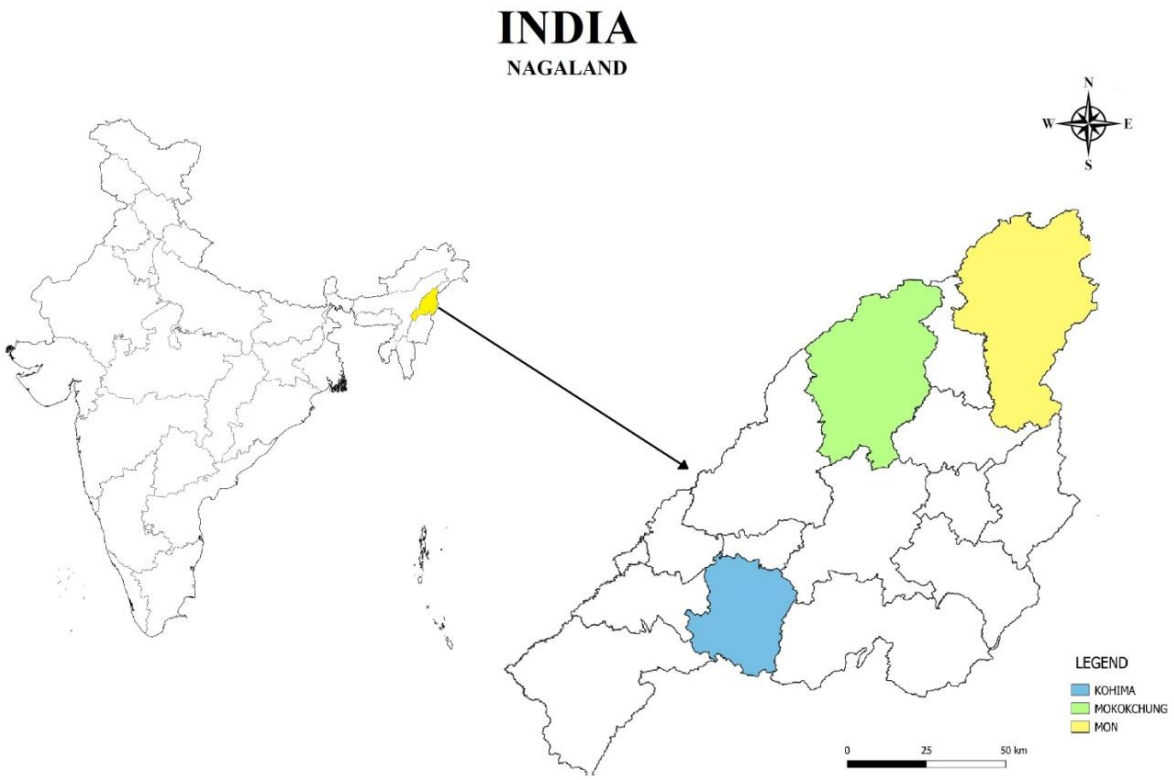
Kohima, the home to the Angami Naga, is one of the districts in Nagaland and also the capital of the state. It shares the boundaries with Chumukedima district in the west, Phek district in the east, Manipur state and Peren district in the South and Southwest, respectively—Tseminyu district in the North, Niuland in the Northwest, and Zunheboto in the Northeast. Kohima has the highest altitude with 3014 m AMSL (Mount Japfü, the second highest peak in Nagaland in the Southern part of the district). The vegetation ranges from Northern Montana Wet- temperate Forest to Sub-tropical Broad-leaved wet hill forest. The district has one Wildlife Sanctuary- Pulie Badze Wildlife Sanctuary, which is a natural habitat of Blyth’s Tragopan.

Mokokchung district in Nagaland is the home to the Ao Naga tribe. It covers an area of 1,615 sq. km. It is bounded by Assam state to its north and northwest, Longleng to its northeast, districts of Wokha to its southwest, Tuensang to its southeast, and Zunheboto to its south. The district lies between 94^{o} 29' and 94^{o} 76' east longitude and 26^{o}20'and 26^{o}77' latitude. The physiography of the district shows six district hills or ranges, namely the Tzurangkong range adjoining the plains of Assam; Japukong, the outermost range stretching from Northeast to Southwest; Jangpetkong, and a parallel range east of Japukong. Asetkong is a central range, Langpangkong is the easternmost range along the course of Dikhu, and Ongpangkong is the southernmost range. The average rainfall of the district ranges from about 1600mm- 2500mm. The district enjoys the Northern Tropical Semi-evergreen forest and Northern sub-tropical Broad Leave wet hill forest.

Mon is one of the districts in Nagaland, which is located in the easternmost region. It covers an area of 1786 sq. km. The district shares its boundaries with districts, states, and international. Mon is bounded by Assam in its West and Northwest, Arunachal Pradesh states to its Northeast, Myanmar international border in the Southeast and Longleng to its Southwest, and Tuensang and Noklak to its South. The district, except for the foothills, is hilly with steep slopes; low-lying areas with undulating hills characterize the foothills. The altitude ranges from 150 - 2413 meters. The district is located in coordinates of 94^{o} 49' east longitude and 25^{o} 45' North latitude.

The district is home to the Konyak tribe. The district is divided into two regions topographically. The upper region, or upper Konyak, comprises Longching, Chen, Mopong, and Tobu areas, and the Lower Region, or Lower Konyak, is Mon, Phomching, Tizit, and Naginimora areas. Patkai ranges are located in the easternmost part of the district. The district has a Northern Tropical wet evergreen forest in the Zangkham area in Tizit and a Northern Sub-tropical broad leave wet hill forest.

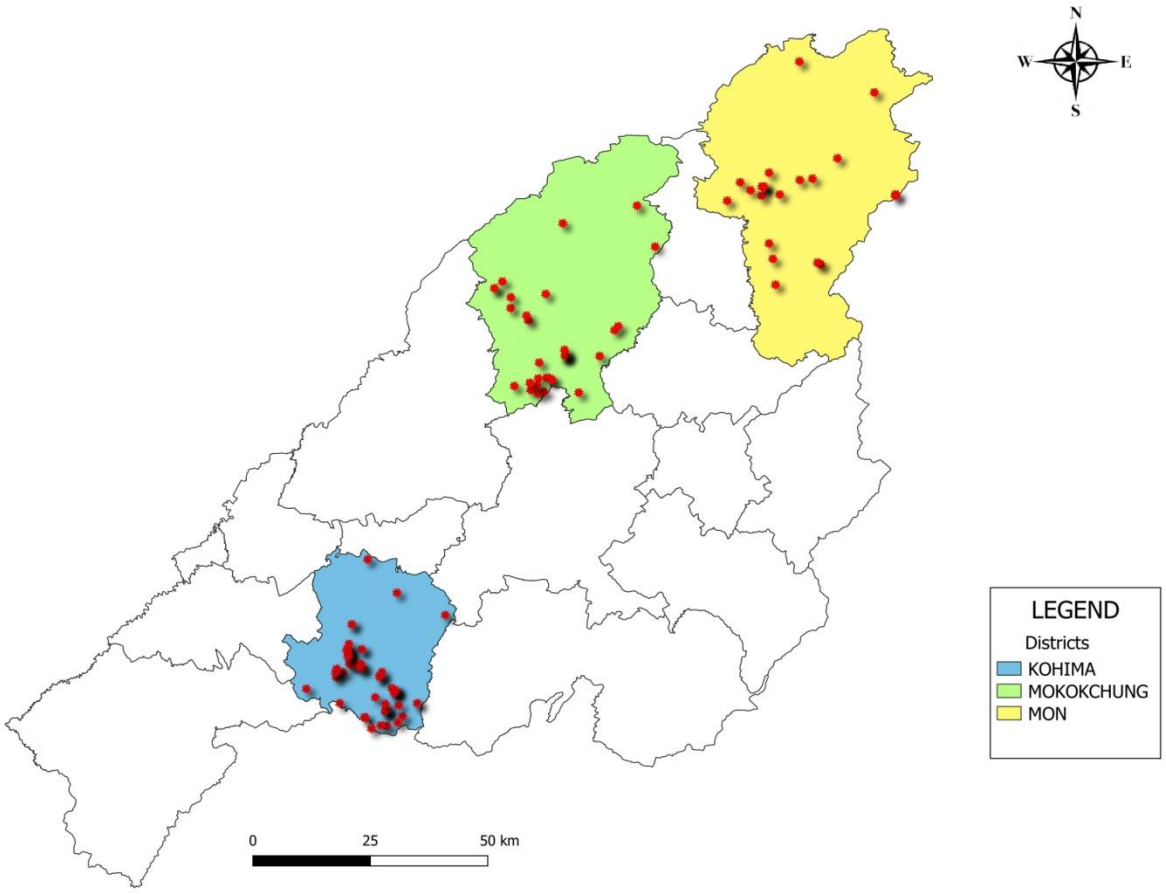
MAP. 1. INDIA MAP SHOWING NAGALAND STATE AND THE STUDY AREAS



Source: State boundary map provided by Nagaland GIS Remote Sensisng Centre, 2023: Planning and Coordination, Government of Nagaland

Disclaimer: The boundaries of Nagaland as shown on this map are subject to revision as provided in the 1960 Delhi Agreement

Map 2. NAGALAND MAP SHOWING THE THREE DISTRICTS, STUDY AREAS AND COORDINATES OF SPECIES COLLECTION.



Source: State boundary map provided by Nagaland GIS Remote Sensing Centre. Planning and Coordination department, Government of Nagaland. 2023. Constructed using Qgis software.

Disclaimer: The boundaries of Nagaland as shown on this map are subject to revision as provided in the 1960 Delhi Agreement

ECOLOGICAL FACTORS

Climate

Nagaland enjoys a very pleasant climate throughout the season. The climate is also one important factor in studying the geographic of the states. The climatic conditions are majorly influences by the altitudinal variations, geographical coordinates, distance from the seas and wind directions. The state's hilly terrain shapes the pleasant climatic condition too. In Nagaland, the summer season average temperature ranges from 16^{o} Celsius to 31^{o} Celsius. The monsoon rainfalls start continuously throughout the state from May to August and September and October occasionally. The recorded average annual rainfall of the states ranges from 1800mm to 2500mm. Winter season is early in the state, and some parts of the state experience very extreme bitter cold. The temperatures drop to 4^{o} Celsius, or some parts enjoy winter with normal temperatures, and the average winter temperature rises to 24^{o} Celsius. The higher altitude districts even receive snowfall or frost. The humidity level is normally high in the state. Strong Northwest winds blow across the state from February to April.

Agriculture

Nagaland is an agricultural state. Most of the economy depends on cultivated crops. The lush green vegetation of the states depicts the natural and cultivated growth. In most hilly terrains, people follow terrace farming, for example, in the districts of Kohima and Phek. At the same time, another district follows Jhum cultivation. Some major food crops in the states are rice, corn, millet, pulses (legumes), fibers, sugarcane oilseeds, potatoes, tobacco, etc. However, the state depends on imported crops from other neighboring states too.

Soil

Nagaland soil can be categorized into 10 major groups, 14 subgroups, 4 orders, 7 sub-orders, and 72 soil families. The soil is one major important part of the topography and geography of Nagaland. The classification of soils into groups and orders led to the management of land use planning, which is of primary significance in the agricultural sector. The four orders of the soil were Inceptisols, Entisols, Alfisols, and Utisols. The most important type of soil covering around 66% area of the state is Inceptisols. The soil textures consist of fine clay, clay

loamy, and fine loamy clay. 23.8% of the land area of Nagaland is covered with Utisols. The soil is characterized by its low base saturation feature. This soil type is found in different regions of the state and is prevalent mostly in the forested regions of the state, which receive a high amount of rainfall. The texture of the soil remains clayey.

Rivers

Nagaland state is covered by many seasonal and perennial rivers and rivulets. The major rivers are Doyang, Dikhu, Dhansiri, Tizu, Milak, Dzu, Langlong, Zungki, Likimro, Lanye and Dzuza. There are other lesser-known rivers, such as Manglu, Tsurong, Nanumg, Tsurang or Disai, Tsumok, Menung, etc. The state relies heavily on these rivers for its consumption and agricultural purpose throughout the year. Major rivers like Dhansiri, Doyang, and Dikhu flow westward and merge with the Brahmaputra River in the plains of Assam, while the Tizu River flows eastwards and joins the Chindwin River in Myanmar.

Doyang River is the longest and the biggest river in Nagaland. It originates from the Japfü Hill near the Southern slopes of the Mao area in Manipur and moves in a southwest direction passing through the Kohima district and flowing northward into Zunheboto and Wokha districts.

Dikhu River originates from Nuroto Hill in the Zunheboto district. It has a total length of about 171 km (from the Phuye/Surumi area to Naginimora). The river traverses north along the border of the Mokokchung and Tuensang districts, forming a natural boundary between the districts. The main tributaries of river Dikhu are Yangyu of Tuensang district and Nanung in the Langpangkong range in the Mokokchung district. The river flows further northward and leaves the hill near Naginimora, and finally merges with the Brahmaputra River.

The Tizu River originated from the central part of Nagaland and flows in the northeast direction through the Zunheboto district, Phek district, and finally flows into the Chindwin River of Myanmar (Burma). The main tributaries of the Tizu River are the rivers Zunki, Lanye, and Likimro. It is the second largest and longest river of Nagaland, roughly covers a one-third area of the state, and is located within the innermost high mountain range bordering Myanmar. The Zunki River, which is the biggest tributary of Tizu, starts from the northeastern part of Changdong forest in the south of Teku and flows in the southern direction towards Noklak, Shamator, and Kiphire and finally joins Tizu below Kiphire.

Dhansiri River originates from the Laisang peak of Nagaland. Dhansiri flows through the southwestern part of the state through Rangapahar- Dimapur Plains of Dimapur District, with a total length of 241 km (from the New Ngaolong area to the Nuiland area). Its main tributaries are the Dzuza River and the Diphu River. It forms a natural boundary between Karbi Anglong (Assam) and Nagaland. The Dhansiri Reserved Forest and Intanki National Park are two important areas which are located on each side of the Dhansiri River.

Forest types in Nagaland

Nagaland has a wide variation of forest types due to its different altitudinal ranges. The elevation ranges from some 100 to 3841 meters above sea level. The state has recorded a forest area of 8629.30 sq. km which is 52% of its geographical area. Out of which, Reserved Forests constitute 3.06%, Protected Forests 5.51%, and unclassed Forests 93.56%.

Table.1. Geographical areas and Forest coverage of Kohima, Mokokchung, and Mon districts, Nagaland.

Districts	Geographical areas	Very Dense Forest	Moderate Dense Forest	Open Forest	Total-%
Kohima	1,463	132	381	673	1,186-81.07%
Mokokchung	1,615	2	504	816	1,322-81.86%
Mon	1,786	32	434	741	1,207-67.58%

Department of Environment, Forest & Climate Change, Nagaland, 2022 report.

Protected Area: The state has one National Park and three Wildlife Sanctuaries covering 222.0 sq. Km, which constitutes 1.34% of the state's geographical area.

The forest types found in Nagaland are as follows as per the Champion & Seth classifications:

1) **Northern Tropical Wet Evergreen Forest**: It is found only in the Mon district. This forest covers a small portion of Zangkham areas under Tizit. The dominant species in this type of forest are *Dipterocarpus macrocarpus* (Hollong), *Shorea assamica* (Makai), *Mesua ferrea* (Nahor), etc.

2) **Northern Tropical Semi-Evergreen Forest:** These types of forests are found in the foothills of Assam- Nagaland borders in Mokokchung, Wokha, and Kohima districts. The species found in these types of forests are similar to Northern Tropical Wet Evergreen Forest, and along with that, there are *Tetrameles nudiflora* (Bhelu), *Stereospermum chelonoides* (Paroli), *Altingia excelsa* (Jutuli), etc. whereas in the present case, the number of evergreen species decreases and the deciduous species are more in number.

3) **Northern Sub-Tropical Broad Leaved Wet Hill Forest**: These types of forests are found in the altitudinal range of 1800m and above 500m in all the districts of Nagaland. The wet evergreen species are conspicuous by their absence, and the dominant species are mostly semi-deciduous. Some of the important timber species are *Abelmoschus* (Koroi), *Chukrasia* (Pomas), *Magnolia* (Sopas), *Betula nigra* (Sam), *Mangifera* (Am), *Prunus* (Badam), etc.

4) **Northern Sub-Tropical Pine Forest:** These types of forests are found in hills with elevations of 1000m to 1500m in the region of the Phek and Tuensang districts of Nagaland. *Pinus* is the dominant species, and along grows *Quercus, Schima, Prunus, Betula*, and *Rhododendron*.

5) **Northern Montane Wet-temperate Forest**: These types of forests are found on the higher reaches of the tallest mountains above 2500m, like the Saramati in Kiphire and Dzükou. The species that dominate are *Rhododendron, Quercus, Birch*, and *Juniperus* species.

6) **Alpine Forest**: This type of vegetation is found at high altitudes in ridges of the Saramati range, which remains covered with snow for a major part of the year from October to April. After the melting of snow in brief summer, a few annual herbs and shrubs, along with mosses, can be seen growing. *Rhododendrons, Abies* and *Juniperus*, are found in sub-alpine vegetation and gradually merge into alpine vegetation, which comprises high-altitude grasses and dwarf Rhododendrons. Many members of the Primulaceae, Saxifragaceae, and Polygonaceae families are also found.

REVIEW OF LITERATURE

Legumes were considered to originate from Africa in the late Cretaceous, then spread out to South America and later North America (Raven and Polhill, 1981). Then the alternative explanation of the distribution of legumes hypothesizes that the Eocene led to a distribution pattern. Legumes were considered to originate from Africa in the late Cretaceous, then spread out to South America and later North America (Raven and Polhill, 1981). Then the alternative explanation of the distribution of legumes hypothesizes that the Eocene led to a distribution pattern.

Many taxonomists contribute to Family Leguminosae in different regions of the world. Linneaus (1753) contributed in his book "Species Plantarum", Bentham, (1860) contributed a synopsis of Dalbergieae tribe. Leguminosae work was reported by Bentham in Bentham and Hooker's (1865) "Genera Plantarum," in which he recognized 399 genera comprised of c.6500 species. Brandis (1906) studied tree species of the Leguminosae family. Baker (1926- 1930) worked on Leguminosae of Tropical Africa. Hutchinson (1959) put 3 families of Mimosaceae, Caesalpinaceae, and Papilionaceae in the order Leguminales. Verdcourt (1970) studied Papilionoideae for Flora of Tropical East Africa.

The modern era of legume systematic had its origin in the landmark series advances in legume systematic, with the publication of the 1st volume edited by Roger M. Pohill and Peter H. Raven (1981). Part 1 of "Advances in Legume Systematic reported 650 genera and 18,000 species. Turner (1959) adds effort to this field; Allen & Allen (1981) describes Leguminosae in their book "The Leguminosae: A Sourcebook of Characteristics, Uses, and Nodulation." Duke, J.A. (1981) also described the importance of Legumes in his book “Handbook of Legumes of World Economic Importance. Polhill, 1994 again 13 years later, worked on increasing the record with 671 genera and c. 17,000 species of legumes. Graham & Vance (2003) also describe Legumes: Importance and constraints to greater use. Lewis *et al.* (2005) gave Legumes of the World.

Legumes are present throughout the main biomes and occur in all vegetation types globally; published phylogenies of legumes at the supra-generic level have been accumulating at an ever-increasing rate since the beginning of the millennium. The landmark publication of Legumes of the World summarized taxonomic and molecular phylogenetic advances to date and

represented a big step toward a phylogeny-based classification of the whole legume family (Lewis *et al*., 2005). Several attempts have been made in different parts of the world to sort out the phylogeny and the nomenclatural problems and to quantify the diversity of the genera concerned. The major problem associated with many revisionary treatments is that they do not apply to geographical areas outside the limit of the study. Lewis *et al*., 2005 in an encyclopedic compendium of legume genera, recorded 727 genera and 19, 325 species.

The intervening 30 years have been especially productive ones for many areas of legume biology, and systematic, in particular, has made tremendous advances. Now in a new era of legume systematic, symbolized by the publication of Legumes of the World (Lewis *et al.*, 2005), which summarizes the biogeography, phylogenetic relationships, and the taxonomy of the family in light of two decades of investigation that have seen a revolution in the kinds and amounts of data coupled with an important conceptual shift in our approaches to inferring evolutionary relationships and the publication of the first paper authored by the Legume Phylogeny Working Group or "LPWG," an international coalition of researchers working together to tackle the important challenges in legume phylogeny and classification more collaboratively (LPWG, 2013a). Revisionary work has to be undertaken on a global scale to obtain a comprehensive idea about a particular taxon at various levels. This process has to be preceded by intensive systematic studies on a local and regional basis.

Contribution of earlier botanists like Willdenow (1802), De Candolle (1825), Roxburgh (1832), Wight and Arnott (1834), Bentham (1844), Baker (1876), Gamble (1918), Hutchinson (1964), etc. are worth mentioning in this regard. Some witness succession of legume researchers at the New York botanical garden, including such major luminaries of 20th-century plant taxonomy as Richard S. Cowan, Howard S. Irwin, and Rupert C. Barneby. The Leguminosae family is morphologically, physiologically, and ecologically exceptionally diverse, representing one of the most spectacular examples of evolutionary diversification in plants. All of these characteristics have led to a continued fascination with the biology, diversity, and evolution of the family, the evolution of functional traits, and the ecology and biogeography of the family by legume biologists (e.g., Stirton & Zarucchi, 1989; Lavin *et al*., 2004; Schrire *et al*., 2005a, b; Sprent, 2007, 2009; Champagne *et al.,* 2007; Simon *et al.,* 2009; Bouchenak- Khelladi *et al*., 2010; Cannon *et al.*, 2010, 2015; Pennington *et al*., 2010; Doyle, 2011; Simon & Pennington 2012; Koenen *et al.*, 2013; Oliveira-Filho *et al.*,2013, Moncrieff *et al.*, 2014; Werner *et al.*, 2014,

2015; Dugas *et al.,* 2015; BFG, 2015). Radical shifts in inter and intra-tribal relationships within Papilionoideae were suggested, but the majority of the tribes remained defined in the traditional sense (Polhill, 1981a, 1981b, 1981c; Polhill, 1994), recognizing the need for more determined supported phylogenies and better taxon sampling (Lewis *et al.,* 2005). This was particularly true for the relationships among the earliest-branching papilionoids, where a resolution was poor and where phylogenies failed to sample several unusual, non-papilionate flowered genera traditionally classified in Sophoreae and Swartzieae (Cardoso *et al.,* 2012a). Indeed, the early-branching papilionoids were problematic in this and other ways, as emphasized earlier by the prominent legume taxonomist Roger Polhill of the Royal Botanic Gardens, Kew. In 1981 Polhill recognized the heterogeneous nature of the Sophoreae: "The Sophoreae s.l. is a tribe of convenience between the Caesalpinioideae and the bulk of the Papilionoideae, sharply defined from neither" (Polhill, 1981a). Then later, in 1994, he pointed out in his revised legume classification that "Considerable emphasis has been made on the analysis of basal groups in the Caesalpinioideae and Papilionoideae, but further studies here are critical if groups with derived features are to be defined clearly" (Polhill, 1994: xlii).

Leguminosae occupies a global distribution spanning all major biomes (temperate, Mediterranean, dry and wet tropical forest, Savanna) (Schrire *et al*., 2005a). Schrire *et al.,* 2005a and 2005b, made tremendous works on the biogeography of Leguminosae distribution globally. (Doyle and Luckow, 2003), focused on the works of legume diversity based on its phylogeny. Flora of China (2010) has made a global addition of Fabaceae in a single volume (10) with 1673 species, out of which 690 species are endemic to China. An extensive report on Leguminosae has been done in all country's floras, like the flora of Singapore, Flora of Bhutan, Flora of Thailand, Flora of British India, etc., and many works on subfamilies, genus levels have been put up worldwide. The LPWG or Legume Phylogeny Working Group (2017) has proposed the new subfamilial classification of Leguminosae, which is the most comprehensive phylogenetic analysis of legumes to date.

Since legumes are the world's most nutritive food, so diverse studies have been taken up even on the nutritive food level (Rubatzky and Yamaguchi, 1997). In the global context, the production of pulses was 61.5 million tons from an area of 70.6 million ha with an average yield of 871kg/ha (IIPR 2011). Developing countries contribute about 74% of pulses production

globally, and the rest from developed countries (Anonymous, 2011) reported that India, China, Brazil, Canada, Myanmar, and Australia are the major pulse-producing countries with a share of 25%, 10%, 5%, 5% and 4% respectively. The variability enables its production in a wide range of cropping systems and environments as diverse as the Americas, Africa, The Middle East, China, and Europe (Blair *et al*., 2010). Despite being cultivated for their fresh pods and grains, beans are produced and consumed mainly as dry grain (M. De Ron, 2015). The common bean has lately gained attention as a functional food due to its health benefits and human disease prevention. Its inclusion in diets is linked to reduced risks of obesity, diabetes, cardiovascular diseases, and colon, prostate, and breast cancer.

The first comprehensive contribution to the taxonomy of the Indian legumes was contributed by J. G. Baker (1876- 78), and the work got published in J.D. Hooker's Flora of British India (Vol. 2. 56-306. 1876-78). Baker recorded 132 genera, 833 species, and 109 varieties of Leguminosae, of which 120 genera, 548 species, and 76 varieties occurred within the present political boundaries of the Indian Republic. Other significant work in these areas was also reported by Clarke (1898), Blatter (1911), Haines (1921), Mooney (1942), Hewetson (1951), Santapau (1958), Burkill (1965). Joshi (1920) reported the first "Nodulation in wild legume named *Crotalaria juncea* in India",

Most of the taxonomical work in India was done in a botanical survey of India. The significant value of this field was viewed by various workers such as Thothathri K. (1961), Jain (1965), Champion and Seth (1968), Arora R.K. & Chandel K.P.S. (1972) gives an account of "Botanical source areas of wild herbage Legumes in India. Enumeration of Legumes in India was done by Hussian & Kopoor (1990). Sanjappa (1992) has done tremendous work on "Legumes of India." In his work, he reported 1152 taxa under 179 genera, 35 subspecies, 103 varieties, and 7 forma of legumes. And including 170 species and 2 varieties, 44 genera are introduced and cultivated, of which about 23% are strictly confined to the present Indian political boundary. Rao & Husain (1993), in their study, mentioned that approximately 56% of the total Leguminosae of India is represented in the Himalayan region.

Rao and Chaudhary (2002) describe advances in Legumes Research, and Chauhan and Rao (2003) also give an account of the Wood anatomy of Legumes in India. Kumar & Sane (2003) work on account of Legumes from South Asia. Bandyopadhyay *et al*. (2005) studied

Genus Bauhinia L. (Leguminosae: Caesalpinioideae) in India. Ansari, A.A. (2008) work on Crotalaria L. in India. Floristic studies and systematic of Indian plants had their origin during the British regime. Botanical studies in India reached their zenith with the publication of J.D Hooker's (1872-1897) "Flora of British India" in seven volumes. After Hooker, Gamble (1918) published "Flora of Presidency Madras,"

Even though many reports are widely distributed, and alien species of Indian Leguminosae are available (Mittre V. and Sharma, 1962; Mitra and Mondal, 1982; Deshmukh *et al*., 2014), only scanty data is available regarding the endemic legumes of India (Murthy, 1992; Tissot *et al*., 1994). Legumes have become the "balanced food" in India, having a vital ingredient in the human diet (Ayachit, 2002). It is an extremely diverse character which is the most important food crop used by humans as legumes, green manures, and forage (Rahman and Parvin, 2015). Legumes are known for their wide uses, and medicinal values studies have also been taken up in different regions. Rahman and Parvin (2015) work on "Taxonomical studies on weeds of Fabaceae for the various ailments in India." India produces a quarter of the world's pulses, accounting for one-third of the total acreage under pulses. In India, the Department of Agriculture and Cooperation has proposed a strategy for increasing the production and productivity of pulses that involves a thrust on non-conventional cropping systems, such as: intercropping of pigeon pea, green gram, and black gram with maize, cotton, groundnut, soya bean, etc. (Amarteifio *et al.,* 2002). The Indian gene center possesses a rich legume biodiversity – 1,152 species comprising cultivated, underutilized edible, and forage legumes. Several Indian legume species (62%) contribute to the food and health security of ethnic communities. S.K Sharma *et al.* (2015) studied the importance of genetic variation in legumes and their wild relatives as a source of desirable resistance to pests and diseases in a changing climate scenario are focused.

Schrire David (1984) considered Desmodieae as one of the most advanced tribes in the subfamilies Papilionoideae and is widely studied (Papilionionoideae genus- *Desmodium Zonatum* has been widely reported from Andaman & Nicobar Island, Assam, Karnataka, Manipur, Meghalaya, Nagaland and Tamil Nadu in India (Ohashi, 1973; Sanjappa, 1992). Recent work on the distribution of Papilionoideae in Peninsular India was also reported (Chandramohan *et al.,* 2016). The genus Crotalaria, as part of Fabaceae, was done by J. G. Baker

(1876). He summarized the results of collections by referring to the work made by N. A. Dalzell, Robert Wight, Nathaniel Wallich., B. Heyne, Graham, and R. H. Beddome. He had recognized 77 species from India.

The diversity of legumes is highest in Peninsular India, which hosts about 619 species, and in North-east India (Aridason and Lakshminarasimhan, 2017). 400 species are reported to be widely distributed along different altitudinal gradients (Baker 1876; Hussain & Kopoor 1990; Sanjappa 1992). The diversity of Legume flora has been working remotely in the local flora of the state. (Chowdhery *et al*., 1996) mention in his studies, out of 8,000 angiosperm species reported from the Himalayas, 5000 species are found in the Arunachal Himalayan region, and Leguminosae is one of the dominant families found in the region. Bandyopadhyay S. (2018) describes the diversity of the Leguminosae family in Koch Bihar and West Bengal. Kumar A. (2020) studied the checklist of Fabaceae in Buddha Wildlife Sanctuary, Bihar & Jharkhand. Gore and Gaikwad (2015) gave a checklist of Fabaceae of Balaghat ranges in Maharashtra state. Balan & Predeep (2021) work on 'Legumes of Kerala, India.' The Botanical Survey of India has maintained e-flora checklist plants of India with 250 taxa Fabaceae.

Most of the flora work in the Northeast region has been established by the Botanical Survey of India. Balakrishnan, N.P. (1981) "Flora of Jowai", Chowdhery *et al,* (1996), "In materials for the Flora of Arunachal Pradesh", Singh *et al*. (2002) "Flora of Mizoram" "Flora of Manipur" (BSI, 2000); Floristic study of Dzukuo valley and surrounding hills of Manipur and Nagaland (Mao A. A. & R. Gogoi, 2010), etc., Flora of Assam by Kanjilal *et al*. (1938) has done an enormous amount of work covering neighboring states of the region and describes Leguminosae Family in Vol. II.

Few workers selected some genera, such as *Desmodium* and allied genera, by Dash & Singh (1998) and Dash (2009) from Sikkim and Arunachal Pradesh. The north-eastern region has the highest potential of increasing the legume production in the country. As compared to the other states of India, the food legumes are not much popular because the diet of the majority population is non-vegetarian, but most farmers grow legumes for economic return, based on the evidence under rabi and kharif pulses in the Northeastern states (V P Bhandana, 2013). Legumes contain high amounts of antinutritional substances (Liener and Kakade, 1980), serving as potential sources of proteins in developing countries. Among several legumes, Manipur consumed *Parkia trimoriana* (Mimosoideae family), and also literature reveals intensive works

on several legumes (Priya Elangbam and S. Giri Singh, 2012). Regarding efforts on the indigenous *P. trimoriana* of Manipur, Longvah, and Deosthale (1998), Giri (2000), and Jekendra *et al*. (2009) contributed by displaying nutritional values. Although quantitative consumption of this legume is counteracted by several flatulencies, only minor work on anti-nutrition substances of this legume was undertaken by Giri (2000). In a recent report, for the very first time, a new species, *Archidendron chevaliera* (kosterm) of Mimosoideae, was reported from Arunachal Pradesh (K. Jeyaprakash *et al.,* 2017). Kalita B.C. *et al.* (2015) studied Legumes in the Papum Pare district of Arunachal Pradesh.

Legumes are widely known for their dietary and economic values- many wild species of legumes are found in Nagaland. However, very few works on this particular family have been done. Early distribution was done and recorded by some taxonomists; Clarke (1887), on the plants of Kohima and Muneypore, Sanjappa (1992), in his work 'Legumes of India' includes the legume diversity of Nagaland. Changkija and Gurung (2017) work on Flora of Nagaland Vol, Checklists of the flora of Nagaland, was done by Mao, A.A. *et al*., (2017). Barua *et al*. (2006) documented 81 accessions of grain legumes from Nagaland with 27 accessions of *Phaseolus vulgaris*, followed by 19, 16, 9, 9, and 1 accession of *Vigna unguiculata*, *Vigna umbellata*, *Lablab purpureus*, *Glycine max,* and *Psophocarpus tetragonolobus*, respectively. Singh and Misra (2014) also reported high grain legume diversity with 59 accessions during their survey in the Dimapur, Kohima, Mokokchung, and Tuensang districts of Nagaland. Moaakum & Chaturvedi S.K. (2015), in their work, a checklist of angiospermic flora of the Zunheboto district of Nagaland contributed to the Leguminosae family. Aolemla *et al.* (2017) reported 19 edible species in some selected districts of Nagaland.

Since, in Nagaland, there is no compiled work on the Family Leguminosae, which is considered an important source of pulses, the present study was taken up to give the broader knowledge of the legumes and give a contribution to the region the importance of the species for future sustainability.

CHAPTER- 2

METHODS AND METHODOLOGY

Field survey.

The field survey was conducted in three districts of Nagaland, namely Kohima, Mokokchung, and Mon. Extensive field exploration was conducted from the year 2017 to 2023. Field visits have been done intensively at frequent intervals of time to catch up with the seasons. The specimen was collected randomly from variations of elevation, seasonal, wild, and cultivated within the study areas. The elevation ranges from 100 – 2700 m above sea level.

Collection of specimens.

The specimens were collected in flowering and fruiting seasons at large. And if the flowers and fruits were not observed, the leafy samples were collected, and a comparison was made with available notes. Geographical coordinates were collected for each species with GPS Garmin, and a geographical distribution map of species was prepared accordingly. The voucher specimens were collected from the field. The specimens were documented with proper characteristics in their natural conditions, habitat, habit, and morphology, along with good photographs. Sketches of some specimens were also done. Then undergo, the poisoning method using formalin of 10%. Duplicate specimens were collected for mounting.

Drying of the specimen.

Then, the specimens were tightly pressed in a wooden frame with blotting paper or newspapers and keep it in room temperature. After 24 hours, the blotting papers/ newspapers were removed and spread out with new ones. The process was repeated till the specimens were completely dry and ready to paste.

Mounting of the specimen.

Herbarium preparation was done by following the standard protocols of Jain & Rao, 1977. The herbarium sheet's size is 42 x 28 cm. The herbarium labels of 8 x 12 cm were pasted in the right corner below. It contains the collection number, date of collection, coordinates, botanical name, family or sub-family, additional notes, and collector details. The specimens were pasted using the paper glue available. The herbarium was then digitally

scanned and stored in a pigeon-hole almirah and treated with naphthalene balls/ powder for pests and insect resistance.

Identification of specimens.

Detailed taxonomic study and identification were done at the Department of Botany, Nagaland University, Lumami. The identification of plants specimen was made with the help of Floras of states and neighboring countries, floristic literature, taxonomic revisions, and monographs. The tentatively identified plants were further confirmed by consulting the experts and scientists. Microscopic studies were done for some critical examinations of plants, like floral details, using hand lenses (10x) and a compound microscope. Photographs were taken using Canon 1500D digital camera.

Updated names or the correct name of the plant species were determined using different flora, Monographs, Revisionary work, research papers, web databases, etc., and following the International Code of Nomenclature (ICN, 2017). Some of the web databases were International Legume Database and Information Service (ILDIS, 2019), Legume Web IDLIS (http://ildis.org/Legume/), International Plant Names Index (IPNI, 2023) (http://www.ipni.org), World flora (http://www.worldfloraonline.org) and The Plant Lists (http://www.theplantlist.org/) were used. Classification of the Leguminosae family into 6 subfamilies was done following the LPWG, 2017 new classifications. The compilation of the subfamilies with their systematic keys on genus, species, and variety level was done.

Methods of presentation.

The taxonomic keys for families, genera, and species have been prepared by observing the suitable characteristics for easy recognition of the species. The intended keys are characterized based on the morphological characters of species. The genus is accompanied by a description and the keys to the species.

The accepted genera and species names are enumerated with detailed descriptions of taxonomic characters. The taxonomic enumerations of species are arranged alphabetically following the LPWG 2017 classifications. The accepted names of species in this thesis were provided with synonyms or basionyms, type species or subspecies, and varieties, if available. Flowering and fruiting of the species were mentioned, along with habitat and ecology and its distributions globally. The voucher specimen details were its locality, elevations, geo coordinates, and collector name with species accession. The measurements of plant parts were provided in the metric system.

CHAPTER-3

KEYS TO SUB-FAMILIES OF LEGUMINOSAE

Leguminosae (Fabaceae)

Trees, shrubs or herbs, sometime climbing or prostrate, often bears root - nodules. Leaves alternate, opposite, pinnate or bi-pinnate, palmately compound or often 3 - foliolate, rarely 1 - foliolate. Stipules and stipels mostly present. Flowers bisexual, rarely unisexual, actinomorphic or zygomorphic, irregular, arranged in panicles of racemes, corymbs, spikes, or heads Sepals (5) are free or connate. Petals 5 usually isomerous with sepals, imbricate or valvate, and often differentiated into uppermost petal or outermost standard or banner, two lateral petals are wings and two innermost forms keel. Stamens mostly 10, sometimes less or more, monadelphous or diadelphous. Ovary superior. Fruit a pod, dry. Legume dehiscent by 1 or both sutures, or indehiscent.

Keys to sub-families

1. Flowers with 4 stamens, petals with marginal glandular structures, anthers fused in a synandrium with poricidal dehiscence. Leaves one pinnate, endemic to Central and West Africa……**Duparquetioideae**

2. Flowers mostly papilionate and bilaterally symmetrical, less commonly radially symmetrical, standard petal outermost, enclosing the wing and the keel petals. Sepals united, at least at the base, into a calyx tube or completely enclosing the floral bud. Stamens enclosed by keel and not visible externally…….**Papilionoideae**

3. Flowers not papilionate, either bilaterally or radially symmetrical, median (standard) petal innermost, or petals valvate (in the mimosoid clade of the caesalpinioideae). Sepals free or fused……..……..**3**

Leaves bipinnate or paripinnate. Inflorescence in racemes with spiral anthotaxy, commonly compounded into branched panicles or contracted in spikes or fascicles. Stamens externally visible and free, or numerous, monadelphous. Seeds commonly with an open or closed pleurogram on each side……..…**Caesalpinioideae**

4. Leaves never bipinnate, seeds without an open or closed pleurogram on each side.

Leaves unifoliolate, bilobed or entire, or compound and bifoliolate. Seed hilum circular or crescent-shaped……..……**Cercidoideae**

5. Leaves various, if simple or bifoliolate, then the seed hilum not crescent-shaped, and rarely circular. Extra-floral nectarines and other glandular structures (when present) on the lower surface or margin of leaflets, stipules usually intrapetiolar (free or united), rarely lateral…….**Detarioideae**

6. Leaves mostly imparipinnate with alternate leaflets (rarely paripinnate with opposite leaflets. Extra-flora l nectarines absent or present on the petiole or on the leaf rachis. Stipules lateral and free or absent……**Dialioideae**

TAXONOMIC ENUMERATIONS

Sub-family: PAPILIONOIDEAE DC.

(nom. alt. Faboideae)

Trees, shrubs or herbs, climbing or trailing herb. Mostly bears root nodules. Leaves usually pinnate, rarely digitate, 1 or 3 foliolate, often stipellate. Flowers zygomorphic, papilionaceous type. Calyx gamosepalous, 2 - lipped. Petals usually 5, the uppermost standard, 2 - wings and 2 - keels. Stamens usually 10, monadelphous or diadelphous. Style usually upward curved. Pods generally dehiscent or indehiscent.

Papilionoideae consists of about 503 genera and ca. 14000 species distributed in the world.

1a. Trees, shrubs or herbs.

2a. Trees

3a. Stem with prickles…….…….....Erythrina

3b. Stem with no prickles.

4a. Leaves 13 - 19 foliolate, alternate 1 – seeded……..Dalbergia

4b. Leaves 13 - 23 foliolate, opposite 2 - 4 seeded…….……..Derris

5a. Stipules thorn - like, narrow……..…….Robinia

5b. Stipules lanceolate.

6a. Pods pear- shaped, valves thick, dehiscent……..Ormosia

6b. Pods ellipsoid, flat, indehiscent.

2b. Shrubs, herbs or runners.

7a. Leaves 1 - 3 foliolate

8a. A perennial erect herb……..Eriosema

8b. A perennial prostrate herb……....Kummerowia

9a. A bushy shrub, petioles 2 cm long…….....Piptanthus

9b. An erect woody shrub, petioles 10 - 20 cm long…….….Meizotropis

10a. Leaf margin toothed……..….Trifolium

10b. Leaf margin entire……...Parochetus

11a. Bracts suborbicular, leaf-like…….....Phyllodium

11b. Bracts linear- oblong.

12a. Inflorescence densely at axillary……...….Flemingia

12b. Inflorescence few at terminal…….Cajanus

13a. Corolla generally yellow……...Crotalaria

13b.Crotalaria white…….…Dendrolobium

14a. Legumes 2-5 jointed…….....Hylodesmum

14b. Legumes 5-8 jointed……Tadehagi

15a. Pods dehiscent at lower suture…….……..Codariocalyx

15b. Pods indehiscent or rarely dehiscent at both sutures…….……...…Desmodium

7b. Leaves numerous- paripinnate or imparipinnate.

16a. Leaves paripinnate

17a. Prostrate herbs. Leaflets 4-foliolate…….…….Arachis

17b. Erect herbs. Leaflets 4- 8 pairs...……....Smithia

18a. Corolla yellow with brown spot…….…….……...Sesbania

18b. Corolla yellow with no spot.

16b. Leaves imparipinnate.

19a. Calyx tubular……Astragalus

19b. Calyx campanulate or biliabate……...…….…...Aeschynomene

20a. Pods cylindric, turgid……Indigofera

20b. Pods flat, septate……...……...Tephrosia

1b. Woody climbers or twining

21a.Woody climbers.

22a. Leaves 3 - foliolate…….…….……....Mastersia

22b. Leaves 5- foliolate.……..Callerya

23a. Pods 7 - 12 cm, densely bristles…..…...Mucuna

23b. Pods 9 - 10 cm, glabrous…….…..Pachyrhizus

24a. Seeds - 1 at apical tips……...……..……..…Spatholobus

24b. Seeds - 2, tapering in ends…….…….....Dalhousieae

25a. Anthers basifixed……...Millettia

25b. Anthers versatile.

21b. Twining herbs.

26a. Stem hirsute……..…….....Shuteria

26b. Stem glabrous…….…….....Apios

27a. Leaves paripinnate 7- 9 pairs…..…….…….....Abrus

27b. Leaves imparipinnate 3- 7 foliolate…….....….Clitoria

28a. Stipules lanceolate……....Amphicarpaea

28b. Stipules obliquely truncat..……..…..Dumasia

29a. Keels petal spirally coiled……...….Phaseolus

29b. Keels petal not spirally coiled…….……..Pueraria

30a. Stamens monadelphous……....Glycine

30b. Stamens diadelphous……...…Lablab

31a. Legumes 4- winged……..…Psophocarpus

31b. Legumes linear, smooth.

32a. Pods sutures with prominent ribs…….…Canavalia

32b. Pods sutures without prominent ribs.

33a. Pods septate between the seeds……....Vigna

33b. Pods not septate between the seeds……..Rhynchosia

***Abrus* Adans.**

Climbers or twinning shrubs. Leaves paripinnate, oblong. Inflorescence at racemes, mostly axillary. Corolla papilionaceous. Calyx campanulate, teeth short or obsolete. Stamens 9, monadelphous. Pods compressed, slightly septate. Seeds globose or subglobose.

***Abrus pulchellus* Wall. Ex Thwaites**, Enum. Pl. Zeyl. 91, 1859; Baker in Hook. f., Fl. Brit. India 2: 175, 1876; Kanjilal *et al*., Fl. Assam 2: 62, 1938; Sanjappa, Legum. India 74, 1992; Haridasan & Rao, Fl. Megh 1: 284, 1985.

Climbing shrubs. Stem terete, alternate branching. Stipules present. Leaves rachis 6-10cm long. Leaves paripinnate, 7 - 9 pairs, opposite, oblong. Leaflets 0.5 - 3 x 0.3 - 0.1 cm, glabrous. Inflorescence at racemes, axillary 7 - 12cm long. Flowers 0.2 - 0.4 cm. Calyx campanulate. Corolla pink or purple. Stamens 9, monadelphous. Pods 4 - 7cm long, covers with densely white hairs, compressed. 4 - 10 seeded.

Flowering & fruiting: September- November.

Habitat & ecology: trailing along roadside, evergreen forest with other plant support.

Voucher specimen: Mima village, Kohima district, Nagaland, 1316 m, 25^{o}37’23.628’’ N and 94^{o}8’16.296’’E. P. Konyak NU-PK- 191.

Distribution: World: Africa, Cambodia, China, Indonesia, Thailand, South-America, Myanmar, Bhutan, Bangladesh, Philipines, Sri-Lanka. India: Almost throughout, Nagaland.

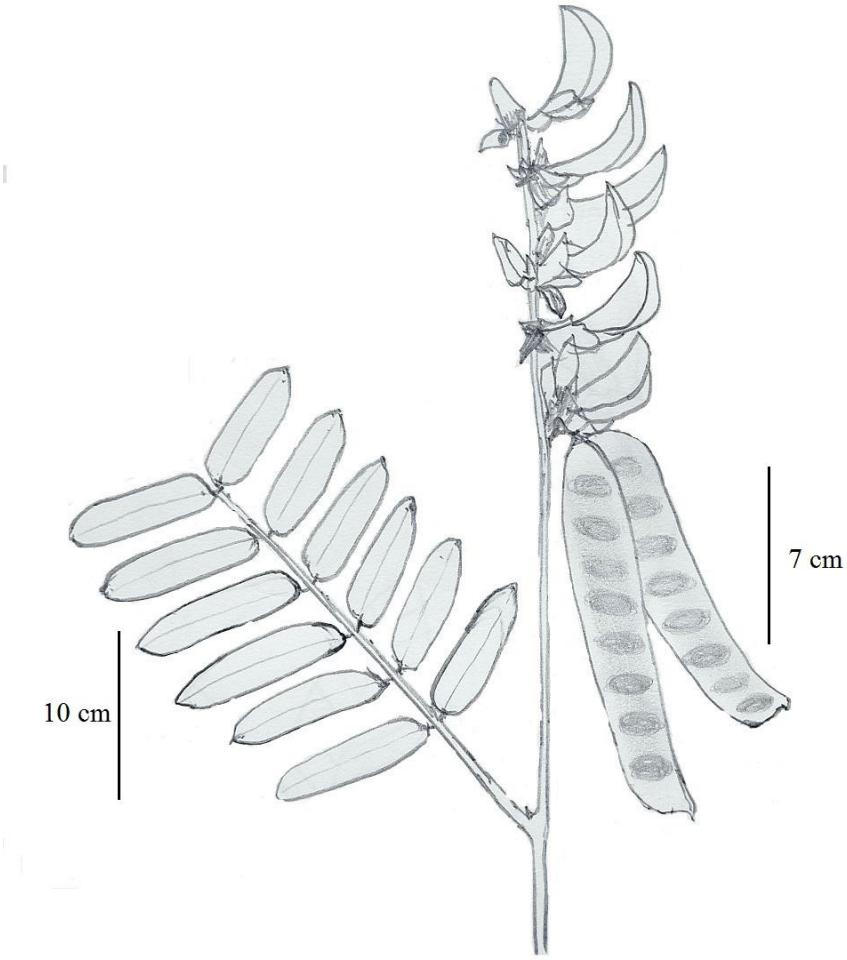


Fig. 2. Twigs of *Abrus pulchellus* Wall. ex. Thwaites

Aeschynomene Linn.

Herbs or undershrubs. Leaves paripinnate or imparipinnate. Stipules lanceolate. Leaflets numerous, linear, oblong, sensitive. Inflorescence in axillary. Calyx 2-lipped. Corolla yellow or pink. Pods linear, compressed or deep intended.

Keys to species

1a. Leaflets paripinnate, 28 - 40 foliolate. Pods the upper margin entire and lower deeply intended……...….*A. americana*.

1b. Leaflets imparipinnate, 45 - 51 foliolate. Pods entire, papillose on its surface…….*A. indica.*

Aeschynomene americana L. Sp. Pl. 2: 713, 1753; Sanjappa, Legum. India. 75, 1992.

Herbs or undershrubs, 2-3 ft tall. Stem much branched, rigid, reddish color. Stipules lanceolate, acute at apex, 1 - 1.2 x 0.1 - 0.3 cm. Leaves 28 - 40 foliolate, leaflets linear, oblong, 0.8 x 1 cm long 0.2 x 0.4 cm broad, oblique at base, obtuse at apex. Inflorescence axillary, racemose, laxly branched, 2 - 4 flowered. Bracts cordate, bracteoles linear- ovate, striate. Calyx 2-lobed, green, hairy. Corolla light pink or white. Legumes serrated or deeply intended at lower margin and upper margin entire, curved, hairy. 6 - 8 seeded, reniform.

Flowering & fruiting: September- November.

Habitat and ecology: Rarely found in roadside, in lower elevation. Wasteland of road construction site.

Voucher specimen: Dzüdza village, Kohima district, Nagaland, 966 m 25^{o}42’18.108”N 94^{o}2’37.5”E. P. Konyak, NU-PK- 683.

Distribution: World: native to tropical America, Indonesia, New Guinea, Philippines, Sri Lanka, China. India: Andaman & Nicobar Island, Bihar, Gujarat, Karnataka, Kerala, Maharashtra, Mizoram, Nagaland, Tamil Nadu and West Bengal.

Aeschynome indica L. Sp. Pl. 2: 713, 1753; Baker in Hook. f., Fl. Brit. India 2: 151. 1876; Kanjilal *et al*., Fl. of Assam 2: 37, 1938; Sanjappa, Legum. India 75, 1992.

Shrub 1.5 - 3ft tall. Stem green, terete branches. Stipules 0.5 cm long, elliptic to lanceolate. Leaves rachis 5 - 7 cm long, 45 - 51 foliolate, imparipinnate, oblong. Inflorescence axillary, racemose. Bracts ovate, caduceous, margin often denticulate. Bracteoles ovate-lanceolate. Calyx 0.3 - 0.4 cm long. Corolla yellow. Legumes papillose on its faces. 10 - 12 seeded, reniform.

Flowering- fruiting: September- November

Habitat & ecology: Found in lower elevation roadside.

Voucher specimen: Dzüdza village, Kohima district, Nagaland, 969 m 25^{o}42’18.216’’N 94^{o}2’45.312”E, P. Konyak NU-PK- 684.

Distribution: World: Japan, Thailand, Sri Lanka and everywhere in tropics of old world. India: Assam, Kashmir, Mizoram, Nagaland.

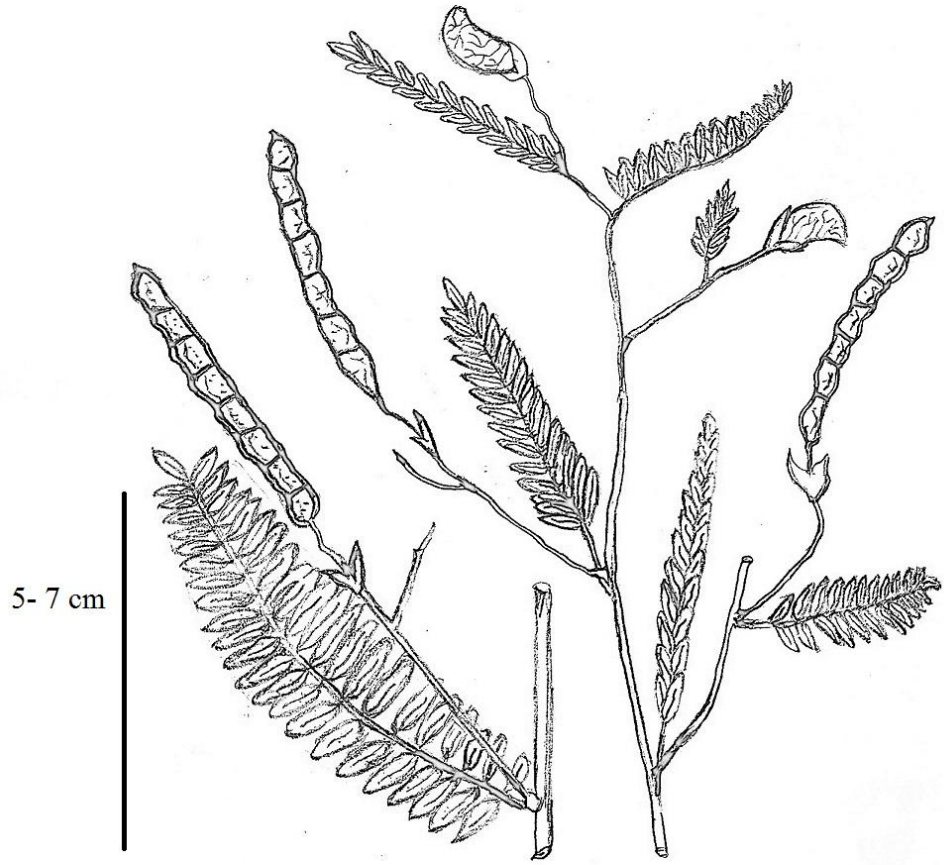


Fig. 3. *Aeschynomene indica* L.

Amphicarpaea Elliott ex Nutt.

Climbing herb. Leaves 3 - foliolate, stipellate. Inflorescence axillary racemose. Calyx tubular, teeth distinct. Corolla much exerted, larger than calyx, petals equal in length. Stamens diadelphous. Legumes flat, linear-oblong, not jointed, compressed, and dehiscent.

Amphicarpaea bracteata (L.) Fernald Rhodora 35:276, 1933; Amphicarpaea bracteata (L.) Fernald ssp. edgeworthi (Benth.) Sanjappa Legum. India 82, 1992. Amphicarpaea edgeworthi Benth. Baker in Hook. f., Fl. Brit. India 2: 181, 1876.

Climbing herb, with slender stem, green, hairy. Leaves 3 - foliolate, covers with hairs all over surface, obovate or ovate. Stipules lanceolate, stipels minute. Leaflets terminal larger with 8 - 13 cm long and 6-9 cm broad, 2 laterals smaller 5 - 9cm long x 3.5 - 6 cm broad and sharply pointed at apex. Calyx tubular, almost pale purple or white in color. Inflorescence clustered at axillary racemes. Corolla pale purple, standard obovate, wings and keels oblong. Pods 2 - 3 cm long, hairy, dehiscent.

Flowering & fruiting: October- November

Habitat and ecology: evergreen forest, edges of paddy fields.

Voucher specimen: Mima village, Kohima district, Nagaland, 1417 m 25^{o}36’56.952’’N 94^{o}8’39.48’’E P. Konyak NU-PK- 965.

Distribution: World: Mexico, Canada, USA, Japan, Korea, Nepal, Taiwan, Tibet. India: Western Himalaya, Nagaland.

Apios Fabr., Enum. 176. 1759

Herb, twining stem. Leaves odd pinnate 5 - 7 foliolate. Inflorescence in axillary or sub terminal, nodes swollen. Calyx campanualate, lobes shorter than tube. Corolla standard broad, wings obovate, keels long. Stamens diadelphous. Legume linear, compressed.

Apios carnea (Wall.) Benth. ex Baker in Hook. f. Fl. Brit. India 2: 188, 1876; Grierson & Long Fl. Bhut. 1.3: 689, 1876; Sanjappa Legum. India. 83, 1992; Singh in Singh et al., Fl. Mizo. 1: 432, 2002.

Climbers. Stem slender, reddish color. Leaves pinnately 5 - foliolate. Leaflets dark green, ovate, elliptic, base rounded or cuneate, apex acute or acuminate, glabrous. Racemes 20 - 40 cm long, 2 - 3 flowered in nodes. Calyx tube, campanulate. Corolla reddish purple or pink, standard broad, wings short, keel linear. Stamens diadelphous. Legume linear 10 - 15 cm long, compressed, glabrous.

Flowering & fruiting: July- November

Habitat & ecology: grows along the margin of evergreen forest.

Voucher specimen: Viswema, Kohima district, Nagaland, 1689 m 25°33'45.993''N 94°9'35.794''E, P. Konyak NU-PK-158.

Distribution: South East Asia, Nepal, Bhutan, China. India: Meghalaya, Sikkim, Mizoram, Nagaland.

Arachis L., Sp. Pl. 2: 741, 1753

Annual prostrate herbs, rooting at nodes. Stipules long, adnate to petiole. Leaves paripinnate 2- pairs opposite. Inflorescence axillary, flowers usually solitary or cluster, hypanthium long. Calyx membranous, 5- lobed. Corolla yellow, standard suborbicular, wings oblong, keels slightly beaked. Stamens 10, anthers dimorphic. Legumes oblong, constricted 2 - 3 seeded sometimes 1.

Arachis hypogaea L., Sp. Pl. 741, 1753; Baker in Hook. f., Fl. Brit. India 2: 181, 1878; Grierson & Long Fl. Bhut. 1.3: 712, 1876; Sanjappa Legum. India 83, 1992.

Prostrate annual herbs. Stem cylindrical, alternate branches, minute hairs. Leaves paripinnate, opposite, petioles 2 - 4 cm long. Leaflets .5 - 1.5 x .4 - .5 cm, glabrous, 4 - foliolate, obovate, subacute, emarginate apex, base rounded. Stipules long, 1-1.5 cm long. Calyx tube, inflorescence axillary, solitary. Corolla yellow, 1cm long, standard suborbicular, wings distinct, oblong, keels distinct long ovate. Pods light brown, oblong.

Flowering & fruiting: March- May

Habitat & ecology: grows in grassland open space

Voucher specimen: Jotsoma, Kohima district, Nagaland, 1632 m 25°39'58.424''N 94°4'29.19''E, P. Konyak NU-PK-956.

Distribution: world: widely cultivated. India: throughout, Nagaland as wild species

Astragalus Linnaeus

Annual or perennial herbs, shrubs, glabrous or hairy. Leaves paripinnate or imparipinnate. Stipules free or connate. Flowers in racemes or in short peduncles. Calyx campanulate. Stamens diadelphous. Pods oblong or oval.

Astragalus concretus Benth. III. Bot. Himal. Mts. 199, 1835; Grierson & Long Fl. Bhut. 1.3: 716, 1987; Astragalus xiphocarpus Benth. Baker in Hook. f., Fl. Brit. India 2: 129, 1876.

A woody shrubs. Stem reddish in color, smooth, alternate branching. Leaves imparipinnate, hairy. Leaf peduncles 5 -10 cm long. Leaflets oblong or lanceolate 19 - 23 pairs, and 1.2 - 1.7 cm long x .4 -.5 cm broad. Inflorescence group in axillary racemes, rachis 5-10 cm long. Calyx green, tubular and join. Corolla yellow, standard obovate, little curl backwards, wings oblong and keel ovate. Pods small ovoid or oblong, 1cm long, little curved, pointed at both ends. Seeds 8 - 10.

Flowering & fruiting: August- October

Habitat & ecology: grows only in higher elevation.

Voucher specimen: Dzukuo valley, Kohima district, Nagaland, 2584 m, 25^{o}33’16.999’’N 94^{o}3’40.996’’E, P. Konyak NU-PK-162.

Distribution: world: Bhutan, Nepal India: Kashmir, Himachal Pradesh, Uttar Pradesh, Sikkim, Nagaland.

Cajanus DC.

Herbs or woody climbers, erect shrubs. Leaves pinnate or digitately 3 - foliolate. Stipels and stipules small, or sometimes absent. Leaflets entire, usually with sessile glands beneath. Inflorescence axillary or terminal racemes, solitary or few. Calyx campanulate. Corolla standard obovate or obovate elliptic, wings elliptic, keel circular, apex obtuse. Stamens diadelphous. Pods linear, oblong, dehiscent. Seeds 2 - 10.

Keys to species

1a. Erect woody shrub. Pods 4 - 7.5 cm long……*C. cajan*

1b. Twining climbers. Pods 2 - 2.5 cm long……..*C. scarabaeoides*

Cajanus cajan (L.) Millsp., Publ. Field columb. Mus. Bot. 2(1): 53, 1900; Grierson & Long Fl. Bhut. 1.3: 703, 1876; Sanjappa Legum. India. 100, 1992; *Cajanus indicus* Spreng. Kanjilal *et al*., Fl of Assam 2: 97, 1938.

An erect woody shrub of about 1.5 - 2 m tall. Stem alternate branching, pubescent. Leaves pinnately 3- foliolate, stipules minute, ovate- lanceolate. Leaflets lanceolate to elliptic, 4 - 8 x 1 - 3 cm densely covered with grayish hairs, apex acute or acuminate. Inflorescence few at terminal. Calyx campanulate. Corolla yellow, 1 cm long. Stamens diadelphous. Pods 4 - 7.5 cm long, oblique in between seeds, acuminate apex. Seeds 3 - 5, dehisced.

Flowering & fruiting: May- July

Habitat & ecology: Cultivated for pulse

Voucher specimen: Jotsoma, Kohima district, Nagaland 1209 m 25^{o}40’37.776’’N 94^{o}2’54.096’’E, P. Konyak NU-PK-972.

Distribution: Cultivated throughout tropics and subtropics of the world. Native to India. Nagaland.

Cajanus scarabaeoides (L.) Thouars, Dict. Sc. Nat. 6: 167, 1806; Sanjappa Legum. India. 103, 1992; Grierson & Long Fl. Bhut. 1.3: 703, 1876; *Atylosia scarabaeoides* (L.) Benth. in Miq., Pl. Jungh 242. 1852; Baker in Hook. f., Fl. Brit. India 2: 215. 1876.

A twining pubescent climbing herbs, slender. Leaves 3- foliolate, terminal leaflets larger 3 - 3.5 x 1 - 1.5 cm, laterals 2- 2.5 x 1.3 - 1.5 cm, 3 - veined, oblong or obovate, acute or sub-acute, base cuneate, pale pubescent. Stipels and stipules minute, deciduous. Flowers in axillary raceme, peduncles 0.5 - 1.5 cm. Calyx densely grey hairs, corolla yellow. Stamens diadelphous. Pods 2 - 2.5 cm long x 7 - 8 mm broad, oblong, densely white silky hairs, transversely septate between seeds. 3 - 5 seeded.

Flowering & fruiting: March- June

Habitat & ecology: open space along roadside

Voucher Specimen: Peducha, Kohima district, Nagaland, 897 m 25°45’35.446’’N 94°3’11.901’’E, P. Konyak NU-PK-06.

Distribution: World: South & S.E Asia, Australia, Pacific Islands, Mauritius, Madagascar, Africa. India almost throughout, Nagaland.

Fig.4. *Cajanus scarabaeoides* (L.) Thouars.

Callerya Endl. Gen. Pl., Suppl. 3:104, 1843

Woody climbers or lianas, shrubs or rarely trees. Leaves imparipinnate, stipules deciduous, leaflets opposite. Inflorescence at axillary racemes, or terminal or panicles. Bracts shorter or longer than flowers. Calyx truncate with short teeth. Corolla standard glabrous or densely covered with hairs, wings and keels equally long. Stamens diadelphous, ovary sometimes stipitate. Legumes flat or inflated, indehiscent.

Callerya cinerea (Benth.) Schot, Blumea 39:17, 1994; Millettia cinerea Benth. in Miq. Pl. Jungh. 249, 1852; Baker in Hook. f. Fl. Brit. India 2:106, 1876; Kanjilal et al., Fl. of Assam 2: 28, 1938; Sanjappa Legum. India 212, 1992.

A large woody climber. Bark brown in color, alternate branching. Leaves glabrous, imparipinnate, 5-foliolate. Leaf petiolules 2 - 11 cm long, pulvinous, pedicels 0.7 cm long. Leaflets 3 - 11 x 2 - 4.5 cm, stipules 1 cm long, lanceolate. Inflorescence in axillary or terminal racemes. Corolla pink or red, standard ovate, outside rusty sericeous. Ovary shortly stipitate. Legume linear 5 - 7 cm long densely covers with hairs, contracted between seeds. 3 - seeded.

Flowering & fruiting: June - August

Habitat & ecology: grows in evergreen forest.

Specimen examined: Longkhum, Mokokchung district, Nagaland, 1338 m 25^{o}15’40.464’’N 94^{o}25’50.239’’E, P. Konyak NU-PK-692.

Distribution: world: China, Bangladesh, Bhutan, Myanmar, Nepal, Thailand, Vietnam. India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Sikkim, West Bengal.

Canavalia **DC.**

Herbs, perennial or annual twinning vines. Leaves pinnately 3 - foliolate, entire stipules small. Inflorescence solitary or few in racemes, purple, rose or white color. Calyx campanulate, bilabiate 2- lobed. Stamens monaldelphous. Legumes large, ligulate or linear oblong, little turgid, dehiscent. 10 - 15 seeded, hilum.

Keys to species

1a. Pods 20 - 30 cm long. Seeds white, elliptic……*C. ensiformis*

1b. Pods 20 - 21 cm long. Seeds red or brown…….*C. gladiata*

Canavalia ensiformis (L.) DC., Prodr. 2: 404, 1825; Baker in Hook. f., Fl. Brit. India 2: 195, 1876; Kanjilal *et al* Fl. of Assam 2: 77, 1938; Sanjappa Legum. India 107, 1992.

A large perennial or annual climbers. Leaves 3- foliolate, stipules deciduous. Leaflets 7 - 15 x 5 - 6 cm, ovate to rhomboid, terminal larger, laterals slightly oblique, apex acute or acuminate, base cuneate or rounded, minutely cuspidate. Raceme axillary, 15 - 25 cm long. Flowers 1 - 5 at nodes of rachis. Corolla purple or white. Legume 20 - 30 cm long, thick, leathery valves. Seeds 6 - 9, white, elliptic.

Flowering & fruiting: May- August

Habitat & ecology: Cultivated for pulses.

Voucher specimen: Khonoma, Kohima district, Nagaland, 1335 m 25^{o}39’26.964’’N 94^{o}1’9.156’’E, P. Konyak NU-PK-190

Distribution: Pantropical. India cultivated throughout.

Canavalia gladiata (Jacq.) DC., Prodr. 2: 404, 1825; Grierson & Long Fl. Bhut. 1.3: 690, 1876; Sanjappa Legum. India 107, 1992; *Dolichos gladiatus* Jacq., Coll. Bot. 2: 276, 1788.

Climbing herbs. Leaves 3 - foliolate . Leaflets 10-15 x 5.5 - 12 cm, ovate, acuminate apex, base rounded, pubescent. Petioles 3 - 8 cm, stipules lanceolate, 5mm. Peduncles 20 - 25 cm. Flowers clustered at each nodes. Calyx 15 - 20 mm, slightly pubescent, upper lip rounded, lower lip 3 - acute teeth. Petals purplish. Pods 20 - 21 cm long, thick, coriaceous. Seeds red or brown, hilum 15 - 20 mm.

Flowering & fruiting: July- October

Habitat & ecology: grows in fallow land or cultivated.

Voucher specimen: Chingkao, Mon district, Nagaland, 917 m, 26^{o}31’49’’N 95^{o}02’31’’E, P. Konyak NU-PK-700

Distribution: Pantropical. India: Throughout

Clitoria L.

Twining herbs or shrubs, perennial. Leaves imparipinnate, 3 - 7 foliolate. Leaflets entire, stipels and stipules present. Inflorescence large, bracts in pairs. Calyx tubular, 5 - toothed. Corolla standard large, wings and keels much shorter. Stamens diadelphous. Legume linear or linear-oblong, dehiscent, septate between seeds.

Clitoria mariana L., Sp. Pl. 2: 753, 1753; Baker in Hook.f., Fl. Brit. India 2:208, 1876; Kanjilal et al., Fl. of Assam 2: 86, 1938; Sanjappa Legum. India. 114, 1992; Grierson & Long Fl. Bhut. 1.3: 697, 1876.

Twining herbs, terete branches. Leaves imparipinnate, usually 3- foliolate. Stipules lanceolate, 10 mm long, stipels 7 - 8 mm, linear. Common petioles 3.8 - 7.5 cm long, slender. Leaflets 5 - 7cm x 2.5 - 3.5 cm, elliptic or lanceolate, glabrous, less acute. Racemes 6-15 cm long. Inflorescence solitary. Calyx tubular, glabrous, 5- lobed. Corolla deep purple or pale blue, standard larger 4 - 5 cm long, exceeding others. The wings and keel petals are comparatively very small. Pods 3 - 5 cm long, linear, glabrous, septate in between seeds. 1 - 3 seeded. Determinate root nodules present.

Flowering & fruiting: July - September

Habitat & ecology: grows in edges of evergreen forest.

Voucher specimen: Lerie, Kohima district, Nagaland 1258 m 25^{o}39’29’’N 94^{o}6’59.999’’E, P. Konyak, NU-PK-166.

Distribution: world: USA, Native- South America, Southeast Asia India: Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland.

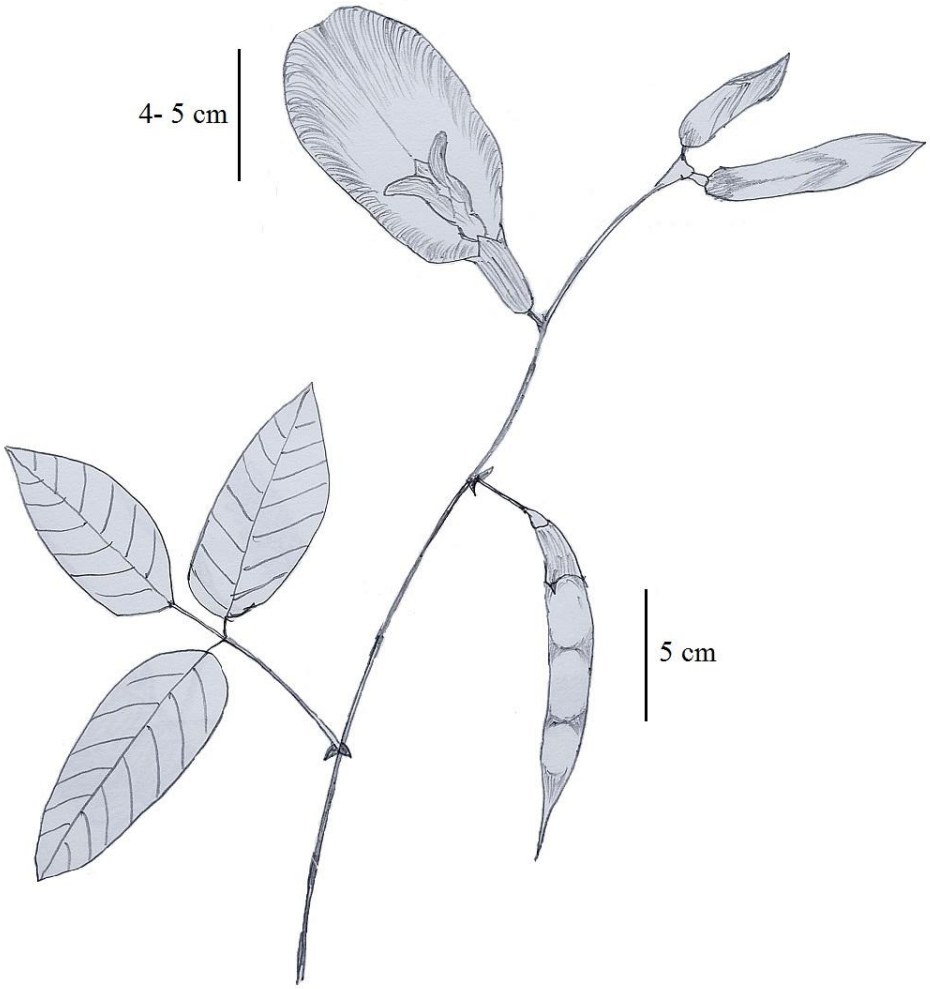


Fig.5. *Clitoria mariana* L.

Codariocalyx **Hassk.**

Erect herbs or shrubs. Leaves 3- foliolate or 1- foliolate, by early deciduous of leaflets. Stipules deciduous. Terminal leaflets larger than laterals. Inflorescence terminal, axillary, paniculate or racemose. Bracts deciduous, bracteole absent. Calyx membranuous, broadly campanulate. Corolla much longer than calyx, standard oblique, wings often half-deltoid, keel falcate. Stamens diadelphous. Legumes 6 - 13, dehiscent at lower sutures.

Keys to species

1a. Terminal leaflets elliptic or lanceolate. Legumes with sparse short hooked hair. …… ……... *C. motorius*

1b. Terminal leaflets obovate or elliptic. Legumes with dense short hooked hairs……..... *C. gyroides*

Codariocalyx motorius (Houtt.) H. Ohashi J. Jap. Bot. 40: 367, 1965; *Desmodium gyrans* DC. Kanjilal et al., Fl. of Assam 2: 58, 1938; *Demodium motorium* (Houtt.) Merr. Grierson & Long Fl. Bhut. 1.3: 670, 1876; Sanjappa Legum. India 158, 1992.

An erect herbs or under-shrubs of about 4 - 5ft tall. Stem terete, green, not branched, glabrous and presence of nodes. Petioles arise from nodes 1.5 - 2cm long, little hairy at the base of leaflets. Leaves 3-foliolate, the terminal leaflets quite large and 2-lateral is very small or falls off easily. Terminal leaflets 3 - 6 cm x 1 - 2 cm, lanceolate or elliptic, laterals 0.5 - 2 cm x 0.3 - 1 cm, linear, very small, glabrous. Inflorescence at terminal racemes, corolla pale purple or orange. Pods 3 - 4 cm long, slightly falcate, with sparse short hooked hairs. 6 - 9 seeded, septate, dehisced at one side.

Flowering & fruiting: September- November

Habitat & ecology: grows along roadside.

Voucher specimen: Dzüdza, Kohima district, Nagaland 1008 m, 25^{o}43’5.34’’N 94^{o}2’49.991’’E, P. Konyak NU-PK-952.

Distribution: world: Australia, Bangladesh, Bhutan, Burma, China, Nepal, Thailand, Vietnam, Sri Lanka, Pakistan. India: Almost throughout, Nagaland.

Codariocalyx gyroides (Link.) Hassk. Flora 25: Beibl. 2: 49, 1842; *Desmodium gryroides* (Link.) DC. Kanjilal et al., Fl. of Assam 2: 59, 1938 Grierson & Long Fl. Bhut. 1.3: 670, 1876; Sanjappa Legum. India 154, 1991.

Shrubs, branches terete, alternate, pubescent when young. Leaves 3- foliolate or 1-foliolate. Petioles 2 - 2.5 cm long, terminal leaflets obovate or elliptic, lateral leaflets oval or elliptic, small, white pubescent, base rounded or cordate, apex obtuse, emarginated. Inflorescence axillary or terminal. Calyx broadly campanulate. Corolla purplish blue, standard obovate, wings auriculate, keel long clawed. Legume flat, green, slightly falcate, one side intended and dehiscent, dense sticky hairs. 10 - 13 seeded.

Flowering & fruiting: August- November

Habitat & ecology: grows along roadside in lower elevation in disturb road construction site.

Voucher specimen: Dzüdza, Kohima district, Nagaland 973 m, 25^{o}41’42.936’’N 94^{o}2’44.879’’E, P. Konyak NU-PK-969.

Distribution: World: Africa, Central America, Bhutan, China, Nepal, Myanmar, Sri Lanka, Thailand. India: Arunachal Pradesh, Assam, Bihar, Madhya Pradesh, Meghalaya, Nagaland, Orissa, Sikkim, Uttar Pradesh, West Bengal.

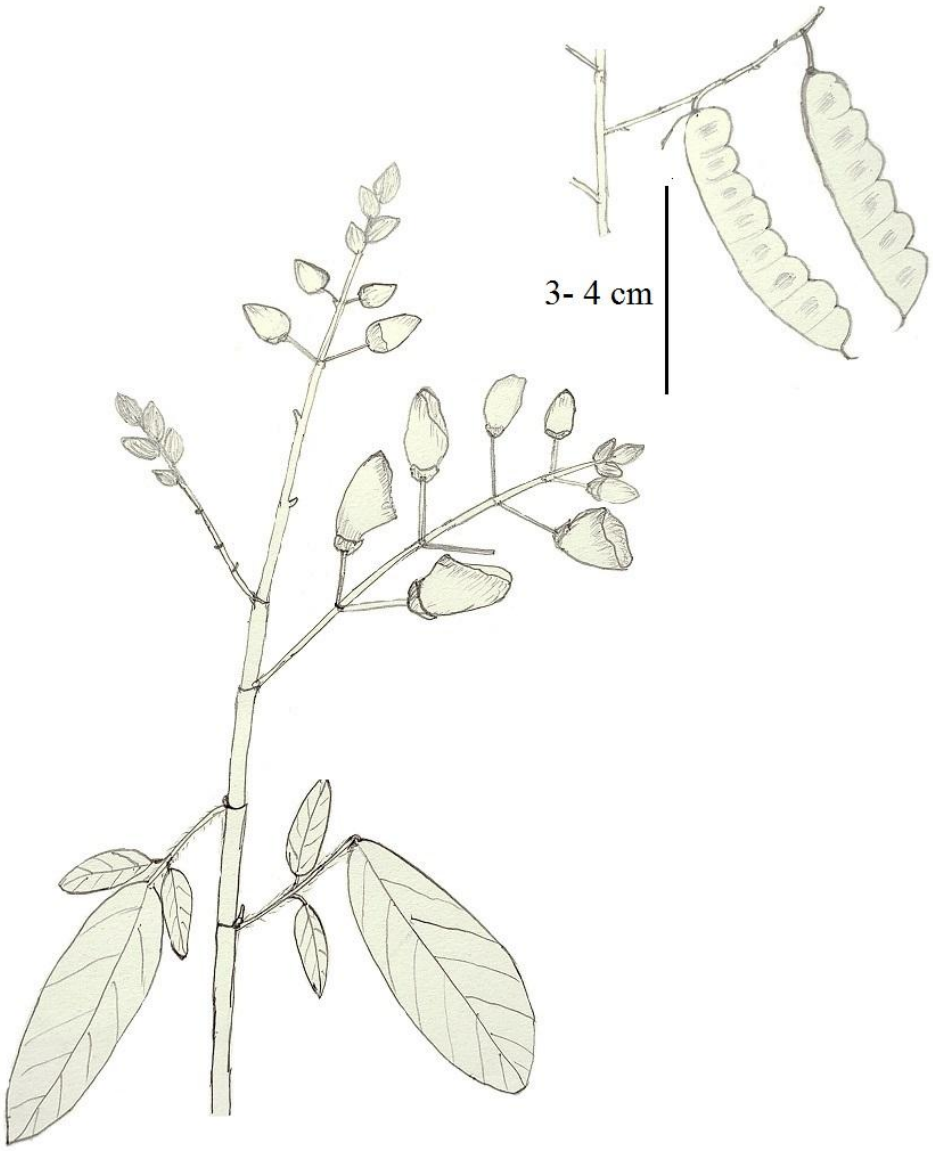


Fig.6. *Codariocalyx motorius* (Houtt.) H. Ohashi

Crotalaria L.

Annual or perennial herbs or shrubs. Leaves simple, or digitately 3-foliolate. Leaflets entire, stipules small or absent. Inflorescence terminal, leaf opposed or axillary. Calyx tube campanulate. Corolla usually yellow, sometimes purplish, white. Stamens monadelphous. Ovary stipitate or sessile. Legume subsessile to long stipitate, oblong, cylindrical, rarely compressed. 2 to many seeded.

Keys to species

1a. Herbaceous plant.

2a. Raceme 12- 16 cm long. 2-6 flowered. ……..*C. ferruginea*

2b. Raceme 7- 20 cm long. 6-9 flowered……..…*C. mysorensis*

3a. Leaflets elliptic or obovate, apex acute…….....*C. humifusa*

3b. Leaflets linear, lanceolate, apex mucronate.

1b. Shrubs

4a. Leaves 1-foliolate

5a. Stem terete. Leaflets 7 – 10 cm long, linear-lanceolate……...*C. juncea*

5b. Stem angular. Leaflets 10- 20 cm long, lanceolate……..…..*C. tetragona*

4b. Leaves 3- foliolate

6a. Pods 2-5 cm long, flat, oblong elliptic.....*C. cytisoides*

6b. Pods 5-6 cm long, turgid.....*C. pallida*

7a. Keels falcate, beaked…….....*C. micans*

7b. Keels oblong, not beaked.

Crotalaria ferruginea Graham ex Benth. London J. Bot. 2: 476, 1843; Kanjilal *et al*., Fl. Assam 2: 12, 1938; Sanjappa Legum. India 122, 1992; Grierson & Long Fl. Bhut. 1.3: 735, 1876.

A small trailing or erect herbs, with spreading brown pubescent. Leaves simple, leaflets 2 - 4 x 1 - 2 cm, subsessile, oblong or obovate, obtuse to rounded apex, brown sericeous in both surfaces. Raceme leaf opposed, 12 - 16 cm long with 2 - 6 flowered. Calyx 2-lipped, densely pilose, lobes lanceolate. Corolla yellow, standard 1 cm long, as long as calyx, linear-oblong. Pods 1 - 2 cm long, linear-oblong, glabrous, dehisced.

Flowering & fruiting: October- November

Habitat & ecology: grows along roadside of forest margin.

Voucher specimen: Khonoma Kohima district, Nagaland, 1206 m 25°39'54''N 94°1'17.22''E, P. Konyak NU-PK-677.

Distribution: world: Sri Lanka, Nepal, Bangladesh, Myanmar, Indonesia, Philippines, Bhutan. India: Assam, Bihar, Gujarat, Karnataka, Meghalaya, Orissa, Sikkim, Uttar Pradesh, Nagaland.

Crotalaria mysorensis Roth. Nov. Pl. Sp. 338, 1821; Baker in Hook. f. Fl. Brit. India 2: 70, 1876; Kanjilal *et al*., Fl. Assam 2: 12, 1938; Sanjappa Legum. India 124, 1992; Crotalaria stipulacea Roxb. Fl. Ind. 3: 264, 1832.

Herbs, stem terete, densely silky hairs. Stipules broadly lanceolate. Leaves simple nearly sessile. Leaflets 2 - 5 x 0.5 - 1.5 cm, elliptic ovate to lanceolate, both surface sparsely pilose, apex obtuse and base cuneate or acute. Raceme terminal or sub-terminal, 7 - 20 cm long, with 6 - 9 flowered. Calyx 2- lipped, with silky hairs. Corolla yellow. Pods 2 - 3 cm long, oblong, glabrous, 20 - 30 seeded.

Flowering & fruiting: September- November.

Habitat & ecology: grows along roadside in disturbed areas.

Voucher specimen: Dzüdza, Kohima district Nagaland 966 m, 25°42'18.756''N 94°2'39.695''E, P. Konyak NU-PK- 695.

Distribution: world: China, Bangladesh, Nepal, Pakistan, Indonesia, Sri Lanka. India: throughout including all North Eastern States, Nagaland.

Crotalaria humifusa Benth. Hook. London J. Bot. 2: 476, 1843; Baker in Hook. f. Fl. Brit. India 2: 67, 1876; Kanjilal *et al*., Fl. Assam 2: 11, 1938; Grierson & Long Fl. Bhut. 1.3: 736, 1876; Sanjappa Legum. India 121, 1992.

A small herb, branched. Stem slender, silky hairs. Leaves simple, nearly sessile. Leaflets 2 - 3 x 1 - 1.5 cm, elliptic or obovate, obtuse or acute, pubescent. Raceme leaf-opposed, 3- 5 cm long, with 2 - 3 flowered. Calyx long-toothed covers in spreading hairs. Corolla bright yellow. Pods oblong 1 - 2 cm long, glabrous.

Flowering & fruiting: August- November

Habitat & ecology: in open space, or barren land.

Voucher specimen: Jotsoma, Kohima district, Nagaland 1423 m, 25^{o}40’28.488’’N 94^{o}4’21.035’’E, P. Konyak NU-PK-687.

Crotalaria juncea L. Sp. Pl. 2: 714, 1753; Baker in Hook. f. Fl. Brit. India 2: 79, 1876; Kanjilal *et al*., Fl. Assam 2: 14, 1938; Grierson & Long Fl. Bhut. 1.3: 733, 1876; Sanjappa Legum. India 122, 1992.

A shrub of 4 - 5 ft tall. Stem terete, appressed pubescent. Leaves 1- foliolate, alternately arranged. Stipules small, caducous. Leaflets 7 - 10 cm long, oblong, linear-lanceolate, obtuse, subacute, petioles very short. Inflorescence mostly terminal, 20 - 25 cm long, 10 - 20 flowered. Corolla bright yellow, exerted. Calyx 2-lipped, lanceolate, brown. Pods 6 -7 cm long, linear oblong, turgid, velvety pubescent. 10 - 15 seeded.

Flowering & fruiting: August- December

Habitat & ecology: grows along roadside in open space.

Voucher specimen: Jhakhama, Kohima district, Nagaland, 1647 m 25^{o}34’38.496’’N 94^{o}7’32.879’’E, P. Konyak NU-PK-160.

Distribution: world: Africa, Australia, Europe, South America, China, Thailand, Bhutan, Myanmar, Bangladesh, Pakistan. India: throughout, cultivated in plains, Nagaland.

Crotalaria tetragona Roxb. ex Andrews Bot. Repos. 10: 593, 1810; Baker in Hook. f. Fl. Brit. India 2: 78, 1876; Kanjilal et al., Fl. Assam. 2: 13, 1938; Sanjappa Legum. India 130, 1992.

Shrubs 1.5 - 2 m. Stem angular, appressed pubescent. Leaves simple, 10 - 20 cm long, alternate leaflets lanceolate, apex acuminate, margin entire, appressed pubescent. Inflorescence in terminal or axillary racemes. Calyx densely brown velvety. Corolla yellow, finely strip with brownish, standard broadly ovate. Pods oblong, obtuse, brown tomentose.

Flowering & fruiting: September- December.

Habitat & ecology: along the forest trails, or cultivated.

Voucher specimen: Mokokchung, Mokokchung district, Nagaland 1092 m 26°20'7.998''N 94°30'9.999''E, P.Konyak NU-PK-176.

Distribution: world: China, Bhutan, Bangladesh, Myanmar, Nepal. India: Arunachal Pradesh, Assam, Bihar, Himachal Pradesh, Manipur, Sikkim, Tripura, Uttar Pradesh, West Bengal, Nagaland.

Crotalaria cytisoides Roxb. (Hort. Bengal 54: 1814 nom. nud.) ex DC. Prodr. 2:131, 1825 Sanjappa Legum. India 118, 1992; *Priotropis cytisoides* (Roxb.ex DC.) Baker in Hook. f. Fl. Brit. India 2: 65, 1876.

Shrub of 1 - 4 m tall. Stem alternate branching, sericeous. Leaves digitately 3-foliolate, glabrous, petioles 1 - 4 cm long. Leaflets elliptic, lanceolate, acute or acuminate. Flowers 20 - 30 in racemes, axillary, sometimes terminal. Calyx broadly campanulate. Corolla yellow or purplish- brown. Pods 2 - 5 cm long, flat, oblong-elliptic.

Flowering & fruiting: August- November

Habitat & ecology: grows along the forest edges in open areas.

Voucher specimen: Lerie, Kohima district, Nagaland 1446 m, 25°38'55.464''N 94°6'40.823''E, P. Konyak NU-PK-685.

Distribution: world: China, Bhutan, Nepal, Myanmar. India: Assam, Meghalaya, Sikkim, West Bengal, Nagaland.

Crotalaria pallida Aiton, Hort. Kew. 3:20, 1789; Sanjappa Legum. India 126, 1992; *Crotalaria striata* DC. Prodr. 2: 131, 1825; Kanjilal *et al*., Fl. Assam 2: 16, 1938.

Shrub or undershrub, 1.5 – 2 m tall. Stem smooth, alternate branching. Leaves 3-foliolate, glabrous, petioles 3 - 6 cm long. Leaflets 3-5 cm long x 2 - 2.5 cm broad, oblong, elliptical-oblong, obovate, obtuse or mucronate, glabrous. Racemes terminal, 15 - 20 cm long, inflorescence clustered. Corolla yellow, exerted beyond calyx, strip with reddish purple veins. Pods turgid or cylindrical 5 - 6 cm long, glabrous. Seeds rattled, 20 - 30 seeded.

Flowering & fruiting: August- October

Habitat & ecology: grows along roadside

Voucher specimen: Dzüdza, Kohima district, Nagaland 974 m 25°42’11.196’’N 94°2’49.956’’ E, P. Konyak NU-PK-688.

Distribution: world: China, Tropical America, Bhutan, Nepal, Sri Lanka, Australia. India: Throughout, Nagaland.

Crotalaria micans Link. Enum. Hort. Berol. Alt. 2: 228, 1822; *Crotalaria anagyroides* Kunth. In HBK., Nov. Gen. Sp. 6: 404, 1823; Balakr., Fl. Jowai 1: 150, 1981.

Subshrubs or shrubs. Stem terete, glabrous, alternate branchlets. Leaves 3-foliolate, two pairs in one node sometimes. Petioles 3 - 3.5 cm long, leaflets 3.5 - 5 x 1.5 - 2.5 cm, terminal larger than laterals, oblong- oblanceolate, cuneate at base, obtuse, mucronate at apex, glabrous. Inflorescence in axillary racemes or terminal, 25 - 30 cm long. Flowers numerous, alternately arranged. Calyx tube, 5- lobed. Corolla yellow, striking with red, standard orbicular, wings oblong and keels falcate, beaked. Legume oblong, turgid, 4 cm long, pubescent.

Flowering & fruiting: March – May

Habitat & ecology: grows along roadside

Voucher specimen: Botsa, Kohima district, Nagaland, 1196 m, 25°53’56’’ N 94°5’12.011’’ E, P. Konyak NU-PK-05.

Distribution: World: Australia, China, Thailand, Vietrnam, Nepal, Tropical America, South America. India: Andhra Pradesh, Karnataka, Kerala, Meghalaya, Tamil Nadu, West Bengal, Nagaland.

Fig.7. *Crotalaria cytisoides* Roxb.

***Dalbergia* L.f.** Suppl. Pl. 52: 316, 1782

Trees, shrubs or woody climbers. Leaves alternate, imparipinnate, entire, stipels absent, stipules absent or caducous. Inflorescence terminal or axillary, racemes or panicles, with numerous flowered. Bracts and bracteoles usually small, caducous, rarely persistent. Flowers small. Calyx campanulate, 5-toothed, unequal. Corolla white, purple. Stamens 9 or 10, monadelphous. Legume indehiscent.

Keys to species

1a. Leaflets 34- 42 numbers, stamens 9 or 10, monadelphous……..*D. pinnata*

1b. Leaflets 13-19 numbers, stamens 5+5, diadelphous……*D. stipulaceae*

Woody lianas, shrubs or trees. Leaves alternate, imparipinnate. Leaflets entire, stipels absent, stipules often deciduous. Inflorescence terminal or axillary, racemes or panicles. bracts and bracteoles small. Calyx campanulate, 5- toothed. Stamens 9 or 10, monadelphous or diadelphous. Pods thin, compressed, coriaceous, indehiscent. 1-seeded, reniform.

Dalbergia pinnata Prain, Ann. Roy. Bot. Gard. Calc. 10: 48, 1905; Sanjappa Legum. India. 138, 1992; *Dalbergia tamarindifolia* Roxb., (Hort. Beng. 53.1814, nom. nud.) Fl. Ind. 3: 233, 1832; Baker in Hook.f., Fl. Brit. India 2: 234, 1876; Kanjilal *et al*., Fl. of Assam 2:105, 1938.

Small trees or woody climbers. Branching alternate, glabrous, and brown. Leaves 10-12 cm long, rachis and petioles with brown hairs. Stipules lanceolate, 5mm. Leaflets 34-42, oblong, small 0.5- 1.5 cm x 4-5 mm, both surfaces puberulent, apex rounded, slightly emarginate. Panicles axillary, corymblike branches, bracts and bracteoles persistent. Calyx campanulate. Corolla white. Stamens 9 or 10, monadelphous. Pods 4-6 cm long, glabrous. 1-seeded, elongate.

Flowering & fruiting: January- May

Habitat & ecology: grows in sub-tropical forest

Voucher specimen: Tang, Mon district, Nagaland 981 m, 26^{o}30’741’’N 94^{o}53’874’’E, P. Konyak NU-PK-14

Distribution: World: Bangladesh, Bhutan, Myanmar, Malaysia India: Andaman Islands, Arunachal Pradesh, Assam, Bihar, Meghalaya, Orissa, Sikkim, West Bengal.

Dalbergia stipulacea Roxb. Hort. Bengal 53 Fl. Ind. iii, 233, 1814; Baker in Hook. f., Fl. Brit. India 2: 237, 1876. Kanjilal et al., Fl. of Assam 2: 107, 1938.

A large woody climber or small tree. Bark brown or grey in color and much branching. Leaves imparipinnate, 12-15 cm long. Leaflets 13- 19 numbers, oblong or elliptic, glabrous. Inflorescence panicles, bracts small, bracteoles obovate. Calyx campanulate. Corolla purple, standard recurved. Stamens diadelphous 5+5. Pods 5-7 cm long, oblong, thin flat, green or brown when ripe, coriaceous. 1-seeded.

Flowering & fruiting: April – June, the dried pods remain attached whole season.

Habitat & ecology: grows along the edges of evergreen tropical forest.

Voucher specimen: Alichen, Mokochung district, Nagaland 1040 m 26^{o}13’134’’N 94^{o}25’106’’E, P. Konyak NU-PK-974.

Distribution: world: Australia, China, Nepal, Bhutan, Bangladesh, Burma,Vietnam. India: Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, West Bengal.

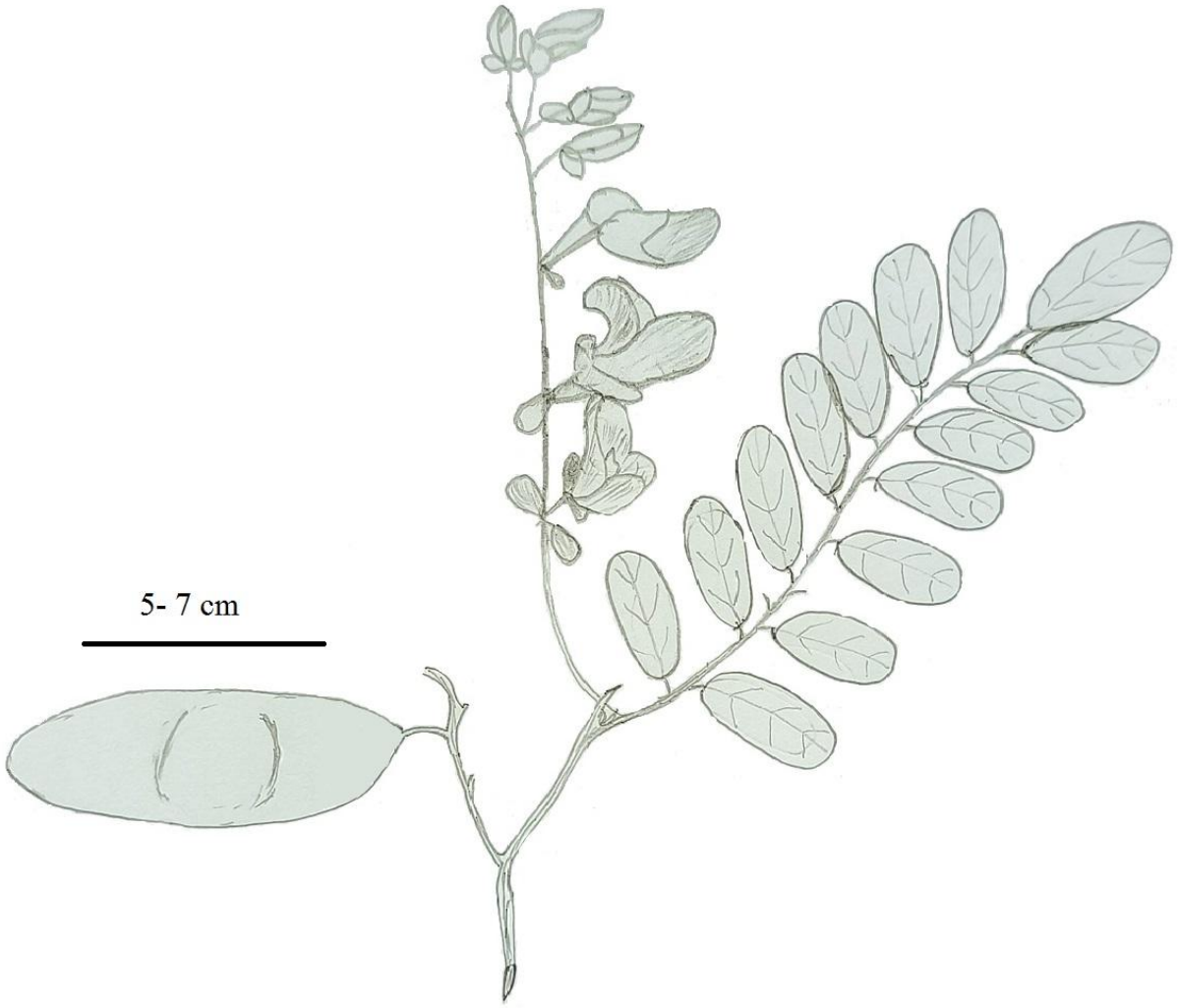


Fig.8. *Dalbergia stipulaceae* Roxb.

Dalhousiea Wall. Ex Benth., Comm. Legum. Gen. 5, 1837

A woody liana or climbing shrub. Leaves 1- foliolate, alternate. Inflorescence axillary. Calyx campanulate, teeth short, deltoid. Corolla exerted, equal in length. Stamens 10, filament free. Pods oblong, subcompressed, tapering in ends, coriaceous.

Dalhousiea bracteata (Roxb.) Graham ex. Benth. Comm. Legum. Gen. 5, 1837; Baker in Hook. f., Fl. Brit. India 2: 248, 1876; Kanjilal *et al*., Fl. of Assam 2: 116, 1938; Sanjappa Legum. India 142, 1992.

Woody climber or liana, with greyish bark. Leaves 1- foliolate, simple, alternately arranged. Leaflets 17- 20 cm long, ovate, acute or obtuse. Stipules small, lanceolate. Inflorescence at axillary corymbs, bracts in pairs, bracteoles larger, also in pairs. Calyx small, campanulate, deltoid. Corolla white or greenish white. Stamens 10, free filaments. Pods green, turgid, compressed, tapering at both ends, coriaceous, 8-10 cm long. 2-seeded.

Flowering & fruiting: June- August

Habitat & ecology: grows in evergreen forest.

Voucher specimen: Changki, Mokokchung district, Nagaland 759 m, 26^{o}25’14’’N 94^{o}25’16.999’’E, P. Konyak NU-PK-172.

Distribution: world: Bangladesh, Myanmar. India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Tripura, Nagaland.

Dendrolobium (Wight & Arn.) Benth.

F.A.W. Miquel, Pl. Jungh. 216, 1852.

Shrubs or small trees. Leaves 3- foliolate, rarely 1- foliolate, stipule and stipels present. Leaflets simple, entire, terminal leaves larger than laterals. Inflorescence axillary, subumbellate or umbellate to short racemose. Corolla white or yellow, stamens monadelphous. Pods jointed, indehisced.

Dendrolobium triangulare (Retz.) Schindl., Repert. Spec. Nov. Regni veg. 20: 279, 1924; *Desmodium cephalotes* Wall. Baker in Hook. f. Fl. Brit. India 2:161, 1876; Kanjilal *et al*., Fl. of Assam 2:46 1991; *Desmodium triangulare* (Retz.) Merr. Sanjappa Legum. India. 162, 1992.

Shrubs of 4-5 ft tall. The stems are triangular, covered with densely grey sericeous hairs. Leaf peduncles 3.5- 7.5 cm long. Leaves 3- foliolate, stipules 1 cm long, leaflets 2.5-6 cm long x 0.7- 1.5cm broad. Terminal leaflets usually larger in size, elliptic, acute, densely grey silky hairs, pedicels 0.2- 1 cm long. Corolla milky white, densely form in short pedicels, axillary umbels, standard elliptic, wings and keels oblong. Pods 1-2 cm long, intended in both side, covered with grey hairs. 2-3 seeded.

Flowering & fruiting: July- September

Habitat & ecology: grows along roadside or in waste-dry land.

Voucher specimen: Meriema, Kohima district, Nagaland 1205 m 25^{o}42’24.048’’N 94^{o}4’27.839’’E, P. Konyak NU-PK-959.

Distribution: world: Bangladesh, Bhutan, Nepal, Sri Lanka. India: Arunachal Pradesh, Sikkim, Meghalaya, Nagaland.

Derris Lour., Fl. Cochinh. 2:423, 1790

Lianas, shrubs or rarely trees. Leaves imparipinnate, leaflets opposite, entire, stipels absent. Flowers in axillary or terminal racemes or panicles, bracts and bracteoles small, deciduous. Calyx campanulate, truncate, or teeth short. Corolla white, purple or pink, standard broad, not auricled, wings long clawed, keels incurved. Stamens monadelphous. Pods thin, indehiscent.

Keys to species

1a. Woody climbers.

2a. Leaflets 13. Pods 3-10 cm, rigid, oblong, elliptic and narrow wing…...*D. elliptica.*

2b. Leaflets 15. Pods 4-5 cm long, flat, oblong……..……..*D. scandens.*

1b. Trees.

3a. Standard orbicular……*D. robusta.*

3b. Standard elliptic- ovate.

Derris elliptica (Wall.) Benth., J. Proc. Linn. Soc., Bot. 4:111, 1860; Baker in Hook. f. Fl. Brit. India 2: 243, 1876; Kanjilal *et al*., Fl of. Assam 2: 114, 1938.

A large woody climbers. Bark brown, rough, alternate branching. Rachis 15- 16 cm long, leaves imparipinnate, 13 foliolate. Leaflets 4.5- 5.5 x 1.5- 2 cm, oblong, obovate-oblong, apex mucronate, acuminate. Racemes axillary or fascicled on older branches. Corolla white or pink, calyx short toothed. Pods 3- 10 cm long, oblong, oblong-elliptic, with narrow wing along both sides. 1-3 seeded.

Flowering & fruiting: April - June

Habitat & ecology: grows along forest edges, roadsides.

Voucher specimen: Alichen, Mokokchung district, Nagaland 1168 m 26°13’250’’N 94°26’047’’E, P. Konyak NU-PK- 694.

Distribution: Australasia, China, South America, Africa, Bangladesh, Nepal, Myanmar, Sri Lanka, Thailand. India: Assam, Meghalaya, Orissa, Punjab, Tamil Nadu, West Bengal.

Derris scandens (Roxb.) Benth., J. Proc. Linn.Soc., Bot. 4:103, 1860; Baker in Hook. f. Fl. Brit. India 2: 240, 1876.

A woody lianas. Stem brown, alternate branching, yellow spotted. Leaves imparipinnate, 8-10 cm long. Leaflets 15 foliolate, opposite, elliptic-oblong, acute or acuminate, rough when mature and glabrous when young. Inflorescence a racemes, axillary, calyx campanulate, teeth short, reddish color. Corolla white or slightly yellow, standard ovate- orbicular. Stamens 10, monadelphous. Pods 4-5 cm long, flat, oblong. 3-5 seeded.

Flowering & fruiting: June- August

Habitat & ecology: grows in evergreen forest.

Voucher specimen: Shiyong, Mon district, Nagaland, 1095 m 26°41’50.267’’N 94°55’2.746’’E, P. Konyak NU-PK-954.

Distribution: world: Australia, almost all South-east Asian countries. India: throughout, Nagaland.

Derris robusta (Roxb. ex DC.) Benth., J. Proc. Linn. Soc., Bot. 4:104, 1860; Baker in Hook. f. Fl. Brit. India 2: 241, 1876; Kanjilal et al., Fl. of Assam 2: 110, 1938.

A medium size tree of about 9- 12 m tall. Bark greyish color spotted with yellow wart, alternate branching. Leaves imparipinnate, 13-23 foliolate, rachis 10-19 cm long. Pedicels 0.5-1 cm long, Leaflets 4-6 x 1.5-2 cm, oblong, elliptic-lanceolate. Flowers in axillary raceme, fascicle, calyx 5-toothed, reddish color. Corolla white, standard orbicular 7mm, keels and wings 7mm. Pods 8-9 cm long, flat, oblong, acuminate and narrow in both ends, glabrous. 2-4 seeded.

Flowering & fruiting: May- October

Habitat & ecology: grows in evergreen and mixed forest.

Voucher specimen: Alichen, Mokokchung district, Nagaland 1053 m, 26°13'256''N 94°25'170''E, P. Konyak NU-PK- 697

Distribution: World: China, Bangladesh, Myanmar, Pakistan, Sri Lanka, Thailand. India: Arunachal Pradesh, Assam, Meghalaya, Punjab, Tripura, Uttar Pradesh, West Bengal, Nagaland.

Desmodium Desv., J. Bot. Agric. 1: 122, 1813

Perennial herbs, subshrubs or shrubs. Leaves pinnately 3- foliolate or sometimes 1-foliolate, stipellate, stipulate. Flowers in axillary or terminal racemes or panicles, rarely solitary. Calyx campanulate, tube short, 5-tooth. Corolla white, pink, purple, exerted, standard obovate, wings oblong more or less adhering to the keels. Stamens diadelphous rarely monadelphous. Pods compressed usually indehiscent, rarely dehisced, 1 to many seeded.

Keys to species

1a. Herbs or shrubs.

2a. Petioles 2- 3 cm long. …….……*D. concinnum*

2b. Petioles 3- 6 cm long.....*D. confertum*

3a. Raceme 10- 30 cm long…….…..*D. gangeticum*

3b. Raceme 8- 10 cm long……..……...*D. velutinum*

4a. Calyx densely villous……..……*D. laxiflorum*

4b. Calyx sparsely villous.

5a. Pods 4 - 7 jointed, intended in lower suture……...……....*D. heterocarpon*

5b. Pods 10 - 17 jointed, intended in both sutures……*D. sequax*

1b. Prostrate herbs or runners.

6a. Raceme axillary or panicles. Pods pubescent……..…*D. heterophyllum*

6b. Raceme terminal.……...……...……..*D. microphyllum*

7a.Stem covers with yellow-brown hairs. Leaflets obtriangular ovate…….....*D. griffithianum*

7b. Stem red, slender, hairy. Leaflets ovate or obovate.....*D. triflorum*

Desmodium concinnum DC. Ann. Sci. Nat. 4: 101, 1825; Baker in Hook. f. Fl. Brit. India 2: 170, 1876; Kanjilal et al., Fl. of Assam 2: 52, 1938; Grierson & Long Fl. Bhut. 1.3: 676, 1987; Sanjappa Legum. India 151, 1991.

Shrubs or undershrubs. Stem slender, terete drooping branches, with nodes. The nodes are covered with dense pubescent hairs. Leaves 3- foliolate, alternately arranged in nodes. Leaf petioles 2-3 cm long, leaflets terminal larger than laterals, oblong- obovate, blades entire, apex obtuse, hairy beneath. Stipules lanceolate. Inflorescence drooping terminal or axillary raceme. Calyx campanulate, deltoid. Corolla purple, 0.5 cm long. Pods 3-6 jointed, deeply intended along lower sutures, hairy.

Flowering & fruiting: September- November

Habitat & ecology: grows along roadside of forest edges.

Voucher specimen: Viswema, Kohima district, Nagaland, 1617 m 25^{o}34’25.752’’N 94^{o}7’24.311’’E, P. Konyak NU-PK-161.

Distribution: World: China, Nepal, Bhutan, Pakistan, Bangladesh. India: Karnataka, Punjab, Uttar Pradesh, West Bengal, Himalayas upto Assam, Meghalaya, Manipur, Nagaland.

Desmodium confertum DC. Ann. Sci. Nat 4: 101, 1825; Baker in Hook. f. Fl. Brit. India 2: 167, 1876; Kanjilal et al., Fl. of Assam 2: 53, 1938; Grierson & Long Fl. Bhut. 1.3: 677, 1876; Sanjappa Legum. India 151, 1991.

Shrubs. Stem terete, hairy. Leaves 3-foliolate, petioles 3- 6 cm long. Leaflets elliptic, obovate, appressed pubescent, apex obtuse or acute. Inflorescence axillary racemes and terminal, bracts caducous. Calyx shortly toothed, hairy. Corolla purple, standard obovate. Pods 5-9 jointed, much intended along the lower sutures, slightly falcate and hairy.

Flowering & fruiting: August- November

Habitat & ecology: grows along the forest edges.

Voucher specimen: Lerie, Kohima district, Nagaland 1414 m 25^{o}38’57.84’’N 94^{o}6’45.684’’E, P. Konyak NU-PK-951.

Distribution: world: Asia- Bhutan, Nepal. India: Arunachal Pradesh, Bihar, Meghalaya, Sikkim, West Bengal.

Desmodium gangeticum (L.) DC., Prodr 2: 327, 1825; Baker in Hook.f., Fl. Brit. India 2: 168, 1876; Van Meeuwen, Reinwardtia 6: 249, 1962; Kanjilal *et al.*, Fl. Assam 2: 55, 1938; Sanjappa Legum. India. 153, 1992.

An erect shrubs, 1m tall, branching alternate, pilose. Leaves 1-foliolate, petiole 1-2 cm long. Stipules lanceolate 8mm, stipels linear 4mm, densely pilose. Leaflets 5-9.5 x 2-3 cm long, elliptic, ovate or lanceolate, margin entire, abaxially sparsely gray villous, adaxially glabrous except for hairy mid-veins, base rounded, apex acute. Raceme terminal or axillary or panicles, 10- 30 cm long. Corolla purple. Pods linear, slightly falcate 1.2- 2 cm long, lower suture deeply intended, upper slightly constricted between seeds, hooked hairs. 4- 6 jointed.

Flowering & fruiting: August- November

Habitat & ecology: grows along the forest margin or roadside.

Voucher specimen: Kidima, Kohima district, 1448 m 25^{o}33’20.155’’N 94^{o}10’39.634’’E, P. Konyak NU-PK-02.

Distribution: World: Africa, Pakistan, Sri Lanka, Nepal, Bhutan, Myanmar, China, Australia. India: Throughout in Himalayas, Nagaland.

Desmodium velutinum (Willd.) DC., Prodr. 2: 328, 1825; Sanjappa Legum. India 165, 1992; *Hedysarum velutinum* Willd., Sp. Pl. 3: 117, 1803; *Desmodium latifolium* (Roxb.) DC., Prod. 2: 327, 1825; Baker in Hook.f. Fl. Brit. India 2: 168, 1876; Kanjilal *et al.*, Fl. Assam 2: 56, 1938

Subshrubs or shrubs, branches densely yellow-brown velutinous and short hooked hairs. Leaves 1-foliolate, alternate. Leaf pedicel 5mm- 1.5 cm, densely velutinous. Leaflets 7-8 x 4- 5.5 cm, ovate, broadly ovate, acute. Stipules 9mm, hairy, triangular or lanceolate. Inflorescence at axillary raceme or terminal 8-10 cm long. Corolla purple or pink, standard obovate-orbicular, wings auriculate, keel narrow. Legume narrowly oblong 1.5- 2.5 cm, indented along both sutures, densely pubescent.

Flowering & fruiting: April- June

Habitat & ecology: grows along the forest margin in sub-tropical forest, along roadside.

Voucher specimen: Peducha, Kohima Nagaland, 924 m, 25^{o}45’35.557’’N 94^{o}03’11.031’’E P. Konyak NU-PK-07

Distribution: World: Africa, China, Indonesia, Thailand, Nepal, Vietnam. India: Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Gujarat, Himachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland.

Desmodium laxiflorum DC. Ann. Sci. Nat 4: 100, 1825; Baker in Hook. f. Fl. Brit. India 2: 164, 1876; Kanjilal *et al*., Fl. of Assam 2: 48, 1938; Sanjappa Legum. India. 156, 1992.

An erect herbs or sub-shrubs. Stem adppressed hairy, alternately branch. Leaves 3-foliolate, stipules persistent, petioles 2-4 cm long. Leaflets ovate or ovate elliptic, sericeous, terminal larger, laterals ovate or lanceolate, shortly acuminate. Inflorescence at terminal or axillary raceme. Calyx densely villous. Corolla purple, standard broadly obovate, wings auriculate and clawed, keel clawed. Legume 2-3 cm long, flat, with dense minute sticky hairs. 6-8 jointed, intended in both the sutures. Nodules present.

Flowering & fruiting: September- November

Habitat & ecology: grows along roadside in open space

Voucher specimen: Jhakhama, Kohima district, Nagaland, 1663 m 25°35’23.424’’N 94°7’25.751’’E, P. Konyak NU-PK-164.

Distribution: world: China, Bhutan, Bangladesh, Pakistan, Nepal, Myanmar, Thailand, Vietnam. India: Almost throughout. Nagaland.

Desmodium heterocarpon (L.) DC. Prodr. 2: 337, 1825; Grierson & Long Fl. Bhut. 1.3: 674, 1876; Sanjappa Legum. India 154, 1992; *Desmodium polycarpum* DC. Baker in Hook. f. Fl. Brit. India 2: 171, 1878; Kanjilal *et al*., Fl. of Assam 2: 54, 1938.

Prostrate or erect herb or shrubs. Stem densely covers with hairs, alternate branching. Leaves 3- foliolate, white pubescent. Petioles 2.5- 3cm long. Stipules lanceolate, 1 cm long. Leaflets terminal 3-5 x 2-3 cm, laterals 2.5- 4 x 1.5- 2 cm, elliptic or broadly obovate, base obtuse, apex rounded, emarginate. Raceme axillary or terminal, 3-7 cm long, rachis covered white hairs. Corolla purple, petals 4-5 mm. Legume 2- 2.5 cm long, densely hooked hairs, intended in lower sutures, 4-7 jointed.

Flowering & fruiting: September- November

Habitat & ecology: grows along roadside or forest edges.

Voucher specimen: Khonoma, Kohima district, Nagaland 1288 m 25°39’26.964’’N 94°1’9.156’’E, P. Konyak NU-PK-186.

Distribution: Australia, America, Africa, most of South-east Asia. India: Throughout. Nagaland.

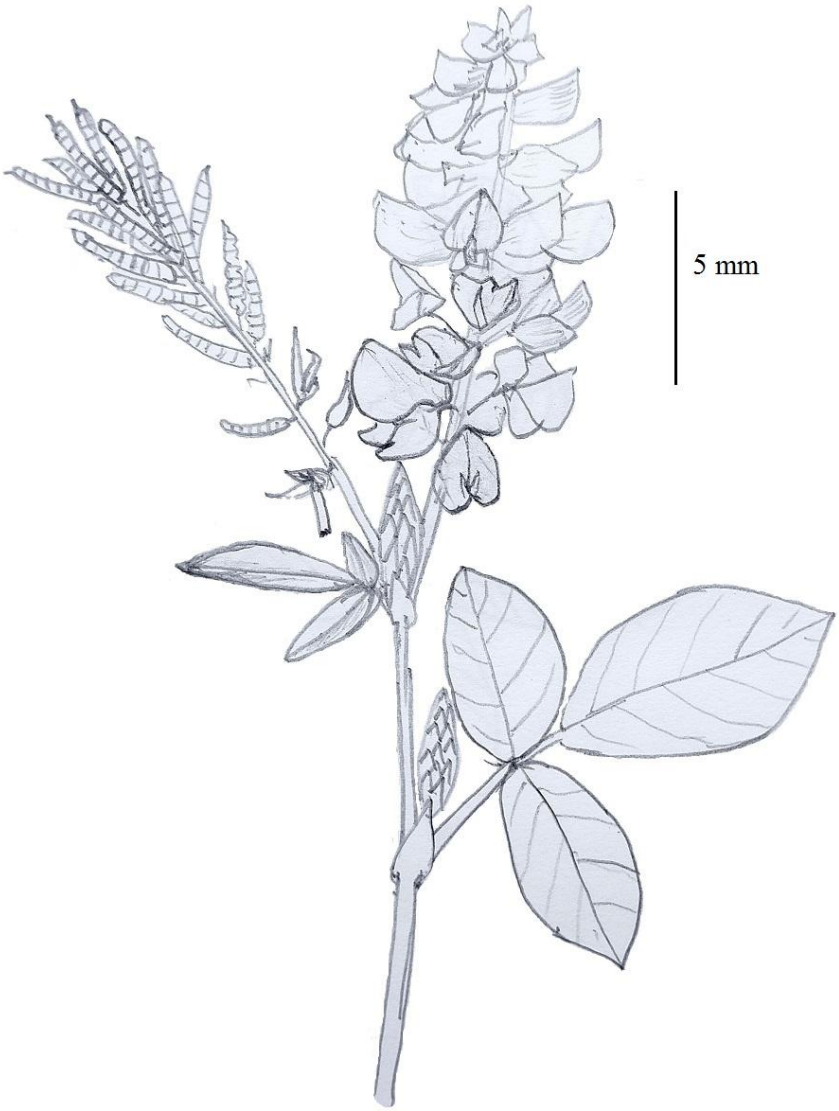


Fig.9. *Desmodium heterocarpon* (L.) DC.

Desmodium sequax Wall. Pl. Asiat. Rar 2: 46, 1831; Baker in Hook. f. Fl. Brit. India 2: 170, 1876; Kanjilal et al., Fl. Assam 2: 49, 1938; Sanjappa Legum. India 161, 1992.

A bushy shrubs of 1-2 m tall. Stem terete, hairy. Leaves 3-foliolate, hairy, petioles 1.5- 5 cm long. Leaflets 5-7 cm long, ovate, elliptic or rhomboid, densely pubescent beneath. Inflorescence in axillary or terminal raceme, numerous and drooping. Calyx lobed, hairy, teeth short. Corolla purple, standard elliptic, wings auriculate, clawed keels long clawed. Stamens monadelphous. Pods 4-5 cm long, indented in both sutures, densely clothed with hooked hairs. 10-17 jointed.

Flowering & fruiting: August – October

Habitat & ecology: grows along the edges of forest

Voucher specimen: Longwa, Mon district, Nagaland, 1325 m 26^{o}39’19’’N 95^{o}11’59’’E, P. Konyak NU-PK-180.

Distribution: world: New Guinea, China, Nepal, Bhutan, Indonesia. India: Punjab, Himachal Pradesh, Uttar Pradesh, West Bengal, North east states, Nagaland.

Desmodium heterophyllum (Willd.) DC. Prodr. 2: 334, 1825; Baker in Hook. f. Fl. Brit. India 2: 173, 1876; Kanjilal *et al*., Fl. of Assam 2: 61, 1938; Sanjappa Legum. India 155, 1992.

Runner, prostrate herbs, alternate branches. Stem red in color, pubescent. Leaves 3-foliolate, oblong, elliptic. Leaflets 0.5- 1.5 x 0.2- 0.5 cm, hairy, base cuneate or rounded, apex emarginated or truncate, blades entire. Inflorescence panicles or axillary racemes, solitary or 2. Corolla 1-2 cm long, purple, stamens diadelphous. Pods 1-2 cm long, falcate, intended in lower sutures, pubescent. 2-5 seeded.

Flowering & fruiting: June- August

Habitat & ecology: grows along the trail of forest in open grassland.

Voucher specimen: Mon, Mon district, Nagaland 749 m 26^{o}42’48.864’’N 95^{o}01’28.228’’E, P. Konyak NU-PK-693.

Distribution: World: Australia, China, Bangladesh, Myanmar, Phillipines, Sri.Lanka, Thailand, Vietnam. India: Peninsula, Andaman & Nicobar Island, throughout east India.

Desmodium microphyllum (Thunb.) DC. Prodr. 2: 337, 1825; Sanjappa Legum. India 157, 1992; *Desmodium parvifolium* DC. Baker in Hook. f. Fl. Brit. India 2: 174, 1876; Kanjilal *et al.*, Fl. Assam 2: 60, 1938.

A trailing prostrate herbs. Stem slender, alternate, covers with small tiny pilose. Leaves 3-foliolate or sometimes 1-foliolate. Leaf rachis filiform, 0.3- 0.5 cm long, little hairy, leaflets 0.1- 0.5 cm long, ovate, elliptic or obovate, glabrous. Raceme terminal, numerous, inflorescence solitary or more. Calyx lanceolate. Corolla bluish or purple 0.1 mm. Pods 2-4 jointed, indented between joints. Root nodules present.

Flowering & fruiting: September- November

Habitat & ecology: grows in forest edges in shady place

Voucher specimen: Mima, Kohima district, Nagaland 1340 m 25^{o}37’7.428’’N 94^{o}8’32.892’’E, P. Konyak NU-PK-960.

Distribution: world: China, Pakistan, Nepal, Bhutan, Myanmar, Japan, Sri Lanka. India: Throughout, Himalayas, Nagaland.

Desmodium griffithianum Benth., Pl. Jungh. 2: 222, 1852; Baker in Hook. f. Fl. Brit. India 2: 171, 1878; Sanjappa Legum. India 154, 1992; *Meibomia griffithiana* (Benth.) O. Kuntz, Rev. Gen. Pl. 1: 198, 1891.

Herbs, prostrate or ascending. Stem and branches covers with fine spreading yellow-brown hairs. Leaves 3- foliolate, petioles 1- 3 cm long, densely hairy. Leaflets obtriangular-ovate or obovate, 1-2.5 x 1-1.6 cm, glabrous above and pubescent beneath. Raceme terminal, peduncle 5- 10 cm long, hairy. Corolla purple or bluish. Legume deflexed, 1-1.5 cm long, lower suture constricted, 3-5 jointed with hooked hairs. Determinate root nodules present.

Flowering & fruiting: September- November

Habitat & ecology: grows in open space along the hill slope or roadside.

Voucher specimen: Mima, Kohima district, Nagaland 1345 m 25^{o}37’7.32’’N 94^{o}8’40.523’’E, P. Konyak NU-PK- 969.

Distribution: World: China, Laos, Vietnam, Myanmar, Thailand. India: Assam, Meghalaya, Manipur, Tripura, Nagaland.

Desmodium triflorum (L.) DC. Prodr. 2: 334, 1825; Baker in Hook. f. Fl. Brit. India 2: 173, 1876; Kanjilal *et al*., Fl. Assam 2: 60, 1938; Sanjappa Legum. India 163, 1992.

Herbs, prostrate runner. Stem reddish, slender, hairy, alternate branching. Leaves 3-foliolate. Leaflets 0.5- 0.8 cm long, ovate or obovate, glabrous, apex truncate, slightly emarginate. Inflorescence solitary or more in leaf axils. Calyx densely villous. Corolla purple or bluish, standard obcordate, wings elliptic shortly clawed, keels long clawed. Stamens diadelphous. Pods indented between the joints in both sutures, 2-4 jointed.

Flowering & fruiting: June- August

Habitat & ecology: grows along roadside.

Voucher specimen: Alichen, Mokokchung district, Nagaland, 1177 m 26^{o}15’28’’N 94^{o}26’90’’E, P. Konyak NU-PK-975.

Distribution: World: Africa, Australia, America, Asia India: Throughout, Nagaland.

Dumasia DC., Ann. Sci. Nat. Paris 4: 96, 1825

Slender twining herbs, hairy. Leaves pinnately 3- foliolate, stipels and stipules persistent. Inflorescence axillary raceme, bracts and bracteoles small. Calyx tubular, obliquely truncate. Corolla yellow, lower than calyx, standard obovate, glabrous, wings falcate-oblong, keels usually shorter than wings. Stamens diadelphous. Ovary linear, style filiform. Pods linear, dehiscent, compressed, not septate, cylindric calyx.

Dumasia villosa DC. , Ann. Sci. Nat. Paris, Ser.1, 4: 96, 1825; Baker in Hook.f. Fl. Brit. India 2: 183, 1878; Kanjilal et al., Fl. of Assam 2: 64, 1938; Sanjappa Legum. India 167, 1992.

A slender twining herbs, s tem villous. Stipules small, lanceolate. Petiole 3- 5 cm long, densely hairy, petiolules 2-3 mm, hairy. Leaflets 3.5- 5 x 2-3 cm, ovate or broadly ovate adpressed villous on both surface, base rounded, apex obtuse, mucronate. Racemes axillary, 4- 15 cm long, flowers cluster, bracts and bracteoles small. Calyx tube 10 mm,

adpressed hairy. Corolla yellow, subequal, standard obovate, wings and keels oblong-elliptic. Style long, hairy. Pods 2-3 cm long, linear, oblong, slightly constricted between seeds, yellow villous.

Flowering & fruiting: September – October

Habitat & ecology: grows in secondary forest

Voucher specimen: Lerie, Kohima district Nagaland 1480 m 25°39'7.2''N 94°6'54.045''E, P. Konyak NU-PK-18

Distribution: World: Africa, China, Myanmar, Sri Lanka, Nepal, Thailand. India: Arunachal Pradesh, Bihar, Himachal Pradesh, Manipur, Meghalaya, Sikkim, Nagaland.

Eriosema (DC.) G. Don, Gen. Hist. 2: 347, 1832

Perennial herbs or undershrubs. Stem simple, slender or little branch. Leaves 1-foliolate, simple, entire. Flowers solitary or two, axillary. Calyx campanulate, 5-toothed. Stamens diadelphous. Pods oblong or elliptic. Densely villous.

Eriosema himalaicum H. Ohashi, J. Jap. Bot. 41:96, 1966; Sanjappa Legum. India 172, 1992. *Eriosema chinense* auct non Vogel Baker in Hook. f. Fl. Brit. India 2: 219, 1876; Kanjilal *et al*., Fl. of Assam 2: 94, 1938.

Perennial herbs, erect upto 15-40 cm tall. Stem red or brown, densely covered with hairs, slender. Stipules linear. Leaves 1- foliolate, linear or lanceolate, spiral, hairy, axillary. Leaflets 1-3.5 cm x o.1- 0.3 cm. calyx campanulate. Corolla yellow 1 cm long. Legumes densely pubescent, oval or elliptic, 0.5- 1 cm long. Seeds 1 or 2, black, dehiscent.

Flowering & fruiting: August- October

Habitat & ecology: open grassland or open land edges of evergreen forest

Voucher specimen: Lerie, Kohima district, Nagaland 1400 m 25°38'53.804''N 94°6'49.982''E, P. Konyak NU-PK-690.

Distribution: world: Bhutan, China, Nepal India: Andhra Pradesh, Bihar, Manipur, Meghalaya, Nagaland, Sikkim, West Bengal.

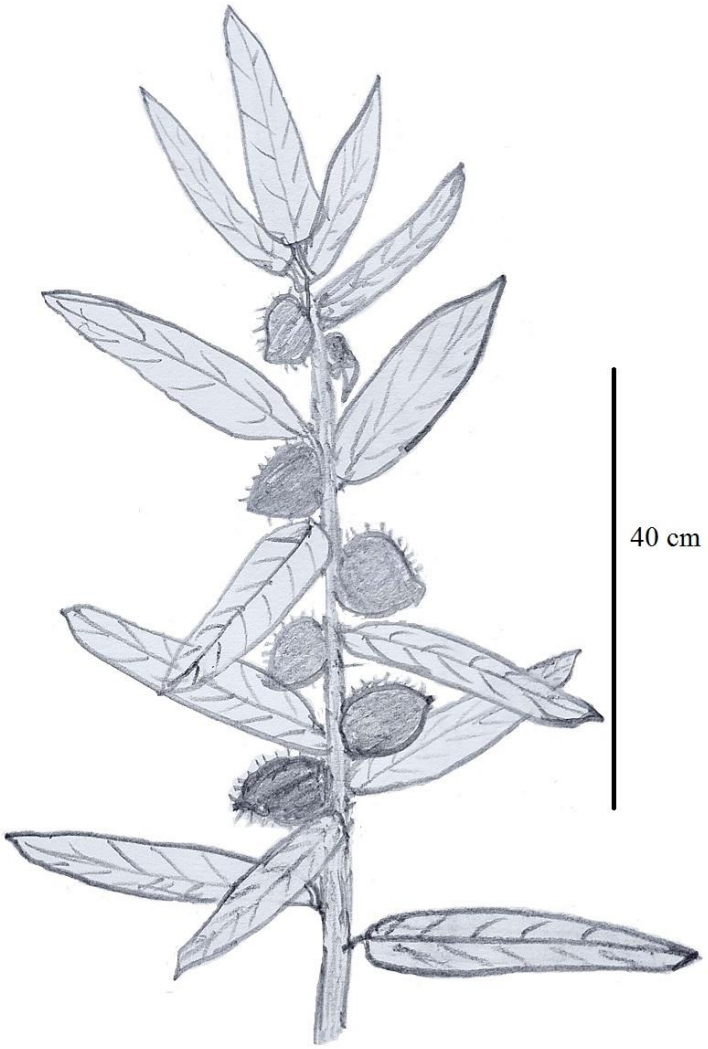


Fig.10. *Eriosema himalaicum* H. Ohashi

Erythrina L. Sp. Pl. 706, 1753

Trees or shrubs. Branches with few or many prickles. Leaves 3-foliolate, stipules small, stipels fleshy and glandular, leaflets entire. Inflorescence axillary or terminal, flowers conspicuous, bracts and bracteoles mostly deciduous. Calyx spathaceous or campanulate. Corolla red or orange, petals unequal, standard much exceeding the wings and the keels. Stamens 10, diadelphous, free or nearly so. Pods linear, septate between seeds.

Keys to species

1a. Calyx truncate or unequal 2- lobed. Terminal leaflets reniform. …….*E. arborescens*

1b. Calyx spathe-like, undivided. Terminal leaflets usually rhomboid. …… *E. stricta*

Erythrina arborescens Roxb. (Hort. Beng. 53. 1814, nom. nud.) Fl. Ind. 3: 256, 1832; Baker in Hook. f. Fl. Brit. India 2: 190, 1878; Kanjilal *et al*., Fl. Assam 2: 72, 1938; Grierson & Long Fl. Bhut. 1.3: 684, 1876; Sanjappa Legum. India 172, 1992.

Trees, trunk and branches with prickles. Stipules small, petioles long without prickles. Leaves 3-foliolate, large. Leaflets terminal reniform, laterals obovate or broadly cordate, glabrous, apex acute or shortly acuminate or rounded, base almost cordate. Raceme axillary, flowers in cluster. Calyx truncate or unequal 2-lobed. Corolla red, standard obovate-elliptic wings obliquely ovate, keels triangular ovate. Filaments slightly shorter than standard. Pods curved, 12-20 cm long, narrow in both ends.

Flowering & fruiting: September- December

Habitat & ecology: grows in evergreen forest.

Voucher specimen: Kigwema, Kohima district, Nagaland 1671 m 25^{o}35’48.084’’N 94^{o}7’27.156’’E, P. Konyak NU-PK- 156

Distribution: China, Nepal, Bhutan, Myanmar. India: Himalayas from Kumaon to Sikkim, Rajasthan, Meghalaya, Mizoram, Nagaland.

Erythrina stricta Roxb., (Hort. Beng. 53.1814, nom. nud) Fl. Ind. 3: 251, 1832; Baker in Hook. f. Fl. Brit. India 2: 189, 1878; Kanjilal *et al*., Fl. Assam 2: 70, 1938; Grierson & Long Fl. Bhut. 1.3: 683, 1876; Sanjappa Legum. India 173, 1992.

Trees with straight trunk, barks furrow, rough with strong whitish prickles. Branches with many short incurved prickles. Leaves 3-foliolate, stipules deciduous, petiole 12- 15 cm long, rarely with prickles. Leaflets large, terminal rhomboid, or broadly obovate, laterals oblique, all apex shortly acuminate or acute, base truncate or rounded, glabrous. Raceme 15- 20 cm long, flowers in cluster, flowering without leaves. Calyx spathaceous, undivided or apex slightly 2-lobed. Corolla red, standard elliptic-lanceolate or ovate-triangular, wings subobovate, keels much longer than wings. Legume 7- 12 cm long, glabrous.

Flowering & fruiting: March- July.

Habitat & ecology: grows in evergreen forest.

Voucher specimen: Longkhum, Mokokchung district, Nagaland 1134 m 26^{o}16’13.943’’N 94^{o}26’36.977’’E, P. Konyak NU-PK-195

Distribution: world: China, Nepal, Vietnam, Myanmar, Bangladesh, Bhutan. India: Orissa, Rajasthan, Arunachal Pradesh, Assam, Mizoram, Sikkim, Nagaland.

Flemingia Roxb. ex Ait. & Ait. F., Hort. Kew. Ed. 2, 4: 349, 1812

Shrubs or undershrubs, erect or trailing. Leaves digitately 3- foliolate or simple. Inflorescence axillary or terminal, racemose, bracteoles absent. Calyx 5-lobed, tube narrow. Corolla longer than calyx. Standard oblong or elliptic, wings narrow, auriculate. Stamens diadelphous. Legume oblong, elliptic, dehiscent. Seeds 1 or 2.

Flemingia macrophylla (Willd.) O. Kuntz ex Merr., Philippine J. Sci. Bot. 5: 130, 1910; Sanjappa Legum. India 176, 1992; Flemingia congesta Roxb. Kanjilal *et al* Fl. of Assam 2: 90, 1938.

A shrub of about 2-3 m tall, alternate branching, stem quadrangular. Leaves digitately 3- foliolate. Leaflets 8- 10 cm long, lanceolate, elliptic, acute or shortly acuminate at apex, glabrous. Inflorescence densely at axillary racemes of 9-10 cm long. Calyx campanulate. Corolla purple or pink or white striking with pink, 1-2 cm long.

Legume 2 cm long, ovoid-ellipsoid, form in cluster at apex, green or pinkish color. 2 seeded, dehiscent.

Flowering & fruiting: September - November

Habitat & ecology: grows in evergreen forest.

Voucher specimen: Khonoma, Kohima district, Nagaland 1271 m, 25°65'77''N 94°01'92''E, P. Konyak NU-PK-187.

Distribution: world: Australia, Africa, China, Bangladesh, Bhutan, Nepal, Pakistan, Myanmar, Sri Lanka. India: Throughout, in Himalayas, Nagaland.

Glycine Willd., Sp. Pl. 3: 1053, 1802

Annual herbs, erect, twining or climber. Leaves pinnately 3- foliolate, leaflets entire, stipellate, stipules small, free, deciduous. Inflorescence at axillary, racemose, flowers solitary or clustered in nodes. Bracts small, at peduncle base, bracteoles paired at calyx base. Calyx campanulate, 5- toothed. Corolla light purple or purple, slightly longer than calyx. Stamens usually monadelphous. Pods oblong, slightly septate, dehiscent.

Glycine max (L.) Merr., Interpr. Rumph. Herb. Amboin. 274, 1917; Sanjappa Legum. India 182, 1992; Grierson & Long Fl. Bhut. 1.3: 693, 1876; *Glycine soja auct.* Non Sieb. & Succ. 1843; Baker in Hook,f, Fl. Brit. India 2: 184, 1878.

Annual herbs, twining or erect, brown hirsute stem. Leaves 3-foliolate, stipules 7mm, broadly ovate. Petioles 7-20 cm long, pubescent. Leaflets 5-9 x 3-6 cm, acute apex, base cuneate or rounded, appressed pubescent. Racemes 5-8 flowered, bracteoles 3 mm. Calyx 5-7 mm, hirsute. Corolla purple or white, wings narrowly oblong longer than keel. Pods 4-5 cm, oblong, hirsute. Seeds creamy white.

Flowering & fruiting: September- October

Habitat & ecology: widely cultivated for legume seeds

Voucher specimen: Shiyong, Mon district, Nagaland 1052 m 26°42'27.706''N 94°52'22.195''E, P. Konyak NU-PK- 11.

Distribution: World: Africa, Asia, Australia, Central America, Europe, North America, South America. India: Cultivated widely. Nagaland.

Hylodesmum H. Ohashi & R. R. Mill. Edinburgh J. Bot. 57: 173, 2000

Perennial herbs or undershrubs. Leaves pinnately compound, 3-7 foliolate. Leaflets entire or slightly undulate. Stipules and stipels present. Racemes axillary or terminal or panicles. Calyx campanulate, 4- or 5-lobed. Stamens monadelphous. Legume 2-5 jointed.

Keys to species

1a. Stem glabracent. Leaf margins entire. Corolla purple……*H. podocarpum*

1b. Stem densely pubescent. Leaf slightly repand. Corolla bright red……. *H. repandum*

Hylodesmum podocarpum (DC.) H. Ohashi & R.R. Mill. Edinburgh J. Bot 57:181, 2000; *Desmodium podocarpum* (Thunb.) DC. Baker in Hook. f. Fl. Brit. India 2: 165, 1876; Sanjappa Legum. India 159, 1992; *Desmodium racemosum* (Thunb.) DC. Kanjilal *et al*., Fl. Assam. 2: 50, 1938.

Herbs, 50- 100 cm tall. Stem dark red, glabrous. Leaves 3- foliolate, alternately arranged leaf stalk. Leaflets terminal larger, broadly ovate or rhomboid- ovate or obovate, apex acute, laterals smaller, ovate, margin entire. Inflorescence axillary and terminal racemes. Calyx short, corolla light purple, standard broadly obovate, 2- flowered in one node. Pods deeply indented in lower sutures, 2- jointed, with minute hairs.

Flowering & fruiting: August- October

Habitat & ecology: grows along the forest edges.

Distribution: world: China, Nepal, Pakistan, Japan. India: Temperate and tropical Himalayas upto 2400 m, Meghalaya, Nagaland.

Voucher specimen: Longwa, Mon district, Nagaland 1325 m 26^{o}39’18’’N 95^{o}11’61’’E, P. Konyak NU-PK- 698

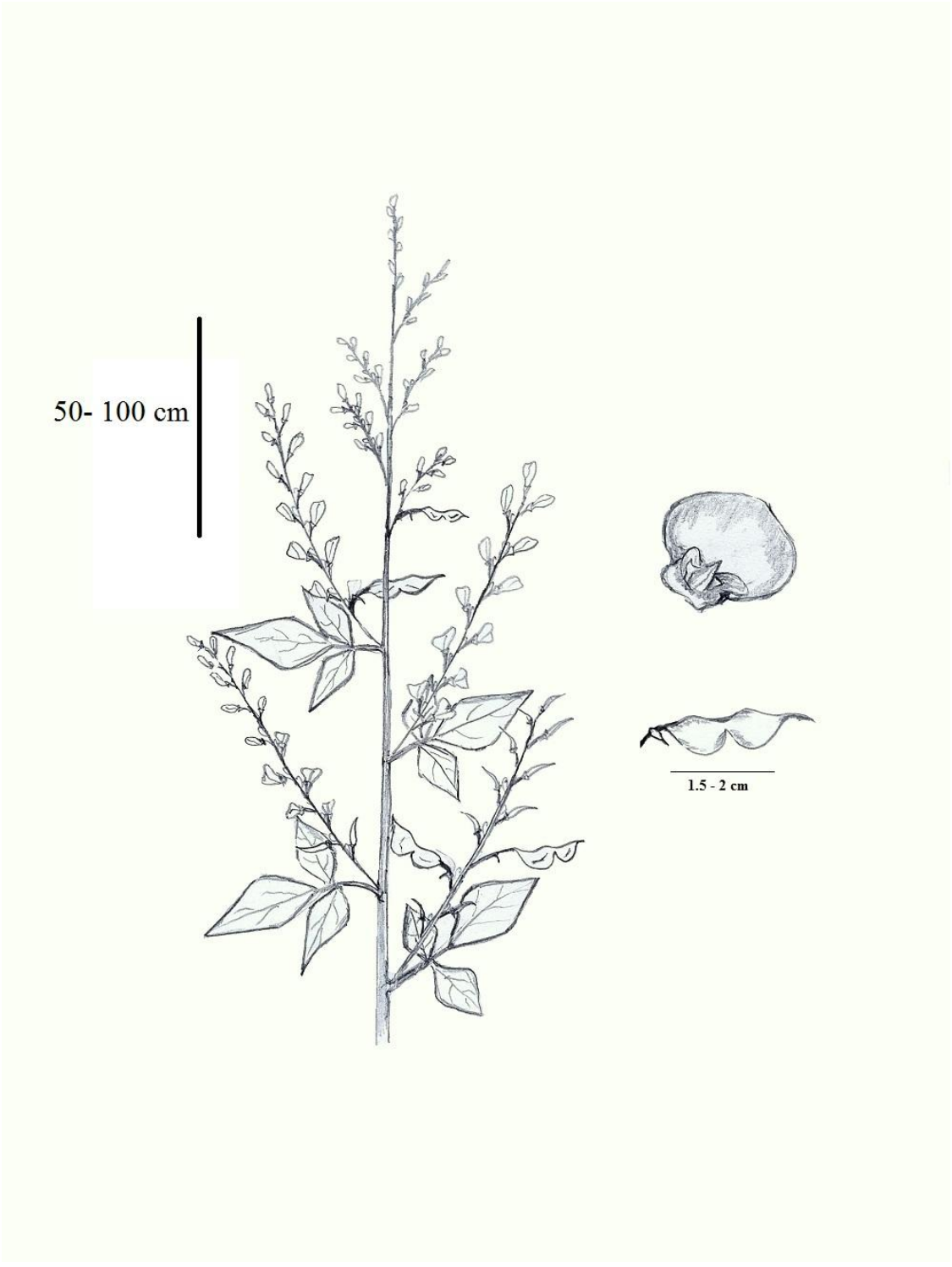


Fig.11. *Hylodesmum podocarpum* (DC.) H. Ohashi & R. R. Mill

Hylodesmum repandum (Vahl) H. Ohashi & R.R. Mill Edinburgh J. Bot. 57: 185, 2000; *Desmodium scalpe* DC. Baker in Hook. f. Fl. Brit. India 2:165, 1876; Kanjilal *et al*., Fl. of Assam 2: 53, 1938; *Desmodium repandum* (Vahl.) DC. Legum. India 161, 1992.

Herbs or undershrubs, 2-4 ft tall. Stem woody hard, slender, hairy. Leaves 3-foliolate, stipules .5- 1 cm long. Leaflets rhomboid or ovate. Inflorescence racemes or panicles, terminal, 25-30 cm long, covers with white pubescent. Pedicels 1-2 cm long, filiform. Bract caduceus, calyx 2.5 mm long. Corolla bright red or orange, .5-1 cm long. Pods densely pubescent, sickle shaped, one side deeply indented. 2-3 seeded.

Flowering & fruiting: September- November

Habitat & ecology: grows along roadside, rarely found.

Voucher specimen: Khuzama, Kohima district, Nagaland 1622 m 25^{o}32’35.124’’N 94^{o}7’37.488’’E, P. Konyak NU-PK-680.

Distribution: world: Africa, Australia, Bhutan, China, Thailand, Myanmar, Sri Lanka. India: Arunachal Pradesh, Gujarat, Manipur, Meghalaya, Rajasthan, Nagaland.

Indigofera L., Sp. Pl. 2:751, 1753

Shrubs or under-shrubs, rarely perennial herbs or trees usually bearing appressed medifixed, branch hairs. Leaves imparipinnate, rarely 1-foliolate or 3-foliolate. Leaflets opposite, stipules small, simple, oblong. Inflorescence densely in axillary racemes, calyx tube campanulate, tooth-5, subequal. Corolla purple or pink, standard ovate. Stamens diadelphous. Pods cylindrical, linear oblong, turgid, tranverse.

Keys to species

1a. Leaves rachis 10-20 cm long, 3-15 numbers leaves, pods 2-5 cm long……...*I. atropurpurea.*

1b. Leaves rachis 7- 10 cm long, 13-17 numbers leaves, pods 2- 2.5 cm long……*I. nigrescens.*

Indigofera atropurpurea Buch.-Ham. Ex Horn., Hort. Hafn. Suppl. 152, 1819; Baker in Hook. f. Fl. Brit. India 2: 101, 1876; Grierson & Long Fl. Bhut. 1.3: 667, 1876; Kanjilal *et al*., Fl. of Assam 2: 20, 1938; Sanjappa Legum. India 185, 1991.

Shrubs, 3-4 ft tall, alternate branching. Stem brown, terete, angular with appressed brown or white medifixed. Leaves rachis 10-20 cm long, imparipinnate with 3-15 foliolate, petioles 0.5 cm long. Leaflets 2.5 – 3 x 1.5-2 cm, elliptic, oblong, light green, glabrous. Inflorescence at axillary racemes, of 12-20 cm long. Stipules 4 mm. Corolla deep purple or pink, standard larger, elliptic. Legumes cylindrical, straight, terete 2-5 cm long.

Flowering & fruiting: August- September

Habitat & ecology: grows in sub- tropical forest along the forest edges.

Voucher specimen: Jotsoma, Kohima district, Nagaland, 1189 m, 25°41'2.976''N 94°3'15.876''E, P. Konyak NU-PK-958.

Distribution: world: China, Bhutan, Bangladesh, Nepal, Myanmar. India: Himalayas, Kashmir to Arunachal Pradesh, Manipur, Meghalaya, Nagaland, Punjab.

Indigofera nigrescens Kurz ex King & Prain, J. Asiat. Soc. Beng. 67: 286. 1898; Kanjilal *et al*., Fl. of Assam 2: 21, 1938; Sanjappa Legum. India 193, 1992.

A shrub of about 1 m tall. Stem brown or green, alternate branching, rough, brown appressed medifixed. Leaves rachis 7- 16 cm long, pulvinous, imparipinnate, 9-17 foliolate. Leaflets 2-3 x 1-1.5 cm, glabrous, elliptic or oblong, dark green, base cuneate or rounded, apex obtuse or mucronate. Inflorescence at axillary racemes upto 20 cm long, clustered. Corolla purple or pink, standard obovate. Legumes linear- oblong, straight, rigid, cylindrical 2-2.5 cm long.

Flowering & fruiting: August- October

Habitat & ecology: Along roadside, rarely occurs.

Voucher specimen: Viswema, Kohima district, Nagaland 1619 m 25°34'25.392''N 94°7'23.916''E, P. Konyak NU-PK-163.

Distribution: world: China, Nepal, Myanmar, Thailand, Vietnam. India: Arunachal Pradesh, Manipur, Meghalaya, Nagaland.

Kummerowia Schindl., Repert. Spec. Nov. Regni Veg. 10: 403, 1912

Herbs or trailing runners. Leaves 3-foliolate, alternately arranged, leaflets visible venation, stipules membranous, ciliate, large and persistent. Flowers 1 or 2, fascicled in

axils of leaves, calyx 5-lobed. Corolla purple or pink, early deciduous. Stamens diadelphous. Pods small, obovate, compressed.

Kummerowia striata (Thunb.) Schindl., Repert. Spec. Nov. Regni Veg. 10: 403, 1912; Lezpedeza striata (Thunb.) Hook. & Arn. Sanjappa Legum. India. 204, 1992.

Prostrate herbs. Stems and branch-lets covers with white hairs pointing downwards, alternate branchlets. Stipules ovate or oblong, ciliate. Leaves 3-foliolate, densely venation, oblong. Inflorescence 1, closed to leaves axils, calyx 5-lobed. Corolla purple, stamens diadelphous. Pods at short pedicels, small, obovate, compressed. 1-seeded.

Flowering & fruiting: August- October

Habitat & ecology: grows along roadside.

Voucher specimen: Mima, Jotsoma, Kohima district, Nagaland, 1345 m 25^{o}37’7.32’’N 94^{o}8’40.523’’E, P. Konyak NU-PK-961.

Distribution: world: USA, China, Russia, Japan. India: Meghalaya, Nagaland.

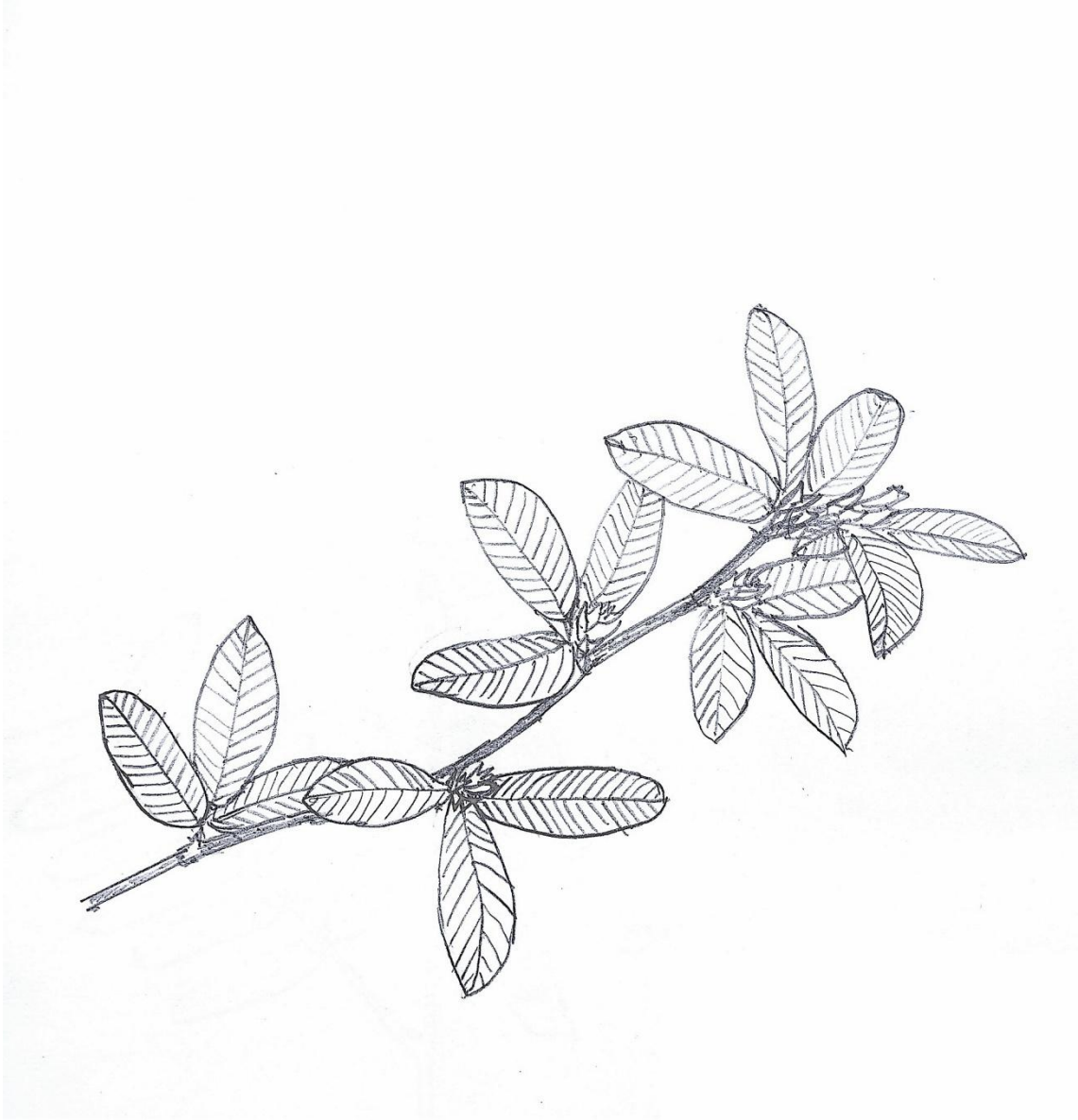


Fig.12. *Kummerowia striata* (Thunb.) Schindl.

Lablab Adans. Fam. Pl. 2:325, 1763

Twining perennial herbs. Leaves pinnately 3- foliolate, leaflets entire, stipules and stipel small. Flowers in axillary racemes, calyx campanulate, tooth short. Corolla purple or white in cluster, stamens diadelphous. Pods straight or curved, compressed.

Lablab purpureus (L.) Sweet, Hort. Brit. 481, 1826; Grierson & Long Fl. Bhut. 1.3: 698, 1876; Sanjappa Legum. India 199, 1992; *Dolichos lablab* L. Baker in Hook. f. Fl. Brit. India 2:209, 1876; Kanjilal *et al.,* Fl. of Assam 2:86, 1938.

Herbaceous twining climbers. Stem terete, purplish brown color. Stipules lanceolate. Leaves 3-foliolate, rough, covers with hairs. Leaflets, terminal larger, deltoid-ovate, laterals oblique, base subtruncate, apex acute or acuminate. Inflorescence in cluster at each nodes terminally. Corolla light or dark purple. Pods 3-5 cm long, flat, oblong-falcate, beaked at apex.

Flowering & fruiting: September- October

Habitat & ecology: Cultivated or spreading in fallow land

Voucher specimen: Dzüdza, Kohima district, Nagaland, 962 m 25^{o}42’20.268’’N 94^{o}2’32’’E, P.Konyak NU-PK-681.

Distribution: Tropics of old world India: Cultivated throughout, Nagaland.

Mastersia Benth. in Benth. & Hook.f., Gen. Pl. 1: 535. 1865

Woody climber. Leaves 3- foliolate, stipules caducous. Leaflets entire, large, stipellate. Racemes axillary or terminal. Flowers in cluster of 2 – 3 at small nodes, bracts 2, deciduous, bracteoles obovate, sheathing base of calyx, persistent. Calyx tube, teeth lanceolate, the upper two united into a broad entire lip. Petals shortly clawed, standard suborbicular, wing oblique, oblong, keel broad, and incurved. Stamens diadelphous. Pods oblong, compressed.

Mastersia assamica Benth., Trans. Linn. Soc. 25: 300, t. 34. 1865; Sanjappa Legum. India 208, 1992; Grierson & Long Fl. Bhut. 1.3: 694, 1876; *Masteria cleistocarpa* Baker in Hook.f., Fl. Brit. India 2: 195, 1876.

Woody climbers. Leaves pinnately 3- foliolate. Stipels 8mm, linear. Rachis 6- 15 cm, long. Leaflets 8- 15 x 6- 13 cm, ovate, elliptic, acuminate, base rounded, glabrous

above, appressed pubescent beneath. Racemes axillary and terminal, 30- 35 cm, long. Inflorescence borne in cluster, bracts 8 mm, ovate- lanceolate. Calyx tube 4-5 mm. Corolla purplish red 10- 18 mm, standard suborbicular, keel obtuse. Stamens diadelphous. Pods thinly coriaceous 10- 12 x 2.5-3 cm, glabrous, flat, blackish when matured. Seeds oblong, black.

Flowering & fruiting: September- November

Habitat & ecology: grows in sub-tropical forest.

Voucher specimen: Longkhum, Mokokchung, Nagaland, 1054 m, 26°14'09''N 94°25'09''E, P.Konyak NU-PK-12

Distribution: World: China, Bhutan, Myanmar. India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Tripura, West Bengal.

***Meizotropis* voight.**

Perennial herbs, shrubs or trees. Leaves pinnately 3- foliolate. Leaflets large, entire. Stipules deciduous. Flowers clustered in axillary racemes or panicles. Calyx campanulate, teeth short. Corolla large or medium size, exerted, petals subequal in size. Stamens diadelphous. Pods compressed, not dehiscent.

Meizotropis buteiformis Voigt, Hort. Suburb. Calcutt. 239, 1845; *Butea buteiformis* (voight) Grierson & Long Fl. Bhut. 1.3: 687, 1876; *Butea minor* Ham. Baker in Hook. f., Fl. Brit. India 2: 195, 1876; Kanjilal *et al*., Fl. of Assam 2: 74, 1938.

An erect woody shrubs of 2-3 m tall. Stem cylindrical, brown or grey, rough, alternate branching. Leaves 3- foliolate, hairy, rough. Leaf petioles 10-20cm long. Leaflets 15-20cm long x 7-13cm broad, ovate or obovate. Inflorescence numerous or clustered at racemes. Calyx .8 cm long, teeth short. Corolla coral red or orange, standard recurved, 1.5cm, wings falcate 1.3cm, keel 1.7cm, ovate. Stamens diadelphous. Pods 7-10cm long x 2-3cm broad, flat, tomentose or with brownish hairs, not dehisced.

Flowering & fruiting: August- October

Habitat & ecology: grows in open hillocks, alongside road in undisturbed edges.

Specimen examined: Viswema, Kohima district, Nagaland, 1625 m 25°32'.076''N 94°07'28.667''E, P. Konyak NU-PK-154.

Distribution: World: Bangladesh, Bhutan, Myanmar, Nepal India: Arunachal Pradesh, Assam, Bihar, Jammu- Kashmir, Manipur, Meghalaya, Mizoram, Nagaland, Tripura, Uttar-Pradesh, West Bengal.

Millettia Wight & Arn., Prodr. Fl. Ind. Orient. 1: 263, 1834

Trees, woody climbers or shrubs. Leaves imparipinnate, opposite or sub opposite, stipels absent or present, stipules small, caducous or persistent. Inflorescence in axillary or terminal panicles. Calyx campanulate, corolla spreading or reflexed, wings oblong free from keels. Stamens monadelphous or diadelphous, anthers uniform. Pods oblong, flat or turgid or constricted between seeds.

Keys to species

1a. Legumes valves thick, covered with yellow warts…….. *M. pachycarpa*

1b. Legumes valves flat, without warts

2a. Medium size trees. Legumes 4-5 cm long, thick…….*M. pinnata*

2b. Woody erect shrub. Legumes 5-8 cm long, flat, compressed.…*M. pulchra*

Millettia pachycarpa Benth., Pl. Jungh. 2: 250, 1852; Baker in Hook. f. Fl. Brit. India 2: 106, 1876; Grierson & Long Fl. Bhut. 1.3: 658, 1876; Haridasan & Rao, Fl. Megh 1: 305, 1985; Kanjilal et al., Fl. of Assam 2: 27, 1938; Sanjappa Legum. India 213, 1992.

Large woody lianas, bark brown. Leaves imparipinnate 13-17 foliolate, rachis 30-50 cm long. Leaflets elliptic-oblong to lanceolate oblong, base rounded, apex acute or obtuse, glabrous, abaxial brown sericeous. Inflorescence at axillary racemes, corolla purple or lilac. Legume dark brown, valves thick, densely covered with yellow warts, 12-15 cm long, oblong. 3-5 seeded seeds ca. 3 cm, reniform.

Flowering & fruiting: June- October

Habitat & ecology: grows in evergreen forest covering canopy of other trees.

Voucher specimen: Mokokchung village, Mokokchung district, Nagaland 1206 m 26°18’47.999’’N 94°32’19.968’’E P. Konyak NU-PK-182.

Distribution: world: China, Nepal, Bangladesh, Bhutan, Thailand, Myanmar. India: East-Himalayas, Arunachal Pradesh, Assam, Manipur, Meghalaya, Sikkim, West Bengal, Nagaland.

***Millettia pinnata* (L.) Panigrahi,** Fl. Bilaspur District 1: 210, 1989; *Pongamia pinnata* (L.) Pierre, Fl. Forest Cochinch Subt. 385, 1899; *Pongamia glabra* Vent., Jard. Malm. 1: 28, t. 28. 1803; Baker in Hook.f. Fl. Brit. India 2: 240, 1876.

Trees about 8- 15 m tall. Branchlets glabrescent, with minute cinereous lenticels. Leaves imparipinnate 5 or 7 foliolate. Rachis 20- 25 cm long, petiole 5- 6 cm long, petiolules 6- 8 mm. Leaflets 5-10 x 4-8 cm, ovate, broadly elliptic or oblong, light green color, leathery, base rounded, broadly cuneate or truncate, apex rounded to acuminate. Inflorescences axillary, 15- 20 cm, pedicels 5- 8 mm, calyx campanulate. Corolla white or pink, standard orbicular, wings oblong, keels falcate. Stamens 10. Pods ellipsoid to oblong, flat 4-5 x 1.5- 2.5 cm, indehiscent, apex shortly beaked.

Flowering & fruiting: May- June

Habitat & ecology: grows in lower elevation areas.

Voucher specimen: Tizit, Mon district, Nagaland, 96 m 26°55’32.93’’N 95°03’36.504’’E P. Konyak NU-PK-678.

Distribution: World: Pakistan, Sri Lanka, Bangladesh, Malesia, Australia. India: almost throughout, Nagaland.

Millettia pulchra Kurz, J. Asiat. Soc. Bengal. 42: 69, 1873; Baker in Hook. f. Fl. Brit. India 2: 104, 1876; Haridasan & Rao, Fl. Megh 1: 306, 1985; Sanjappa Legum. India 214, 1992.

Woody shrubs, alternate branching. Leaves imparipinnate, 13-21 foliolate, rachis 15-20 cm long, pulvinous at base, leaf pedicels 3mm. Leaflets 3-5 x 1-2 cm, elliptic or elliptic lanceolate, acute at both ends. Inflorescence in axillary racemes, corolla pale purple. Stamens monadelphous. Pods flat, compressed, young pubescent, glabracent, 5-8 cm long. 2-3 seeded.

Flowering & fruiting: April- August

Habitat and ecology: grows alongside of forest edges in open space.

Voucher specimen: Khonoma, Kohima district, Nagaland, 1288 m 25°39'26.964''N 94°1'9.156''E, P. Konyak NU-PK-189.

Distribution: world: China, Bangladesh, Myanmar. India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Nagaland.

Mucuna Adans. Fam. 2: 325, 579, 1763

Perennial or annual vines, lianas or herbs. Leaves pinnately 3- foliolate, stipels usually present, stipules small, caducous. Leaflets entire, laterals asymmetric. Inflorescence at racemes, axillary or borne on old stem. Calyx campanulate, 2-lobed. Corolla dark purple, violet, red, standard usually shorter than wings and keels. Stamens diadelphous. Pods oblong, curved, densely bristles, dehiscent.

Keys to species

1a. Large woody climbers. ……..…..*M. imbricata*

1b. Semi-woody vines.

2a. Pods cover with brown irritant, indehisced……..…*M. pruriens*

2b. Pods covers with white silky hairs……..…*M. pruriens var. utilis*

Mucuna imbricata DC. Prodr. 2: 406, 1825 ex Baker in Hook. f. Fl. Brit. India 2: 185, 1878; Kanjilal *et al*., Fl. of Assam 2: 66, 1938; Grierson & Long Fl. Bhut. 1.3: 686, 1876; Haridasan & Rao, Fl. Megh 1: 308, 1985.

Large woody climber. Leaves 3- foliolate, large. Leaflets 15- 20 cm long, ovate or rhombic, acute, mucronate, base rounded or cuneate, glabrous or brown appressed hairs. Inflorescence sometimes arises from old wood up to 20 cm long. Calyx tube broadly, campanulate. Corolla dark purple. Pods 7- 12 cm long, oblong- elliptic, with 2 oblique lamellae, surface with longitudinal section, lamella covered with brown irritant bristles, dehiscent. Seeds 2, discoid.

Flowering & fruiting: June- October

Habitat & ecology: in dense evergreen forest.

Voucher specimen: Mangmetong, Mokokchung district, Nagaland 1209 m 26°16’35.991’’N 94°25’43.335’’E, P. Konyak NU-PK-183.

Distribution: World: Bangladesh, Bhutan, Myanmar. India: Tropical Himalayas from Kumaon to eastwards of 1500m, Andaman Islands, Assam, Bihar, Manipur, Mizoram, Nagaland.

Mucuna pruriens (L.) DC. Prodr. 2:405, 1825; Baker in Hook. f. Fl. Brit. India 2: 187, 1878; Grierson & Long Fl. Bhut. 1.3: 687, 1876; Sanjappa Legum. India 217, 1992.

Semi-woody twining vines. Stem and branchlets slender, hairy. Leaves 3- foliolate, petiole 15- 25 cm long, hairy like stem. Leaflets elliptic or ovate 6- 15 x 5- 10 cm long, obtuse or acute, rounded at base, hairy when young, later glabrous. Inflorescence axillary, 15- 30 cm long, pendulous. Calyx with dense soft adpressed hairs, tube, 2-lobed. Corolla deep purple. Legume linear-oblong, swollen, S-shaped, densely covered with orange or brown irritant caducous bristles, margin thickened.

Flowering & fruiting: September- November

Habitat & ecology: grows in disturb areas along roadside.

Voucher specimen: Dzüdza, Kohima district, Nagaland 979 m 25°41’36.06’’N 94°2’43.403’’E, P. Konyak NU-PK-682.

Distribution: Pantropical. India: Throughout, Nagaland.

Mucuna pruriens* var**. ***utilis (Wall. Ex Wight) Baker ex Burck., Ann. Jard. Bnitenz. 11:187, 1893; *Mucuna capitata* (Roxb.) Wight & Arn., Prod. 255, 1834; Baker in Hook.f., Fl. Brit. India 2: 187, 1876;

Climbers, stem with sparse long fine spreading hairs. Leaflets 5-13 x 5-8 cm, ovate, obtuse or acute, rounded at base, appressed pubescent. Petioles 15-20 cm long. Raceme 5-25 cm, calyx tube 5-7 mm, appressed pubescent with long fine brown bristles. Corolla purple or white. Pods s-shaped, 6-8 cm long, covers with silky white hairs, turgid, valves thick. Seeds 6-8, oblong-ellipsoid.

Flowering & fruiting: August- October

Habitat & ecology: cultivated for legumes.

Voucher specimen: Khar, Mokokchung district, 880 m 26°28’49.048’’N 94°27’43.56’’E, P. Konyak NU-PK- 09

Distribution: World: Sri Lanka- widely cultivated in tropics. India: Himalayas, Bihar, Haryana, Madhya Pradesh, Sikkim, West Bengal, Nagaland.

Ormosia Jack., Trans. Linn. Soc. London10: 360, 1811

Medium size evergreen trees. Leaves imparipinnate, leaflets coriaceous, entire, lanceolate. Stipels absent, stipules small. Racemes axillary or terminal. Calyx campanulate, teeth-5. Stamens free. Pods ellipsoid, valve thick, dehiscent, seeds 1 or 2.

Ormosia robusta (Roxb. ex Wight) Voigt, Hort. Suburb. Calcutt. 205, 1845; Baker in Hook. f. Fl. Brit. India 2: 258, 1878; Kanjilal et al., Fl. of Assam 2:118, 1938.

A small medium size tree of about 25-30 ft tall. Bark spotted green or brown, alternate branching. Leaves imparipinnate, 7-9 foliolate. Leaves rachis 7-10 cm long, pedicels 0.5- 1 cm long, pulvinous at base. Leaflets simple, lanceolate, dark green coriaceous, acute at apex. Inflorescence at axillary racemes, corolla white, in cluster. Fruit ellipsoid or pear-shaped, 2- valved, thick, orange in color. Seeds 2, red, dehiscent.

Flowering & fruiting: December- February

Habitat & ecology: evergreen forest, rarely found.

Voucher specimen: Leangha, Mon district, Nagaland, 873m 26°42’38.16’’N 94°59’52.223’’E, P. Konyak NU-PK-970.

Distribution: world: Bangladesh, Myanmar, Thailand. India: Arunchal Pradesh, Assam, Nagaland.

Pachyrhizus L.C. Rich. Ex DC., Prod. 2: 402, 1825

Perennial twining herb with tuberous root. Leaves pinnately 3-foliolate, stipels and stipules present. Leaflets large, ovate or rhomboid, entire. Racemes or panicles axillary, flowers borne in small cluster. Bracts and bracteoles caducous. Calyx tube, campanulate, upper lip emarginate, lower 3-toothed. Corolla purple or white, standard broadly obovate,

wings oblong or falcate, keels beaked, subequal to wings. Stamens diadelphous. Pods linear, compressed, septate between seeds.

Pachyrhizus erosus (L.) Urban, Symb. Antill. 4: 311, 1905; *Pachyrhizus angulatus* L.C. Rich. Ex DC., Prod. 2: 402, 1825; Grierson & Long Fl. Bhut. 1.3: 691, 1876; Sanjappa Legum. India 227, 1992; Baker in Hook.f. Fl. Brit. India 2: 207, 1876.

Woody climber, smooth. Leaves 3- foliolate, coriaceous, glabrous, stipules 7mm. Rachis 10- 17 cm long. Leaf petioles 4 cm long. Leaflets 11- 18 x 8- 12 cm, ovate, laterals, oblique, base rounded, apex acute. Inflorescence at racemes of 20- 40 cm long. Calyx 5-toothed, hirsute. Corolla purple, standard 1.5 x 1.3 cm, suborbicular, with yellow spot, wings 1.5 cm, falcate, keels 1.5 cm long, sub-falcate. Stamens 10. Pods 9 - 10 cm long, glabrous, flat, oblong, septate between seeds. Seeds 10- 15.

Flowering & fruiting: May- July

Habitat & ecology: grows in sub-tropical forest.

Voucher specimen: Wakching, Mon district, Nagaland, 951 m, 26^{o}43’50.423’’N 94^{o}51’24.294’’E, P. Konyak NU-PK- 13.

Distribution: World: cultivated throughout tropics- native of C. America. India: Andaman & Nicobar Islands, East and North-east India.

Parochetus Buch.-Ham. Ex D. Don, Prodr. Fl. Nepal. 240, 1825

A perennial prostrate herb. Leaves palmately 3-foliolate, stipules entire free to basally adnate. Leaflets obcordate, glabrous, green, margin entire. Inflorescence racemes, solitary erect, corolla blue, standard obovate, wings oblong, keels shorter, triangular falcate. Stamens diadelphous. Pods linear-oblong.

Parochetus communis Buch.-Ham. Ex D. Don, Prodr. Fl. Nepal. 240, 1825; Baker in Hook. f. Fl. Brit. India 2: 86, 1876; Grierson & Long Fl. Bhut. 1.3: 728, 1876; Kanjilal et al., Fl. of Assam. 2: 17, 1938.

A perennial prostrate herbs or runners, branches extending 10- 15 cm long. Leaves digitately 3- foliolate. Leaflets obcordate, glabrous, green, entire margin. Peduncles 10-12 cm long. Inflorescence racemes, solitary erect. Corolla blue, standard large, obovate, wings oblong, keels shorter than wings, triangular falcate. Stamens diadelphous. Pods linear-oblong, glabrous 2.5cm long. Root nodules- indeterminate, brown.

Flowering & fruiting: September- October

Habitat & ecology: trailing along roadside in higher elevations above 2000 meters.

Voucher specimen: Dzukou, Kohima district, Nagaland 2692 m 25°32’13.38’’N 94°5’41.28’’E, P. Konyak NU-PK-155.

Distribution: World: Africa, China, Bangladesh, Bhutan, Nepal, Thailand, Vietnam, Myanmar, New Zealand. India: Arunachal Pradesh, Assam, Himachal Pradesh, Jammu-Kashmir, Karnataka, Manipur, Meghalaya, Punjab, Sikkim, Tamil Nadu, Uttar Pradesh, West Bengal, Nagaland.

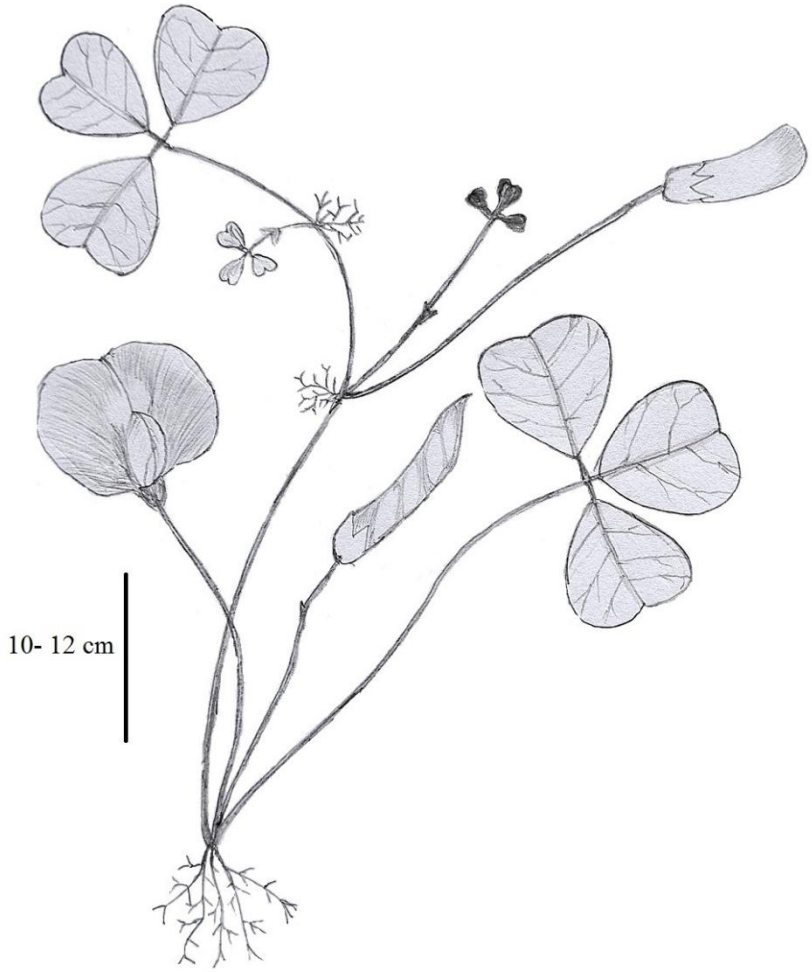


Fig.13. *Parochetus communis* D.Don.

Phaseolus L., Sp. Pl. 723, 1753

Annual or perennial twining herbs. Leaves 3-foliolate covers with white pubescent, stipules basifixed. Racemes axillary, flowers on swollen nodes. Bracts and bracteoles persistent or deciduous, calyx campanulate. Corolla white, yellow, purple. Stamens diadelphous. Pods oblong or linear, dehiscent.

Keys to species

1a. Bracteoles elliptic, shorter than calyx. Corolla yellow or white……*P. lunatus*

1b. Bracteoles ovate, usually as long as calyx. Corolla purple……*P. vulgaris*

Phaseolus lunatus L., Sp. Pl. 724. 1753; Baker in Hook. f. Fl. Brit. India 2: 200, 1876; Grierson & Long Fl. Bhut. 1.3: 702, 1876; Sanjappa Legum. India 228, 1992.

Annual or perennial twining herbs, alternate branching. Leaves 3- foliolate, white pubescent. Stipules triangular. Leaflets broadly ovate or obovate- rhombic, laterals slightly oblique, base rounded, apex acuminate or obtuse. Inflorescence at axillary racemes, bracteoles elliptic, shorter than calyx tube. Corolla white or yellow, standard large, wings obovate. Stamens-10, diadelphous. Pods 8 cm long, falcate oblong, compressed. Seeds 6, maroon, reniform, spotted with white in surface.

Flowering & fruiting: March- June

Habitat & ecology: Cultivated for pulse

Voucher specimen: Shiyong, Mon district, Nagaland 1060 m 26^{o}41’47.512’’N 94^{o}55’19.006’’E, P. Konyak NU-PK-197.

Distribution: world: Native to tropical America. India: Cultivated in most parts, Nagaland.

Phaseolus vulgaris L., Sp. Pl. 723, 1753; Baker in Hook. f. Fl. Brit. India 2: 200, 1876; Grierson & Long Fl. Bhut. 1.3: 702, 1876; Sanjappa Legum. India 228, 1992.

Annual twining herbs. Stem pubescent or glabracent when matured. Leaves 3-foliolate, covers with white pubescent, stipules lanceolate. Leaflets ovate or obovate-rhombic, laterals oblique, base rounded, apex acute or acuminate. Inflorescent at short

racemes, clustered flower at top. Bracteoles ovate, usually long as calyx. Corolla purple, standard larger, wings obovate, keels spirally twisted. Stamens-10, ovary pubescent. Pods linear-oblong, glabrous, turgid. Seeds 5-10, white, oblong.

Flowering & fruiting: April- July

Habitat & ecology: cultivated

Voucher specimen: Shiyong, Mon district, Nagaland, 988m 26^{o}40’46.968’’N 94^{o}57’19.87’’E, P.Konyak NU-PK-196.

Distribution: Native to Mexico- Guatemela. India: cultivated throughout, Nagaland.

Phyllodium Desv., J. Bot. Agric. 1: 123, 1813

Phyllodium pulchellum (L.) Desv., J. Bot 2,1: 124, 1813; *Desmodium pulchellum* (L.) Benth. Fl. Hongk. 83, 1861; Baker in Hook. f. Fl. Brit. India. 2: 162, 1876; Sanjappa Legum. India. 160, 1992; Kanjilal *et al.*, Fl. of Assam 2: 47, 1938; Grierson & Long Fl. Bhut. 1.3: 669, 1876.

Shrubs 2- 2.5 m tall. Bark white or grey pubescent. Leaves 3-foliolate, coriaceous, petioles 5-7mm. Terminal leaflets 6-10 x 2.5- 4 cm, twice as long as laterals leaflets, ovate, elliptic or obovate, acute or obtuse, base rounded, pubescent beneath. Stipules lanceolate, stipels subulate. Inflorescence axillary or terminal consisting of an elongate series of paired leafy suborbicular bracts or leaf-like bracts, 1-1.5 x 1-1.5 cm, 3-6 flowers in fascicles. Corolla white, standard elliptic, wings oblong, keel spathulate. Pods slightly constricted in both sutures, pubescent along sutures, otherwise glabrous. 1-2 seeded.

Flowering & fruiting: August- October

Habitat & ecology: grows along the roadside, in dry deciduous forest.

Voucher specimen: Alichen, Mokokchung district, Nagaland, 1330 m, 26^{o}15’45.432’’ N 94^{o}24’42.79’’E, P. Konyak NU-PK- 10

Distribution: World: Australia, China, Bangladesh, Bhutan, Thailand, Sri Lanka, Vietnam. India: Throughout hills and in E. Himalayas, Meghalaya, Mizoram, Sikkim, Tripura, Nagaland.

Piptanthus Sweet. Brit. Fl. Gard. 264, 1828

Shrubs, 1-4 m tall. Leaves digitaly 3- foliolate, leaves entire, stipules large. Flowers in short terminal racemes. Bracts stipule-like, bracteoles absent. Calyx campanulate 5-tooth. Corolla yellow, petals sub-equal. Stamens free. Pods linear oblong, compressed. Seeds reniform.

Piptanthus nepalensis (Hook.) D. Don in Sweet, Brit. Fl. Gard. 3: 264, 1828; Baker in Hook. f. Fl. Brit. India 2: 62, 1876; Grierson & Long Fl. Bhut. 1.3: 737, 1876; Sanjappa Legum. India 228, 1992.

A bushy shrub of 2-3 m tall. Stem alternate branching, stipulate, reddish brown when matured. Leaves 3- foliolate or digitately arranged. Leaf petiolules 2 cm. Leaflets 8 - 9 x 2- 2.5 cm, lanceolate, entire, acuminate. Calyx campanulate. Flowers bright yellow, about 2-3 cm long, clustered raceme. Petals standard strike with brownish color, wings slightly curved towards keel. Stamens 10. Pods 5-9 cm long, linear, apex pointed, dehiscent. Seeds 5-10, brown, reniform.

Flowering & fruiting: May- September

Habitat & ecology: Grows in higher elevations

Voucher specimen: Dzukou valley, Kohima district, Nagaland 2653 m 25^{o}33’39.8’’N 94^{o}4’46.699’’E, P. Konyak NU-PK-200.

Distribution: world: Bhutan, Nepal, China, Myanmar. India: Temperate Himalayas from Shimla to Sikkim, Meghalaya, Nagaland.

Fig.14. *Piptanthus nepalensis* (Hook.) D. Don

Psophocarpus Neck. ex DC. Prodr. 2: 403, 1825

Climbing prostrate herbs. Leaves pinnately 3- foliolate, stipules lanceolate. Flowers in axillary racemes, solitary, in swollen nodes. Bracts caducous, bracteoles large, persistent. Calyx 5-toothed. Corolla lilac or pale blue, exerted from calyx, standard suborbicular, wings obovate, keels obtuse. Legumes green, 4-winged.

Psophocarpus tetragonolobus DC. Prodr. 2: 403, 1825; Baker in Hook. f. Fl. Brit. India 2: 211, 1876; Sanjappa Legum. India 230, 1992.

Annual or perennial climbing herbs. Leaves 3- foliolate, stipules lanceolate. Leaflets ovate- deltoid, base truncate or rounded, apex acute or acuminate. Inflorescence in axillary racemes. Calyx campanulate. Corolla pale blue. Pods green, tetragonal, 10- 15 cm long, serrated edges in four curves.

Flowering & fruiting: August- November

Habitat & ecology: cultivated

Voucher specimen: Mokokchung, Mokokchung district, Nagaland 1092 m 26^{o}20’8’’N 94^{o}30’9.999’’E, P. Konyak NU-PK-178.

Distribution: Africa, Native to South- East Asia, Australia, South America. India: Cultivated throughout.

Pueraria DC. Ann. Sci. Nat. Paris 4: 97, 1825

Twining herbs or shrubs with tuberous roots sometimes. Leaves pinnately 3-foliolate, leaflets large, stipellate, ovate, obovate or rhomboid, entire. Inflorescence axillary racemose or paniculate or many racemes at apex. Bracts usually small or narrow, bracteoles small and caducous. Corollas purple or blues, clustered, large. Calyx campanulate. Pods oblong or cylindrical, compressed, transverse.

Keys to species

1a. Large woody climbers.

2a. Calyx deeply toothed, corolla purple. Pods flat, densely covered with brown hirsute……*P. montana* var. *thomsonii*

2b. Calyx triangular teeth, Corolla white with bluish tip. Pods flat, green, glabrous……*P. tuberosa*

1b. Twining herbs.

3a. Leaflets not lobed, glabrous, little hairy beneath. Pods glabrous…….. *P. peduncularis*

3b. Leaflets sometime lobed, adpressed hairy in both surface. Pods hirsute……..…… *P. phaseoloides*

Pueraria montana* var. *thomsonii (Benth.) M.R. Almeida, Fl. Maharashtra 2: 122, 1998; *Pueraria thomsonii* Benth. J. Linn. Soc. Bot. 9: 122, 1865; Baker in Hook. f. Fl. Brit. India 2: 198, 1876; *Pueraria thunbergiana* (Siebold & Zucc.) Benth. Soc. J. Linn. Bot. 9: 122, 1867; Kanjilal *et al*., Fl. Assam 2: 81, 1938.

A large climbing shrub. Stem clothed with brown hairs, alternately branching. Petioles 10- 13 cm long, leaves 3-foliolate. Leaflets 10- 15 cm long x 6-10 cm broad, rhomboid to ovate, lobed, apex acuminate, rough, thin hairs beneath. Racemes simple, flower clustered at terminal, bract almost purple, in pairs, pubescent. Calyx long toothed. Corolla 1.5- 2 cm long, deep purple or bluish, yellow at the standard base. Pods 8- 15 cm long, densely covered with rusty brown hairs, flat. 6-14 seeded.

Flowering & fruiting: August- October

Habitat & ecology: grows along roadside

Voucher specimen: Jotsoma, Kohima district, Nagaland, 1420 m 25^{o}40’28.93’’N 94^{o}3’56.011’’E, P. Konyak NU-PK-184.

Distribution: world: Bhutan, China, Vietnam, USA, Philippines, Myanmar. India: Arunachal Pradesh, Delhi, Gujarat, Meghalaya, Manipur, Sikkim, West Bengal, Mizoram, Nagaland.

Pueraria tuberosa (Roxb. ex Willd.) DC. Ann. Sci. Nat. 4: 97, 1825; Baker in Hook. f. Fl. Brit. India 2: 197, 1878; Sanjappa Legum. India 235, 1992.

A large trailing woody climbers. Stems hairy, brown spotted, pulvinous nodes and opposite branching. Leaves 3- foliolate, pubescent. Terminal leaflets 12- 13cm x 7-8 cm, ovate or rhomboid, lateral leaflets 8-10cm x 5-6 cm, smaller, ovate or slightly oblique and all acuminate apex. Calyx grey hairy, teeth triangular, shorter. Corolla standard white stain with yellow at base, wings pale purple and keels tip bluish, at racemes. Stamens diadelphous. Flowers give scented aroma. Pods green, 2-5 cm long, glabrous. Seeds 6-8, flat, or little constricted.

Flowering & fruiting: August- October

Habitat & ecology: in evergreen dense forest of higher elevation

Voucher specimen: Dzulekie, Kohima district, Nagaland 1826m 25^{o}35’28.476 94^{o}01’40.32 P. Konyak NU-PK-696

Distribution: world: Asia- Nepal, Pakistan. India: Native, throughout.

Pueraria peduncularis (Grah. ex Benth.) Benth., J. Linn. Soc. Bot. 9:124, 1867; Baker in Hook. f. Fl. Brit. India 2: 197, 1878; Grierson & Long Fl. Bhut. 1.3:692, 1987; Sanjappa Legum. India 234, 1992.

Twining herbs stem densely hirsute, brown in color when mature. Leaves 3-foliolate, stipules basifixed, lanceolate. Leaflets ovate or obliquely ovate or deltoid, hirsute beneath, base little truncate, apex acuminate, margin entire. Bracts and bracteoles caducous. Inflorescence at axillary racemes, clustered, calyx short toothed. Corolla pale purple nearly white, standard obovate, wings oblong, keel oblanceolate. Pods flat 5-8 cm long, glabrous, slightly septate. 5-7 seeded.

Flowering & fruiting: August- October

Habitat & ecology: densely covers the trees in tropical forest as canopy.

Voucher specimen: Kigwema, Kohima district, Nagaland, 1648 m, 25°34’38.388’’N 94°7’38.808’’E, P. Konyak NU-PK-966.

Distribution: World: China, Bhutan, Nepal, Pakistan, Myanmar. India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Sikkim, Uttar Pradesh, West Bengal, Nagaland.

Pueraria phaseoloides (Roxb.) Benth. J. Linn. Soc. Bot. 9:125, 1867; Baker in Hook. f. Fl. Brit. India 2: 199, 1878; Kanjilal *et al*. Fl. Assam 2: 82, 1938; Sanjappa Legum. India 234, 1992.

Twining herbs. Stem slender, densely covers with hairs. Leaves 3- foliolate, stipules basifixed. Leaflets adpressed hairy, shallowly lobed or sometimes not lobed. Rachis 5-7 cm long, leaflets 3.5-4 cm x 2.5-3 cm, ovate, rhomboid, terminal larger, hirsute. Inflorescence at axillary racemes, pedicels 6- 10 cm long. Corolla light purple or lilac. Legume 5-8 cm long, flat, green, hirsute, obliquely acuminate apex.

Flowering & fruiting: September- November

Habitat & ecology: grows in edges of evergreen forest, fallow land.

Voucher specimen: Mima, Kohima district, Nagaland, 1340 m 25°37’7.356’’N 94°8’32.388’’E, P. Konyak NU-PK-968.

Distribution: world: Australia, China, Bhutan, Thailand, Myanmar. India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Bihar, Kerala, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh, West Bengal, Nagaland.

Rhynchosia Lour., Fl. Cochinch. 425, 460, 1790.

Creeping or twining vines, rarely herbs or shrubs. Leaves 3- foliolate, entire, gland dotted beneath. Stipels and stipules small. Flowers in axillary racemes, calyx campanulate, 5-toothed. Corolla longer than calyx or short. Stamens diadelphous. Pods oblong, compressed.

Rhynchosia minima (L.) DC. Prod. 2: 385, 1825; Baker in Hook.f. Fl. Brit. India 2: 223, 1876; Grierson & Long Fl. Bhut. 1.3: 709, 1987; Sanjappa Legum. India 239, 1992; Dolichos minimus L., Sp. Pl. 726, 1753.

A small twining herb. Stem slender, pubescent. Leaves 3- foliolate, stipules small. Petioles 1-2 cm long, glabrous or sparsely pubescent. Leaflets 1-2 x 0.7- 2 cm, rhombic-ovate, laterals slightly oblique, base rounded, apex shortly acute, villous, and densely glandular beneath. Racemes 2- 12 cm long, axis slender, 3-10 flowered. Calyx tube 1.5 mm, teeth lanceloate, pubescent. Corolla yellow with purple veins, standard obovate, wings oblong, keels upcurved, rounded distally. Pods 1.3- 1.7 cm long, minutely pubescent.

Flowering & fruiting: May- September

Habitat & ecology: grows along the edge of forests.

Voucher specimen: Meriema, Kohima district, Nagaland 1200 m, 25^{o}44’33.145’’N 94^{o}5’1.843’’E, P. Konyak NU-PK- 15.

Distribution: Pantropical India: Throughout plains, Nagaland.

Robinia L. Sp. Pl. 2: 722, 1753

Trees, shrubs or herbs. Stipules thorn-like, narrow or absent. Leaflets opposite, sub-opposite or alternate, ovate. Raceme axillary or fasciculate sometimes. Calyx campanulate, bilabiate, 5- toothed. Corolla white or purple. Stamens diadelphous. Pods flat, leathery.

Robinia pseudoacacia L. Sp. Pl. 2: 722, 1753; Sanjappa Legum. India 241, 1992.

A medium size tree, 30ft tall, alternate branching. Leaves imparipinnate, 9-15 foliolate, alternate. Leaf rachis 20-25 cm long, pedicels 1 cm long, leaflets 3.5- 4.5 cm long x 1- 2.5 cm broad, ovate or elliptic oval. Inflorescence at axillary racemes, 3-7 cm long. Corolla pale purple or white, 1 cm long. Stamens-8. Pods 5-10 cm long, flat, leathery.

Flowering & fruiting: May- August

Habitat & ecology: Along roadside, evergreen forest.

Voucher specimen: Shiyong, Mon district, Nagaland, 1059 m 26^{o}40’0.584”N 94^{o}54’39.97’’E P. Konyak NU-PK-973.

Distribution: world: Asia, Australia, Europe. India: Himachal Pradesh, Jammu Kashmir, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh.

Sesbania Adans. Fam. Pl. 2: 327, 1763

Herbs, shrubs or rarely trees. Leaves paripinnate, stipels absent or small. Leaflets numerous, leaf margin entire. Raceme axillary at apical parts, bracts and bracteoles subulate, caducous. Calyx campanulate, corolla yellow or dark spotted, glabrous. Standard broad, wings falcate, keels curved. Stamens diadelphous, ovary stipitate. Pods linear, terete, many seeded, dehiscent.

Sesbania bispinosa (Jacq.) W. Wight Bull. Bur. Pl. Industr. U.S.D.A. 137:15, 1909; Sanjappa Legum. India 242, 1992; *Sesban aculeatus* nom. illeg., Baker in Hook. f. Fl. Brit. India 2: 114, 1878.

A woody erect shrubs, 6-7ft tall. Stem alternate branching, glabracent. Leaves paripinnate, 15-30 pairs. Leaf pedicels 8-15 cm long, stipules linear- lanceolate, leaflets

oblong with a small thin spike at apex. Inflorescence at raceme axillary, corolla yellow, spotted with brown color. Pods cylindrical, linear, 12-15 cm long, terete, not septate.

Flowering & fruiting: October- November

Habitat & ecology: grows along roadside.

Voucher specimen: Khonoma, Kohima district, Nagaland, 1271 m 25^{o}39’25.484’’N 94^{o}2’4.88’’E, P. Konyak NU-PK-188.

Distribution: Africa, China, Asia, South America. India: throughout, Nagaland

Shuteria Wight & Arn., Prod. 207, 1834

Perennial twining or climbing herbs. Leaves pinnately 3- foliolate, leaflets entire. Stipels and stipules deciduous or persistent. Racemes axillary, bracts and bracteoles persistent or deciduous. Calyx campanulate. Corolla usually purple or red. Stamens diadelphous. Legumes linear, compressed.

Key to species

1a. Leaflets ovate, acuminate……..*S. hirsuta*

1b. Leaflets obovate, rounded…….*S. involucrata*

Shuteria hirsuta Baker in Hook. f. Fl. Brit. India 2: 182, 1878; Grierson & Long Fl. Bhut. 1.3:695, 1987; Kanjilal *et al*., Fl. Assam 2: 64, 1938; Sanjappa Legum. India 244, 1992.

Climbing herbs. Stem with densely brown hirsute, alternate branching. Leaves 3-foliolate, stipules lanceolate. Leaflets 3- 3.5 x 2- 2.5 cm, ovate, adpressed hairs on both surfaces, base rounded, apex acuminate, 3- veined at base. Corolla purple. Pods 5 cm long, densely hirsute, oblong, constricted between seeds, dehiscent. 10- seeded.

Flowering & fruiting: October- December or old pods till April.

Habitat & ecology: grows along roadside, or edges of forests.

Voucher specimen: Viswema, Kohima district, Nagaland 1383 m, 25^{o}33’0.023’’N 94^{o}09’0.541’’E, P. Konyak NU-PK-699

Distribution: World: Asia- Bhutan, Nepal, China, Laos, Myanmar, Thailand, Vietnam. India: Meghalaya, Sikkim, West Bengal, Nagaland.

Shuteria involucrata (Wall.) Wight & Arn., Prod. 207, 1834; Grierson & Long Fl. Bhut. 1.3:695, 1876; *Glycine involucrata* Wall. Pl. Asiat. Rar. 3: 22, 1832; *Shuteria vestita* Wight & Arn. Var. *involucrata* (Wall.) Baker in Hook. f. Fl. Brit. India 2: 182, 1878.

Twining herbs. Stem terete, densely hairy. Leaves 3- foliolate, stipules 6-7 mm, lanceolate. Petioles 4-7 cm long. Leaflets 2.5- 5 x 2- 3.5 cm, obovate, broadly ovate, veins visible, rounded apex or base, glabrous. Raceme axillary, many flowered. Corolla purple. Pods 2.5- 3 cm long, linear, oblong, hirsute brown, dehiscent. Seeds 4 or 5, compressed.

Flowering & fruiting: November- March

Habitat & ecology: grows along the forests margin

Voucher specimen: Mangmetong, Mokokchung district, Nagaland, 1188 m, 26^{o}16’11.792’’N 94^{o}23’45.224’’E, P. Konyak NU-PK-686.

Distribution: World: Africa, China, Bhutan, Myanmar, Cambodia, Thailand, New Guinea. India: Arunachal Pradesh, Andhra Pradesh, Bihar, Delhi, Goa, Himachal Pradesh, Kerela, Manipur, Meghalaya, Sikkim, Orissa, Nagaland.

Smithia Aiton, Hort. Kew. 3: 496, 1789

Herbs or undershrubs. Stem terete, slender and glabracent. Leaves paripinnate, subsessile, stipule persistent. Leaflets sensitive, linear oblong, bristle on abaxial side and margin, mucronate apex. Inflorescence axillary, dense raceme or scorpioid cyme. Corolla yellow, white or bluish, small, calyx membranous or scarious. Stamens usually diadelphous. Pods within calyx, 1- seeded, orbicular.

Smithia ciliata Royle, III. Bot. Himal. 2: 201, 1835; Baker in Hook. f. Fl. Brit. India 2: 150, 1876

Annual herbs stem reddish, terete, alternate branching, glabrous. Leaves paripinnate, 4-8 pairs, subsessile. Stipules lanceolate, membranous. Leaflets 0.3- 1 cm long, linear-oblong, bristle in margin and abaxial, mucronate apex. Bracteoles leafy and ciliated. Inflorescence at axillary dense raceme or scorpioid cyme. Corolla pale blue or

white, small, calyx membranous, bristles. Stamen diadelphous. Pods loment, shortly stipitate, densely papillate.

Flowering & fruiting: August- October

Habitat & ecology: grows along roadside, edges of forest.

Voucher specimen: Chiechema, Kohima district, Nagaland 1382 m 25^{o}49’38.316’’N 94^{o}8’54.168’’E, P. Konyak NU-PK-962.

Distribution: world: Bhutan, China, Japan, Myanmar, Thailand, Vietnam. India: Arunachal Pradesh, Bihar, Himachal Pradesh, Meghalaya, Nagaland, Orissa, Sikkim, Uttar Pradesh, West Bengal.

Spatholobus Hassk., Flora 25 (2) Biebl. 52, 1842

Woody climbers. Leaves pinnately 3- foliolate, stipules small, stipels persistent or deciduous. Panicles axillary or terminal. Flowers numerous or clustered at nodes of rachis or branches, bracts and bracteoles small. Calyx campanulate 2-lipped, upper 2- teeth connate into entire or emarginated upper lip lower lip with 3-teeth, triangular or lanceolate. Corolla exserted, petals all clawed. Standard ovate or suborbicular, shorter than wings, wings oblong, keel shorter or longer than wings. Stamens diadelphous. Legumes sessile, falcate or oblong, compressed, densely velutinous. 1- seeded.

Spatholobus suberectus Dunn. J.Linn. Soc., Bot. 35: 489, 1903.

Woody climbers. Bark brown pubescent, alternate branching. Leaves 3-foliolate, leathery, stipels subulate. Leaf rachis 5-16 cm long, pedicels 1-5 cm long, pulvinous at base, leaflets 10 - 18 cm x 7 - 10 cm, leathery, glabrous or short hairs along the mid-veins abaxially, terminal leaflets broadly obovate, base cuneate or rounded, apex shortly cuspidate, laterals slightly smaller. Inflorescence panicle axillary or apical of branches upto 35 cm long, covers in brown pubescent. Calyx 4 mm, 2-lipped lower 3, triangular, upper 2 connate. Corolla red, or white at lower, standard 10mm, orbicular, base cuneate, wings 8 mm obliquely cuneate, oblong, keels 7mm. stamens sub equal, 5 longer, 5 shorter. Pods 13- 15 cm long, sub falcate, densely brownish velutinous, flat. 1- seeded, at the apical parts of pods, 2-3 cm long.

Flowering & fruiting: April- June

Habitat & ecology: found in sub-tropical forest as forest canopy.

Voucher specimen: Longkhum, Mokokchung, Nagaland, 1055 m 26°13'35.688"N 94°24'57.923''E, P. Konyak NU-PK-08

Distribution: World: China, Laos, Thailand, Vietnam. India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Tripura, Nagaland.

Tadehagi (Schindl.) H. Ohashi, Ginkgoana 1:284, 1973

Herbs or shrubs or undershrubs. Leaves 1- foliolate, petiole winged, glabrous. Inflorescence at axillary raceme or terminal. Calyx campanulate 5- toothed. Corolla purple, blue, standard orbicular, broadly elliptic or obovate, wings oblong, keel obtuse or acute. Stamen 10.

Tadehagi triquetrum (L.) H. Ohashi, Ginkgoana 1: 290, 1973; *Desmodium triquetrum* (L.) DC. Prod. 2: 326, 1824; Baker in Hook. f. Fl. Brit. India 2: 163, 1878; Kanjilal *et al*., Fl. of Assam 2: 56, 1938; Sanjappa Legum. India. 163, 1992; *Hedysarum triquetrum* L., Sp. Pl. 746, 1753.

Shrubs or undershrubs, 1m tall. Stem triquetrous, alternate branches. Stipules 1-2 cm long, tapering from broad base, striate. Petioles 1-4 cm long, wing 1 cm long to 4 mm wide, oblanceolate. Leaflets 6-9 x 2-3 cm, coriaceous, oblong- lanceolate, subcordate at base, acute or shortly acuminate at apex. Inflorescence in raceme axilllary or terminal. Calyx campanulate. Corolla bluish or purple, standard nearly orbicular. Stamens diadelphous. Legume 5-8 jointed, densely covered with whitish strigose.

Flowering & fruiting: October- November

Habitat & ecology: grows along the forest margins.

Voucher specimen: Mokokchung, Mokokchung district, Nagaland, 1092 m, 26°20'8''N 94°30'9.999''E, P. Konyak NU-PK-192.

Distribution: China, Bangladesh, Bhutan, Myanmar, Thailand, Nepal, Sri Lanka. India: Throughout. Nagaland.

Tephrosia Pers. Syn. Pl. 2: 328, 1807

Annual or perennial herbs or shrubs. Stem mostly sericeous. Calyx caducous. Leaves imparipinnate, stipules usually persistent. Inflorescence terminal, or axillary, corolla few or solitary, creamy white. Stamens monadelphous or diadelphous. Legumes flat, more or less septate, apex beaked.

Keys to species

1a. Herbs or shrub.

2a. Shrubs. Leaflets 19-27 foliolate. Corolla milky white…….…….. *T. candida*

2b. Herbs. Leaflets 11-13 foliolate. Corolla purple or pink…….…….. *T. purpurea*

2b. Trees.

Tephrosia candida DC. Prodr. 2: 249, 1825; Baker in Hook. f. Fl. Brit. India 2: 111, 1876.

Shrub 3m tall with bushy branching. Stem brown, sericeous, alternate branching. Leaves imparipinnate, peduncles 15- 18 cm long. Leaflets 19-27 foliolate, oblong elliptic, 4-4.5 cm x 1-1.5 cm, glabrous above and pubescent beneath. Inflorescence raceme 3-15cm long, axillary, calyx campanulate, hairy. Corolla creamy white. Pods 7-9 cm long, flat, hairy or brown sericeo us, obliquely apex or beaked. 10-15 seeded.

Flowering & fruiting: August- October

Habitat & ecology: grows along roadside, edges of semi-evergreen forest.

Voucher specimen: Longkong, Mokokchung district, Nagaland 1315 m 26^{o}23’21.844’’N 94^{o}36’25.858’’E, P. Konyak NU-PK-177.

Distribution: world: Australia, China, Africa, Nepal, Bangladesh, Myanmar, Sri Lanka, South America India: Tropical Himalayas from Kumaon to Sikkim, Assam, Bihar, Gujarat, Karnataka Manipur, Meghalaya, Nagaland.

Tephrosia purpurea (L.) Pers. Syn. Pl. 2: 329, 1807; Baker in Hook. f. Fl. Brit. India 2: 251, 1876; Kanjilal *et al.*, Fl. of Assam 2: 31, 1938; Sanjappa Legum. India 258, 1992.

An erect spreading herbs of about 1 m tall. Stem terete, glabrescent, reddish color with minute hairs, alternate branching. Leaves imparipinnate, 11-13 foliolate. Leaf

peduncles 8-10 cm long. Leaflets 2-2.5 x 0.5-1 cm, obovate or oblong, base rounded, apex rounded or obtuse. Inflorescence axillary raceme. Corolla pale pink or purple. Pods green, 3-5 cm long, constricted.

Flowering & fruiting: June – August

Habitat & ecology: grows at the edges of tropical forest

Voucher specimen: Pulie badze, Kohima district, Nagaland 1661 m 25^{o}40’25’’N 94^{o}3’45’’E, P.Konyak NU-PK-173.

Distribution: world: Africa, Asia, South America, North America. India: Throughout.

Trifolium L., Sp. Pl. 2: 764, 1753

Annual or perennial herbs. leaves pinnately 3- foliolate. Inflorescence in densely globose, axillary or terminal, stipules entire or toothed, bracts small or absent. Calyx unequal, 5- toothed. Corolla persistent, white, pink or purple. Legume indehiscent, 1 or 3 seeded.

Trifolium repens L., Sp. Pl. 2: 767, 1753; Baker in Hook. f. Fl. Brit. India 2: 86, 1876; Grierson & Long Fl. Bhut. 1.3:730, 1876; Sanjappa Legum. India 263, 1992.

Trailing herbs, extending wide areas, stoloniferous. Stem reddish brown or green in color, alternate branching. Leaves 3-foliolate, glabrous. Leaf pedicels 5-10 cm long. Leaflets ovate or obovate with toothed margins. The 3- foliate leaves form a white triangle patterns. Inflorescence densely globose in long stalk of 8- 13 cm long. Corolla white or slightly pinkish, 1.5- 2 cm long. Calyx 5- lobed, stamens 10. Pods minute, linear oblong. 3- seeded.

Flowering & fruiting: April- July

Habitat & ecology: Lawns, trailing along roadside.

Voucher specimen: Jotsoma, Kohima district, Nagaland, 1316 m 25^{o}39’58.26’’N 94^{o}4’30.425’’E, P. Konyak NU-PK-955.

Distribution: world: Europe, North Africa, Australia, Bhutan, Nepal, Pakistan, throughout Asia. India: Temperate to alpine Himalayas, Rajasthan, Tamil Nadu, Nagaland.

Vigna Savi, Pisa Nuovo Giorn. Lett. 8: 113, 1824

Annual or perennial twining herbs. Leaves pinnately 3- foliolate, leaflets entire or lobed. Stipels present, stipules peltate, 2-lobed, cordate or truncate. Racemes axillary or terminal, flowers borne on swelling glandular. Calyx campanulate, 5- tooth. Corolla yellow or purple, ovary sessile. Legume linear, linear-oblong, terete.

Keys to species

1a. Legumes unseptate between seeds……*V. mungo*

1b. Legumes septate between seeds.

2a. Stem with spreading brown hairs……..*V. radiata*

2b. Stem pilose with yellow hairs……..……..*V. umbellata*

3a. Pods 10- 60 cm long, glabrous……..…*V. unguicaulata*

3b. Pods 5-10 cm long, brown hirsute…….…..*V. vexillata*

Vigna mungo (L.) Hepper Kew Bull. 128, 1956; Sanjappa Legum. India 275, 1992; *Phaseolus mungo* L., Mant. 1: 101, 1767; Baker in Hook.f. Fl. Brit. India 2: 203, 1878; *Phaseolus radiatus* Roxb. Fl. Ind. 3: 296, 1832.

Twining herb or climber. Stem covering with reddish brown hairs. Leaves 3-foliolate, leaflets 5-6 x 3.5- 4 cm, ovate, deltoid, rounded at base, acuminate apex, membranous. Flowers in short peduncles, corolla yellow. Pods 1.5- 3.5 cm long, sub-cylindric, slightly recurved, and not septate between seeds. 4-6 seeded, greenish or grayish black.

Flowering & fruiting: September- November

Habitat & ecology: cultivated or naturalized in the wild, along roadside or secondary forest.

Voucher specimen: Kezocha, Kohima district, Nagaland, 1359 m, 25°42’35.352’’N 94°3’22.3518’’E, P. Konyak NU-PK-03

Distribution: World: South Africa, Australia, Pakistan, Nepal, Japan, Bangladesh, Afghanistan, Sri Lanka, Vietnam. India: Cultivated throughout, Nagaland.

Vigna radiata (L.) R. Wilczek, Fl. Congo Belge 6: 386, 1954; Grierson & Long Fl. Bhut. 1.3:700, 1876; *Phaseolus mungo* L. var. *radiatus* (L.) Baker in Hook. f. Fl. Brit. India 2: 203, 1878.

Annual twining herbs. Stem with spreading brown hairs, petioles 5- 20 cm long. Leaves 3- foliolate. Leaflets 4- 10 x 2.5-7 cm, ovate or ovate-rhombic, laterals slightly oblique ovate, shortly acuminate, base cuneate or rounded, sparsely pilose on both surfaces. Raceme axillary, 2 to many flowered. Calyx tube 3-4 mm, glabrous, lobes narrowly deltoid. Corolla yellow, 1.5 cm long. Pods 5- 9 cm long, linear, dehisced.

Flowering & fruiting: September- November

Habitat & ecology: grows along roadside or edges of forest.

Voucher specimen: Dzuleke, Kohima district, Nagaland, 1825 m, 25°37’19.544’’N 93°57’26.422’’E, P. Konyak NU-PK-165.

Distribution: widely cultivated in tropics and subtropics of both the hemispheres. India: cultivated throughout, Nagaland.

Vigna umbellata (Thunb.) Ohwi & H. Ohashi, J. Jap. Bot. 44:31, 1969; Grierson & Long Fl. Bhut. 1.3:701, 1876; *Phaseolus calcaratus* Roxb., Baker in Hook. f. Fl. Brit. India 2: 203, 1878.

Annual, climbing herbs. stem slender, covers with yellow hairs when young, and later glabrescent. Leaves 3-foliolate, rough. Petioles 5-9 cm long, stipules medifixed, elliptic. Leaflets 4-8 x 2.5- 5 cm, ovate, acuminate, base cuneate or rounded, margin entire. Raceme axillary, 10-12 flowered, peduncles 4-6 cm long. Calyx 3-4 mm, corolla yellow. Pods linear 7- 8 cm long, glabrous.

Flowering & fruiting: September- October

Habitat & ecology: Cultivated for vegetables and pulse.

Voucher specimen: Khonoma, Kohima district, Nagaland 1335 m 25°39'26.964''N 94°1'9.192''E, P. Konyak NU-PK- 691

Distribution: World: China, Pakistan, Malaysia, Nepal, Sri Lanka. India: Gujarat, Himachal Pradesh, Assam, Manipur, Meghalaya, Rajasthan, Sikkim, Uttar Pradesh, West Bengal, Nagaland.

Vigna unguicaulata (L.) Walp. Ssp. ***cylindrica*** (L.) Van Eseltine, Hendricks, veg. New York 1: 11, 1931; *Vigna catjang* (Burm f.) Walp. Linnaea 13: 533, 1839 nom. illeg. Baker in Hook. f. Fl. Brit. India 2: 205, 1878.

Trailing or twining herbs. Stem subglabrous. Stipules lanceolate, 1 cm long. Leaves 3- foliolate. Leaflets 7- 12 cm long, ovate- rhomboid, laterals oblique, glabrous, base acute to rounded, apex acute. Raceme axillary, short 3- 6 flowers clustered. Calyx campanulate, corolla yellow or purplish. Pods terete, 10- 60 cm long, glabrous.

Flowering & fruiting: October- November

Habitat & ecology: Cultivate for vegetables

Voucher specimen: Shiyong, Mon district, Nagaland, 1059 m, 26°41'47.512''N 94°55'19.006''E, P. Konyak NU-PK- 967.

Distribution: Pantropical. India: cultivated throughout, Nagaland.

Vigna vexillata (L.) A. Rich., Hist. Fis.Polit. Nat. 1 Cuba 11: 191, 1845; Baker in Hook.f. Fl. Brit. India 2: 206, 1878; Grierson & Long Fl. Bhut. 1.3:700, 1876; Kanjilal *et al*., Fl. Assam 2: 84, 1838.

Twining herb, slender stem. Petioles deflexed hirsute. Leaves 3- foliolate, petioles - 10 cm long. Leaflets 5- 12 x 2-3 cm, ovate-lanceolate, base rounded, apex acuminate, appressed brown pubescent, stipules ovate-lanceolate, 6mm. Raceme axillary, 1-3 flowered, peduncles 5- 30 cm long. Corolla purplish white, standard obovate, 16mm, wing 15 mm, keel 4mm. Pods 5-10 cm long, brown hirsute.

Flowering & fruiting: August- October

Habitat & ecology: grows in forest edges.

Voucher specimen: Viswema, Kohima district, Nagaland 1380 m, 25°33’58.983’’ N 94°7’45.087’’E, P. Konyak NU-PK- 16.

Distribution: Pantropical. India: Almost throughout, except North-west India, Nagaland

Sub family- Caesalpinioideae DC. Prod. 2: 473, 1825

Trees, shrubs, lianas, suffruticose or herbaceous. Common armed or unarmed with prickles or spines. Stipules free or absent. Leaflets pinnate or bipinnate, mostly paripinnate. Inflorescence globose, spicate, paniculate, racemose or in fascicles. Flowers bisexual rarely unisexual. Pods dehiscent or indehiscent.

Caesalpinioideae after circumscription (Mimosoideae clade), there are around 148 genera and ca.4400 species distributed globally.

1a. Herbs, shrubs or small trees, woody climbers.

2a. woody climbers or lianas.

3a. Stem covered with prickles…….....*Acacia*

3b. Stem smooth, twining…….……..*Entada*

2b. Herbs, shrubs or small trees.

4a. Prostrate or erect herbs. Leaves bipinnate, sensitive……*Mimosa*

4b. Erect herbs. Leaves abruptly pinnate, not sensitive……..*Chaemaecrista*

5a. Shrubs or small trees, stipules small. Leaflets 10-15 pairs.....*Leucaena*

5b. Shrubs or small trees with stipular spines. Leaflets 6-9 pairs.…….*Calliandra*

6a. Shrubs with short prickles……*Caesalpinia*

6b. Herbs or shrubs, no prickles…….....*Senna*

1b. Trees. Plants unarmed.

7a. Petals in spike-like.

8a. Legume falcate, strap-shaped…….*Adenanthera*

8b. Legume linear oblong, compressed…….....*Albizia*

9a. Stamens numerous, filaments exerted……..…..*Archidendron*

9b. Stamens 10, in a long bundle, filiform…….. *Parkia*

7b. Petals simple.

10a. Legume cylindrical, large. Corolla yellow or pink……...*Cassia*

10b. Legume compressed, oblong, thick valves. Corolla orange-red…….. *Delonix*

Acacia Mill., Gard. Dict. Abr. Ed. 4: 28, 1754

Trees, shrubs or lianas, with stipules spine or prickles. Leaves bipinnate, rarely reduced to phyllode. Leaflets numerous, petioles and rachis usually glanduliferous, stipules spiny or small and deciduous. Inflorescence axillary cluster, globose head or spike, solitary or fascicled in leaf axils. Flowers bisexual or polygamous. Sepals connate, valvate. Petals valvate. Stamens numerous, exerted. Legume variable, dehiscent or indehiscent, compressed, leathery or woody.

Acacia pennata (L.) Willd., Sp. Pl. 4: 1090, 1806; Baker in Hook. f. Fl. Brit. India 2: 297, 1878; Grierson & Long Fl. Bhut. 1.3: 641, 1987; Kanjilal *et al*., Fl. Assam 2: 156, 1938; Mimosa pennata L. Sp. Pl. 1507, 1753.

A woody climber. Stem cover with prickles, grey or brown color bark. Leaves bipinnate, rachis 15- 20 cm long, leaf pinnae 12- 15 pairs. Stipules lanceolate. Leaflets 3.5-4 x .5 - .6 cm, oblong, linear. Flowers head globose, petioles 1-2 cm long, whitish yellow color. Calyx subcampanulate 5- toothed. Pods 8- 10 cm long, flat, glabrous, reddish brown when matured.

Flowering & fruiting: May- September

Habitat & ecology: grows in Tropical forest

Voucher specimen: Jotsoma, Kohima district, Nagaland, 1204 m, 25^{o}40’23.304’’N 94^{o}3’4.535’’E, P. Konyak NU-PK-971.

Distribution: World: China, South-east Asia. India: Throughout India, Nagaland.

Adenanthera L., Sp. Pl. 1: 384, 1753

Trees, unarmed, deciduous. Leaves bipinnate, leaflets alternately arranged. Stipules small, deciduous. Raceme terminal or panicle, axillary, flowers numerous in spike-like. Calyx campanulate, 5-toothed. Petals-5, connate at base, subequal. Stamens 10, free, slightly longer than petals. Ovary sessile, many ovuled, style filiform. Legume falcate, strap shaped, septate between seeds.

Adenanthera pavonina L. Sp. Pl. 1:384, 1753; Baker in Hook. f. Fl. Brit. India 2: 287, 1878; Grierson & Long Fl. Bhut. 1.3: 636, 1987; Kanjilal *et al*., Fl. Assam 2: 150, 1938; Sanjappa Legum. India 54, 1992.

A middle- size trees, unarmed, deciduous. Leaves bipinnate, pinnnae evenly paired. Leaflets 11-19 per pinnae, ovate-oblong, 2.5-4 x 1.5- 2 cm, obtuse or emarginated, base rounded. Inflorescence axillary or arranged in panicle raceme, 8- 15 cm long. Calyx 1mm, pubescent. Corolla yellowish, elliptic. Stamens 10, free, hardly exerted. Pods 18- 20 cm long, falcate, septate between seeds. Seeds 8-15.

Flowering & fruiting: May- August

Habitat & ecology: grows along roadside.

Voucher specimen: Longtho, Mokokchung district, Nagaland 450 m, 26^{o}28’45’’N 94^{o}21’14’’E, P. Konyak NU-PK-679.

Distribution: Tropical Asia- widely cultivated, Africa, Australia, North- America. India: Assam, Bihar, Goa, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Sikkim, Tamil Nadu, Tripura, West Bengal, Nagaland.

Albizia Durazz., Mag. Tosc. 3: 13, 1772

Trees or shrubs, unarmed. Leaves bipinnate, stipules usually small and caducous. Petioles and rachis with glands, leaflets numerous pairs and small, sensitive. Inflorescence of globose head, axillary or terminal panicles. Flowers bisexual, calyx campanulate, 5-toothed. Corolla white, yellow, pinkish, funnel shaped, stamens numerous. Legume linear or oblong, compressed.

Keys to species

1a. Midvein of leaflets eccentrically close to lower margin…… *A. procera*

1b. Midvein of leaflets eccentrically close to upper margin....……*A. lebbeck*

2a. Corolla yellow, 1 - 1.5 cm…….……..…….. *A. chinense*

2b. Corolla pink, 8 - 10 mm……..*A. julibrissin*

Albizia procera (Roxb.) Benth., London J. Bot. 3:89, 1844; Baker in Hook. f. Fl. Brit. India 2: 299, 1878; Kanjilal *et al*., Fl. Assam 2: 163, 1938; Grierson & Long Fl. Bhut. 1.3: 645, 1987; Sanjappa Legum. India 58, 1992;

Trees, deciduous, 15- 20 m tall. Bark grayish color, subglabrous. Leaf rachis glabrous, 25- 30 cm long. Leaves bipinnate, pinnae 3-6 pairs, 15- 20 cm long. Leaflets 8-12 pairs, ovate-elliptic, obtuse or emarginated, base rounded, dark green above and pale beneath. Panicles upto 30 cm long, much branched, flowers in globose head. Corolla white, stamina tube longer than corolla tube. Pods 10- 15 cm long, flat, coriaceous, ligulate. Seeds 11, obovoid-elliptic.

Flowering & fruiting: June- August

Habitat & ecology: grows in evergreen forest.

Voucher specimen: Shiyong, Mon district, Nagaland 1062 m. 26^{o}41’46.533’’N 94^{o}55’18.529’’E, P. Konyak NU-PK-964.

Distribution: world: Tropical Asia, Australia. India: Andaman Island, Arunachal Pradesh, Bihar, Delhi, Gujarat, Jammu, Meghalaya, Rajasthan, Uttar Pradesh, Mizoram, Nagaland.

Albizia lebbeck (L.) Benth., London J. Bot. 3: 87, 1844; Baker in Hook. f. Fl. Brit. India 2: 298, 1878; Kanjilal *et al*., Fl. Assam 2: 165, 1938; Grierson & Long Fl. Bhut. 1.3: 644, 1987; Sanjappa Legum. India 56, 1992; *Mimosa lebbeck* L., Sp. Pl. 516, 1753.

Trees, 20- 30 m tall. Bark rough, brown spotted. Leaf rachis oval or circular gland at the base, pubescent or glabrous. Rachis 7-10 cm long. Leaves paripinnate, leaflets 8-20, oblong or obovate, rounded at apex, glabrous. Peduncles axillary, 5- 10 cm long, flowers in globose head, white, dimorphic. Stamens numerous, Greenish- white. Pods 6-7 cm long, coriaceous, green or brown, flat. 6 seeded, no septate.

Flowering & fruiting: August- October

Habitat & ecology: grows in mixed deciduous forest and sub-tropical.

Voucher specimen: Mima, Kohima district, Nagaland, 1486 m 25°36'47.016''N 94°8'37.787''E, P. Konyak NU-PK-963.

Distribution: World: Africa, Central America, Tropical and Subtropical Asia. India: Throughout, Nagaland.

Albizia chinensis (Osbeck) Merr., Amer. J. Bot. 3: 575, 1916; *Albizia stipulata* (Roxb.) Boiv., Encycl. 19, Siecle 2: 33, 1834; Baker in Hook. f. Fl. Brit. India 2: 300, 1878; Kanjilal *et al*., Fl. Assam 2: 167, 1938.

Trees, 35- 40 m tall. Bark dark brown, smooth. Leaf rachis 8- 20 cm long, with an oval gland at the base. Leaves bipinnate, pedicels .5- .7 cm long, leafets 38- 46 foliolate, sessile, oblong- linear or lanceolate, slightly falcate, sensitive, hairy beneath. Panicles 10- 15 cm long, flowers in globose head. Corolla 1- 1.5 cm long, yellow, villous, tomentose. Legume 8- 12 cm long, brown, ligulate, compressed. Seeds ellipsoid, 6- 10 seeded.

Flowering & fruiting: April- July

Habitat & ecology: evergreen forests, in all elevation ranges.

Voucher specimen: Longjongkong, Mokokchung district, Nagaland 477 m 26°24'37.998''N 94°25'30.999''E, P. Konyak NU-PK-167

Distribution: world: China, Nepal, Bhutan, Pakistan, Myanmar, Thailand, Laos, Sri Lanka, Cambodia. India: Throughout, Nagaland.

Albizia julibrissin Durazz., Mag. Tosc. 3: 11, 1772; Baker in Hook.f. Fl. Brit. India 2: 300, 1878; Kanjilal *et al*., Fl. Assam 2: 168, 1838; *Acacia julibrissin* (Durazz.) Willd., Sp. Pl. 4: 1065, 1806.

Trees, 5 - 10 m tall, branches pubescent. Rachis 10 - 30 cm long. Stipules deciduous, linear- lanceolate. Pinnae 4 - 8 pairs, 5 - 15 cm long. Leaflets 10 - 30 pairs, obliquely linear to oblong, 1 - 2 x 0.5 - 0.7 cm long, acute, base truncate, obliquely attached to pinnae, mid-rib closer to upper margin, appressed pubescent on both surfaces.

Panicles terminal. Corolla pink, 8 - 10 mm, calyx 3 mm, pubescent, filaments white at base. Pods 10 - 15 cm long, flat, coriaceous.

Flowering & fruiting: May - August

Habitat & ecology: grows along roadside or open space in warmer region.

Voucher specimen: Tizit, Mon district, Nagaland, 120 m, 26°54’13.566’’N 95°4’27.224’’E, P. Konyak NU-PK- 01.

Distribution: World: Bhutan, China, Japan, Middle East, America, Europe. India: Arunachal Pradesh, Assam, Himachal Pradesh, Jammu-Kashmir, Karnataka, Manipur, Meghalaya, Sikkim, Tripura, Uttar Pradesh, West Bengal, Nagaland.

Archidendron F. Muell., Fragm. 5: 59, 1865

Trees or shrubs, unarmed. Leaves evenly bipinnate, stipules present or absent. Rachis and pinnae gladuliferous, leaflets opposite. Inflorescence a globose head or in terminal, panicles or axillary. Flowers bisexual or polygamous, uniform. Calyx campanulate or tubular, 4-5 toothed. Stamens numerous, filaments exerted, united in a tube at base. Legume spirally twisted, dehiscent, flat or swollen, coriaceous.

Archidendron clypeariae (Benth.) I.C. Nielsen, Opera Bot. 76: 38, 1985; *Pithecolobium clypearia* (Jack.) Benth. in Hook.., London J. Bot. 3: 298, 1844; Baker in Hook. Fl. Brit. India 2: 305, 1878; *Abarema clypearia* (Jack) Kosterm., Bull. Org. Natuur. Ord. Indonesia 20: 42, 1954.

A small size trees, 10- 15 m tall. Bark brown, rough, alternate branching, branchlets angulate, yellow tomentose. Leaf petioles 4- angulate, leaf rachis and petiole base with pulvinous. Pinnae 2-6 pairs, leaflets 3-6 pairs at lower pinna, uppermost 10- 12 pairs, subsessile, elliptic, glabrous, acute or acuminate, lower surface slightly white pubescent. Inflorescence in terminal or axillary, corymb several flowered. Calyx campanulate 5- toothed. Corolla yellow or white, stamens as long as corolla. Legume spirally twisted, constricted between seeds, reddish color. Seeds black, ellipsoid or oval.

Flowering & fruiting: April - June

Habitat & ecology: Evergreen forest

Voucher specimen: Longtho, Mokokchung district, Nagaland, 450 m, 26°28’45’’N 94°21’13.996’’E, P. Konyak NU-PK- 174

Distribution: Sri Lanka, South East Asia. India: Peninsula, North India, Andaman & Nicobar Islands, Arunachal Pradesh, Meghalaya, Sikkim, Nagaland.

Caesalpinia L., Sp. Pl. 1: 380, 1753

Shrub or small trees or climbers, with prickles. Leaves alternate, bipinnate, leaflets opposite or alternate, small or large, axillary or terminal. Stipules present or absent. Flowers showy, yellow or red. Petals 5, clawed, spreading, orbicular. Stamens 10, free, usually decurved in open flower. Pods dehiscent or indehiscent, smooth or bristles, compressed.

Caesalpinia decapetala (Roth.) Alston, Handb. Fl. Ceylon 6 (Suppl.) 89, 1931; Grierson & Long Fl. Bhut. 1.3: 624, 1987; Sanjappa Legum. India 11, 1992; *Caesalpinia sepiaria* Roxb. Fl. Ind. 2: 360, 1832; Baker in Hook.f. Fl. Brit. India 2: 256, 1878.

Climbing shrubs with copious prickles. Bark dark red, branches, rachis of leaves with recurved prickles and pubescent. Leaves 15- 25 cm long, paripinnate, pinnae 9- 10 pairs, opposite, with prickles in pairs at base. Leaflets 2- 2.5 cm x 7-9 mm, oblong, both ends rounded, glabracent. Racemes terminal, 15- 30 cm long, with numerous flowers, densely prickly. Corolla yellow, stamens sub-equal to petals in length. Legumes oblong-ligulate, 6- 12 cm long, glabrous, dehiscent, apex sharp beak. Seeds 6- 9, brown, elliptic.

Flowering & fruiting: May - September

Habitat & ecology: grows along the margin of evergreen forest

Voucher specimen: Shiyong village, Mon, Nagaland 1100 m 26°39’36.37’’N 94°54’31.672’’E, P. Konyak NU-PK-04

Distribution: world: Australia, Sri Lanka, Nepal, Bhutan, Bangladesh, Myanmar, China, Thailand, Vietnam, Japan, Korea. India: Bihar, Himachal Pradesh, Jammu & Kashmir, Punjab, Rajasthan, Himalayas upto 2000 m, Manipur, Nagaland.

Caesalpinia pulcherrima (L.) Sw., Observ. Bot. 166, 1791; Baker in Hook. f. Fl. Brit. India 2: 166, 1878; Grierson & Long Fl. Bhut. 1.3: 626, 1987; Sanjappa Legum. India 13, 1992; *Poinciana pulcherrima* L., Sp. Pl. 380, 1751.

Shrubs, bark green in color, smooth with scattered short prickles. Leaves bipinnate, rachis 12- 17 cm long. Pinnae 5- 7 cm long, leaflets 5-8 pairs, oblong or obovate, emarginated or obtuse apex, rounded base. Stipules subulate. Raceme terminal or axillary 25- 30 cm long. Corolla red fading to orange-yellow, orbicular, with claw subequal. Stamens 10, very far exerted, filaments free, long. Pods 6- 10 cm long, oblong, obliquely beaked, indehiscent. 6-9 seeded.

Flowering & fruiting: July- September

Habitat & ecology: grows as ornamental plant

Voucher specimen: Yimyu, Mokokchung district, Nagaland, 1092 m, 26°20'7.998''N 94°30'10''E, P. Konyak, NU-PK- 185.

Distribution: World: native of South America. India cultivated for ornamental, Nagaland.

Calliandra Benth., J. Bot. 2: 138, 1840

Shrubs or small trees. Leaves bipinnate, glabrous. Stipules persistent often spinescent, rarely absent. Pinnae 1 to several pairs, leaflets opposite, numerous, small or large. Head globose and axillary or racemes terminal. Flowers polygamous, calyx campanulate, toothed. Stamens indefinite, filaments connate at the base, much exerted. Legume flat, strap shaped, slightly falcate, margin thick. Seeds obovoid or orbicular.

Calliandra umbrosa (Wall.) Benth. Trans. Linn. Soc. 30: 537, 1875; Baker in Hook. f. Fl. Brit. India 2: 302, 1878; Kanjilal *et al.*, Fl. Assam 2: 174, 1938; *Inga umberosa* Wall. Pl. Asiat. Rar. 2: 23, 1831.

Shrub or small size tree. Stem brown with stipular spines. Leaves bipinnate, stipules spinescent, pinnae 1 pair. Leaflets oblong to elliptic, glabrous, coriaceous, and bluntly acuminate. Head axillary, peduncles 3-4 cm long. Flowers clustered, sessile, calyx campanulate. Corolla funnel shaped. Stamens numerous. Legume strap shaped, flat 10- 15 cm long, margin thicker, dehiscent.

Flowering & fruiting: October- January

Habitat & ecology: Cultivated for ornaments.

Voucher specimen: Wakching, Mon district, Nagaland 1105 m 26°41᾽19.99’’N 94°53’38.187’’E, P. Konyak NU-PK-181

Distribution: Bangladesh, Myanmar, Malaysia. India: Assam, Meghalaya

Cassia L., Sp. Pl. 1: 376, 1753

Trees, shrubs or herbs. leaves paripinnate, leaflets opposite, without stipels. Stipules deciduous or persistent. Flowers in terminal panicles or axillary. Corolla zygomorphic, Sepals 5, subequal. Petals 5, subequal. Stamens 10, subequal or unequal. Pods linear, cylindrical or compressed, flat, indehiscent, septate in between. Seeds few to numerous.

Cassia fistula L., Sp. Pl. 377, 1753; Baker in Hook.f. Fl. Brit. India 2: 261, 1878; Kanjilal *et al*., Fl. Assam 2: 128, 1838; Grierson & Long Fl. Bhut. 1.3: 628, 1987; Sanjappa Legum. India 15, 1992.

Deciduous trees of about 15- 20 m tall. Leaves 15 - 40 cm, 3 or 4 pairs. Stipules deltoid, 1-2 mm deciduous. Leaflets 7 - 13 x 4 - 8 cm, ovate, leathery, glabrous when mature, and puberulent when young, base broadly cuneate, apex acute. Racemes axillary 20 - 40 cm, pendent, clustered flowers. Pedicels 3 - 5 cm, slender. Corolla golden yellow, broadly ovate, subequal. Stamens 10, 3 long with curved filaments 3-4 cm, 4 medium size 8-10mm and 3 smaller. Pods 30- 60 cm long, pendulous, blackish-brown, indehiscent. Seeds numerous.

Flowering & fruiting: May- June

Habitat & ecology: cultivated as decorative trees

Voucher specimen: Tuli, Mokokchung district, Nagaland, 160 m, 26°40’25’’N 94°39’42.998’’E, P. Konyak NU-PK- 17.

Distribution: World: Africa, Asia, Australia, America. India: throughout drier parts- often cultivated, Nagaland.

Cassia javanica L., Sp. Pl. 379, 1753; Grierson & Long Fl. Bhut. 1.3: 629, 1987; Sanjappa Legum. India 16, 1992.

Trees upto 40 - 45 m tall. Stem brown or grayish. Leaves paripinnate, rachis 10 - 25 cm long, leaf peduncles alternate. Pedicels .5 - 1.5 cm long. Leaflets 12 - 24 pairs, entire, ovate - elliptic, minutely pubescent beneath, apex acute or obtuse or shortly acuminate. Inflorescence at short side branches, or terminal, panicles. Sepals ovate or broadly lanceolate. Corolla pink, petals 5, elliptic. Stamens 10, 3 long with filament, 7 short. Pods 7 - 30 cm long, terete, dark brown, indehiscent.

Flowering & fruiting: June- August

Habitat & ecology: grows near roadside.

Voucher specimen: Longnak, Mokokchung district, Nagaland, 554 m, 26^{o}27’35’’N 94^{o}23’18.999’’E, P. Konyak NU-PK-168

Distribution: world: Australia, Indonesia, USA, Southeast Asia. India: Almost throughout, Nagaland.

Chamaecrista (L.) Moench, Methodus 272, 1794

Annual or perennial herbs or undershrub, rarely trees. Leaf abruptly pinnate, leaflets opposite. Gland usually present, disk or cup-shaped, flat. Flowers yellow or red. Sepals 5, petals 5, unequal. Stamens 10 - 5, filaments straight. Legume dehiscent, flat.

Chamaecrista mimosoides (L.) Greene, 4:27, 1899; *Cassia mimosoides* L. Sp. Pl. 379, 1753; Baker in Hook. Fl. Brit. India 2: 266, 1878; Sanjappa Legum. India 17, 1992; Grierson & Long Fl. Bhut. 1.3: 630, 1987.

An erect herbs or undershrubs of about 3.5 ft tall. Stem with spreading hairs branches, reddish, terete, hard and hairy. Leaves alternate arrangement. Leaves bipinnate, 5-6 cm long, discoid sessile gland in upper parts of petioles. Leaflets linear, sensitive, midvein near the upper margin unequal, mcronate apex, minute hairs in lower surface. Stipules subulate. Flowers in short raceme, solitary. Corolla bright yellow, 4 - 5 petals, obovate or orbicular. Stamens 10, 5 long and 5 shorter. Legumes flat, white pubescent, transverse apex and tapering base. Nodules present- indeterminate.

Flowering & fruiting: September – October

Habitat & ecology: along roadside or edges of evergreen forest.

Voucher specimen: Jhakhama, Kohima district Nagaland, 1650 m 25°34’38.604’’N 94°7’32.843’’E, P. Konyak NU-PK- 159.

Distribution: Africa, Middle East South East Asia, Australia. India: South India, Delhi, Gujarat, Himachal Pradesh, Uttar Pradesh, East India, Nagaland.

Fig.15. *Chaemaecrista mimosoides* (L.) Greene

Delonix Raf. Fl. Tellur. 2:92, 1837

Trees, unarmed. Leaves bipinnate, leaflets small, numerous, small, entire. Stipels absent, stipules leaf-like, deciduous. Inflorescence corymbose racemes, terminal or axillary. Sepals 5 subequal, valvate. Petals 5, alternating with setals, margin crispate, clawed. Stamens 10 free. Legume compressed, large, linear-oblong. Seeds transverse oblong.

Delonix regia (Bojer ex Hook.) Raf. Fl. Tellur. 2: 92, 1837; Grierson & Long Fl. Bhut. 1.3: 622, 1987; *Poinciana regia* Bojer ex Hook. in Bot. Mag. 56: 5, t. 2884. 1829; Baker in Hook. Fl. Brit. India 2: 260, 1878;

Trees, deciduous, 15 - 20 m tall. Bark grey, rough, crown hemispherical. Leaves 20 - 60 cm, pinnae 20 - 25 pairs. Leaflets 25 - 30 pairs, oblong, obtuse or subacute, base obliquely rounded. Racemes terminal or axillary. Corolla red to orange - red, obovate. Sepals reddish inside, margin yellow. Stamens curved upward 3 - 4 cm long, unequal. Filaments thick, woolly in lower part. Legume 30 - 60 cm long, thick, oblong.

Flowering & fruiting: July- October.

Habitat & ecology: planted for landscaping or ornamental.

Voucher specimen: Lampong Sheanghah, Mon district, Nagaland, 906 m, 26^{o}45’26’’N 95^{o}4’37.999’’E, P. Konyak NU-PK-193

Distribution: Asia, Australia, Central America, Africa. India: Throughout India, Nagaland

Entada Adans., Fam. Pl. 2: 318, 1763.

Woody climbers, or scandent shrubs, large. Leaves bipinnate, rachis ends in branched tendril, stipules small. Leaflets opposite, 1 to many pairs. Flowers small, numerous in crowded axillary spike, bisexual or polygamous. Calyx campanulate, shortly dentate. Petals free or slightly united. Stamens 10, free. Legume woody large, straight or spirally twisted, sutures thickened. Seeds globose to orbicular large, testa brown.

Entada phaseoloides (L.) Merr. in Philipp. J. Sci., C9:86, 1914; *Lens phaseoloides* L. in Herb. Amb. 18, 1754; *Entada scandens* (L.) Benth. In J. Bot. (Hooker) 4: 332, 1841; *Mimosa scandens* L. in Sp. Pl. ed. 2: 1501, 1763.

Large woody climbers. Stem twinning. Leaves bi-pinnate, leaflets 4 - 6 pairs, lamina entire, acute or obtuse, glabrous. Stipules small, linear. Racemes long, slender, axillary and terminal. Flowers polygamous, sepals green, petals creamy white to yellowish, stamen white. Pods 15 - 90 x 8 - 12 cm, straight to slightly curved, pericarp bony, green, turning dark brown. Seeds 2 - 15, testa hard, dark red or brownish - red.

Flowers & fruiting: April- August

Habitat & ecology: grows in evergreen forest or along the edges of forest.

Voucher specimen: Wanching, Mon district, Nagaland 1269 m 26^{o}39’58.627’’N 94^{o}50’40.987’’E, P. Konyak NU-PK-171

Distribution: world: Australia, Pacific Ocean- Fiji, Bismarck Archipelago, China, Japan, Philippines, Thailand, Vietnam, Myanmar. India: East Himalaya, Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Tripura, West Bengal.

Leucaena Benth., J. Bot. 4:416, 1842

Trees or shrubs, evergreen. Leaves bipinnate, stipules small, deciduous. Rachis bear glands near lowest and uppermost pinnae. Leaflets opposite, numerous and small. Flowers small, numerous in globose heads on axillary peduncles, or terminal and racemosely arranged. Calyx campanulate, 5 - toothed. Petals 5 free, stamens 10 free, exerted. Legume linear, compressed, coriaceous.

Leucaena leucocephala (Lam.) de Wit, Taxon 10: 54, 1961; *Leucaena glauca* Benth. Hook., London J. Bot. 4: 416, 1842; Baker in Hook. f. Fl. Brit. India 2: 290, 1876; *Leucaena latisiliqua* (L.) Gillis, Taxon 23: 190, 1974; Sanjappa Legum. India 67, 1992; *Mimosa glauca* L. Sp. Pl. ed. 2, 1: 1504, 1763, non L., 1753; *Mimosa leucocephala* Lam. Encycl. 1:12, 1783.

Shrubs or small tree. Stem brown, branches pubescent, glabrous when matured. Stipules caducous. Pinnae 12 - 20 cm long. Leaflets 10 - 15 pairs, linear, oval or obliquely oblong and glabrous, acute at apex. Peduncles 2 - 5 cm long. Corolla white in globose head

in short peduncled. Stamens 10, partly pubescent. Pods 10 - 20 cm long, compressed, coriaceous. 15 - 21 seeded green or brown when matured.

Flowering & fruiting: June- September

Habitat & ecology: cultivated as ornamental or vegetables

Voucher specimen: Khensa, Mokokchung district, Nagaland, 1108 m 26°20'50''N 94°30'6''E, P. Konyak NU-PK-170

Distribution: world: tropical Asia, Africa, tropical America. India: throughout, Nagaland.

Mimosa L., Sp. Pl. 1: 516, 1753

Herbs or shrubs prostrate or erect rarely trees or climbers. Leaves evenly bipinnate, pinnae digitately arranged or alternate, leaflets very sensitive to contact, numerous. Stipules persistent. Flowers polygamous, sessile, in globose head, axillary or some terminal. Calyx campanulate, minutelt toothed. Petals connate at base. Stamens 4 or 8, free, exerted. Pods oblong or linear, membranous or leathery, dividing transversely into 1 seeded segment.

Keys to species

1a. Stem cylindric with curved prickles. Pinnae 2 pairs…….. *M. pudica*

1b. Stem angular without prickles. Pinnae 7- 10 pairs…..……..*M. diplotricha var. inermis*

Mimosa pudica L., Sp. Pl. 1: 518, 1753; Baker in Hook. f. Fl. Brit. India 2: 291, 1878; Sanjappa Legum. India 69, 1992; Kanjilal et al., Fl. Assam 2: 152, 1938; Grierson & Long Fl. Bhut. 1.3: 639, 1987.

Annual or perennial herbs or undershrubs, deciduous, spreading. Stem cylindric, branched, with reflexed bristle and curved prickles. Leaves sensitive, pinnae 5 - 8 cm long, 2 pairs, digitately arranged. Leaflets 20 - 27 pairs, linear- lanceolate, adaxially glabrous and bristles under surface, margin ciliate, apex acute. Heads solitary or 2, axillary, globose. Flowers numerous, corolla pink, small. Stamens 4, exerted. Pods 3 - 5, developing from each head, flat, oblong, bristle sutures.

Flowering & fruiting: May- August

Habitat & ecology: grows as weeds along roadside.

Voucher specimen: Longtho, Mokokchung district, Nagaland, 554 m, 26°29’36.517’’N 94°22’14.235’’E, P. Konyak NU-PK- 169.

Distribution: Pantropical- native to tropical America. India: throughout, Nagaland.

Mimosa diplotricha var. inermis (Adelb.) Veldkamp, Fl. Males. Bull. 9: 416, 1987; *Mimosa invisa var. inermis* Adelb., Reinwardtia 2: 359, 1953.

Subshrubs or herbs. Scandent or prostrate stem, angular, hirsute, without prickles along angles. Leaves 10 - 15 cm long, alternate, rachis tomentose, pinnae 7 - 10 pairs and base of each pinnae has recurved prickles. Leaflets 20 pairs, linear-oblong, white villous. Heads axillary or apex of leaves. Corolla pink, stamens 8. Legumes in cluster, oblong 3-3.5 cm long, villous. Seeds 3 - 5.

Flowering & fruiting: October- December

Habitat & ecology: grows as weeds along roadside or edges of forest.

Voucher Specimen: Ungma Mokokchung district, Nagaland, 1090 m 26°16’59’’N 94°28’32’’E, P. Konyak NU-PK- 957

Distribution: Tropical America, Indonesia, New Guinea, Sri Lanka, Mauritius India: Kerala, Tamil Nadu, Karnataka, naturalized in other states too as weeds, Nagaland.

Parkia R. Br., Denh. & Clapp. Trav. App. 234, 1826

Trees, unarmed. Leaves bipinnate, with numerous pinnae and leaflets. Inflorescence solitary and axillary or several at apices of branches, large and clavate or depressed globose, pedunculate. Calyx cylindric, teeth 5, short and imbricate. Petals 5, linear – spatulate, free or connate to middle. Stamens 10, free or connate to base and adnate to corolla. Staminodes 10, in a long bundle, filiform. Legumes straight or curved, oblong or elongate, woody transversely seeded.

Parkia timoriana (DC.) Merr., Philippine J. Sci. Bot. 5: 33, 1910; Sanjappa Legum. India 70, 1992; *Parkia roxburghii* G. Don., Gen. Syst. 2: 397, 1832; Baker in Hook. f. Fl. Brit. India 2: 289, 1878; Kanjilal *et al*., Fl. Assam 2: 151, 1938.

Trees, around 30 m, branches brown. Leaf rachis 30 - 50 cm long, glabrous, petiolar gland circular. Pinnae 20 - 30 pairs, leaflets bi-pinnate 50 - 60 pairs, numerous, obliquely oblong, glabrous. Head turbinate- clavate, 4 - 6 cm, constricted at base, flowers 1 - 1.5 cm long. Corolla white or yellow, corolla lobes spreading. Stamens exerted. Pods 15 - 30 cm long, straight or twisted, glabrous. Seeds ovoid, black when matured.

Flowering & fruiting: October- March

Habitat & ecology: cultivated for legume, grows as shades to crop plantation.

Voucher specimen: Shiyong, Mon district, Nagaland, 990 m, 26^{o}40’20.038’’N 94^{o}55’19.722’’E, P. Konyak NU-PK- 198.

Distribution: world: cultivated in tropical Asia- Burma to New Guinea. India: Assam, Meghalaya, Mizoram, Manipur, Nagaland.

Senna Tourn. Ex Mill., Gard. Dict., ed. 8, 1768

Herb, shrubs or small trees. Leaves pinnate, leaflets opposite. Rachis and petiole with or without glands. Inflorescence in axillary or terminal racemes, bracteoles absent. Sepals 5, petals 5, subequal, usually yellow. Stamens 10, subequal. Legume indehiscent or inertly dehiscent in one or both sutures. Seeds numerous, filiform.

Keys to species

1a. Petiole and rachis of leaves without gland……*S. alata*

1b. Petiole and rachis of leaves with gland.

2a. Leaf rachis with glands between the leaflets.

3a. Leaflets 3-4 pairs, apex acuminate……..……*S. floribunda*

3b. Leaflets 3 pairs, apex rounded…….…….……...*S. tora*

2b. Leaf rachis with the glands at the base only.

4a. Leaves and pods hirsute. Sutures of pods not thickened……*S. hirsuta*

4b. Leaves and pods not hirsute. Sutures of pods thickened..…*S. occidentalis*

Senna alata (L.) Roxb., Fl. Ind. 2: 349, 1832; Cassia alata L., Sp. Pl. 378, 1753; Baker in Hook. f. Fl. Brit. India 2: 263, 1878; Kanjilal *et al*., Fl. Assam 2: 133, 1938; Sanjappa Legum. India 14, 1992; Grierson & Long Fl. Bhut. 1.3: 629, 1987.

Shrubs 1 - 5 m tall. Branches green, thick. Leaves pinnate, opposite, 30 - 40 cm long. Stipules persistent. Leaflets 7 - 12 pairs, oblong or obovate- oblong, coriaceous, glabrous, base obliquely truncate, apex rounded and cuspidate. Racemes axillary or terminal panicles, many flowered, 10 - 50 cm long, sepals orange- yellow, unequal. Petals yellow ovate-orbicular. Stamens 10, 2 lateral ones larger than others. Pods 10 - 15 cm long, tetragonous, seeds flat, rhombic.

Flowering & fruiting: August- October

Habitat & ecology: cultivated for ornamental and medicinal values.

Voucher specimen: Mokokchung, Mokokchung district, Nagaland, 1092 m, 26^{o}20’7.998’’N 94^{o}30’9.999’’E, P. Konyak NU-PK-179.

Distribution: Pantropical- native to South America. India: Naturalized in Southern and Eastern parts of India, Nagaland.

Senna floribunda (Cav.) H.S. Irwin & Barneby, Mem. New York Bot. Gard. 35: 360, 1982; *Cassia floribunda* Cav. Descr. 132, 1802; Sanjappa Legum. India 15, 1992; *Cassia laevigata* Willd., Enum. Hort. Berol. 441, 1809; Kanjilal *et al*., Fl. Assam 2: 132, 1938.

Shrubs, stem glabrous, alternate branching. Leave paripinnate, 3 - 4 pairs, rachis 10 - 17 cm long, gland in between each pair of leaflets. Stipules caducous. Leaflets 4 - 7 x 2 - 3 cm, glabrous, acuminate, base rounded. Inflorescence in axillary racemes. Corolla yellow, obovate. Stamens 7 fertile, 2 longer, 1 intermediate and 4 short. Pods 8 - 10 cm long, terete, transversely septate.

Flowering & fruiting: May- August

Habitat & ecology: grows along roadside, edges of Sub-tropical forest.

Voucher specimen: Kigwema, Kohima district, Nagaland, 1739 m 25°36'13.608''N 94°69.432''E, P. Konyak NU-PK- 153.

Distribution: world: Nepal, native to tropical America. India: Assam, Bihar, Himachal Pradesh, Karnataka, Manipur, Meghalaya, Mizoram, Sikkim, Tamil Nadu, Uttar Pradesh, Nagaland.

Senna tora (L.) Roxb., Fl. Ind. 2: 340, 1832; Cassia tora L. Sp. Pl. 376, 1753; Baker in Hook. f. Fl. Brit. India 2: 263, 1878; Kanjilal *et al*., Fl. Assam 2: 131, 1938; Sanjappa Legum. India 22, 1992.

Herbs or undershrub, 1 - 2 m tall. Stem cylindrical, alternate branching. Leaves rachis 8 - 10 cm long. Leaflets 3 pairs, 5 - 6 x 2.5 - 3 cm of upper leaflets, lower 2.5 - 3 x 1.5 - 2 cm, obovate, obovate-oblong, apex rounded or cuspidate, base rounded or cuneate. Inflorescence in very short axillary racemes with 2-3 flowered. Corolla yellow, unequal, 4 -5, sepals membranous. Stamens fertile 7, 3 reduced. Pods 10 - 12 cm long, terete, septate transverse in between numerous seeds.

Flowering & fruiting: August- October

Habitat & ecology: grows in lower elevation as weed along roadside.

Voucher specimen: Longnak, Mokokchung district Nagaland, 550 m, 26°26'11.74''N 94°23'17.916''E, P. Konyak NU-PK- 175.

Distrbution: Native to South America, pantropical weed. India: throughout, Nagaland.

Senna hirsuta (L.) H.S. Irwin & Barneby, Phytologia 44: 499, 1979; *Cassia hirsuta* L., Sp. Pl. 378. 1753; Baker in Hook. f. Fl. Brit. India 2: 263, 1878; Kanjilal *et al*., Fl. Assam 2: 131, 1938; Sanjappa Legum. India 15, 1992.

Herbs or shrubs, 0.6- 2.5 m tall. Stem and leaf rachis, petioles densely villous. Rachis 10 - 18 cm long, with gland at the base, stipules subulate, .2 - .7 cm long. Leaflets 4 - 5 pairs, ovate- oblong, oblong lanceolate 2 - 7 x 1 - 2 cm, both surface villous, base rounded, apex acuminate, lower leaflets much smaller than terminals. Inflorescence at axillary or at the apical regions in short villous peducles, clustered. Sepal 5 unequal, villous. Corolla yellow, stamen 6, unequal in length. Ovary hirsute, subsessile. Legume hirsute 7- 15 cm long, slender or cylindrical. Seeds ovate.

Flowering & fruiting: October- November

Habitat & ecology: grows along roadside

Voucher specimen: Chuchuyimpang, Mokokchung district, Nagaland 1000 m 26°20'1.999''N 94°34'32.999''E, P. Konyak NU-PK- 157.

Distribution: Native to tropical America. India: Assam, Meghalaya, Nagaland.

Senna occidentalis (L.) Link, Handbuch 2: 140, 1831; *Cassia occidentalis* L. Sp. Pl. 377, 1753; Baker in Hook. f. Fl. Brit. India 2: 262, 1878; Kanjilal *et al*., Fl. Assam 2: 129, 1938; Sanjappa Legum. India 19, 1992.

Herb or undershrub, foetid, cylindrical stem, glabrous. Rachis 10- 12 cm long, gland at the base, leaves 4 - 5 pairs. Stipules lanceolate .7 cm long. Leaflets 3.5 - 6 x 1 - 2.5 cm, ovate to ovate-oblong, base rounded, apex acuminate. Inflorescence in axillary or terminal racemes. Pedicels .5 - 1 cm long, corolla yellow. Pods 7 - 12 cm long, compressed with transverse depression between seeds. Seed 20 - 30, orbicular, brown.

Flowering & fruiting: April – September

Habitat & ecology: grows along roadside in lower elevation upto 1050 m.

Voucher specimen: Tanhai, Mon district, Nagaland 1017 m 26°43'34.766''N 94°55'59.018''E, P. Konyak, NU-PK-199.

Distribution: Native to South America, Sri Lanka. India: Throughout India, Nagaland.

Fig.16. *Senna occidentalis* L.

Sub-family: Cercidoideae LPWG

Trees, shrubs or lianas. Unarmed but with prickles or infrastipular spines. Leaves uni- or bifoliolate. Leaf blade entire or bilobed with a small mucronate apex or between the lobes. Flowers bisexual, rarely unisexual. Sepals united in a spathaceous or 2 to 5 lobed calyx or free. Petals free, stamens 10 or fewer in two whorls of alternate length. Filaments partly connate or free. Pods dihescent.

There are 12 genera and ca. 335 specis distributed in the world.

Bauhinia L., Sp. Pl. 1: 374, 1753

Trees, shrubs or climbers. Dieocious or bisexual plant. Leaves simple, bilobed at apex, palmately veined, stipules small, caducous. Flowers in axillary or terminal or panicles, more or less zygomorphic. Bract and bracteoles small, calyx tube, closed or open with 5 - teeth, spathe-like. Petals 5, subequal, usually clawed at base, white, pink or purple. Stamens 5 or 10 or even reduced, filaments free. Pods linear, oblong, flat, coriaceous or woody, dehiscent or indehiscent.

1a. Shrubs or trees. Leaves simple or 2-lobed……. *Bauhinia*

Keys to species

1a. Trees.

2a. Flowers when leafy. Petals pure white, rarely purple. Fertile stamens……..*B. purpurea*

2b. Flowers when leafless. Petals usually white spotted with pink or purple. Fertile stamens - 5…….*B. variegata*

1b. Shrub.

3a. Young branches glabrous…….*B. acuminata*

3b. young branches brown pubescent.

Bauhinia purpurea L., Sp. Pl. 1: 375, 1753; Baker in Hook. f. Fl. Brit. India 2: 284, 1878; Grierson & Long Fl. Bhut. 1.3: 633, 1987; Sanjappa Legum. India 5, 1992. Haridasan & Rao, Fl. Megh 1: 316, 1985.

Small medium size tree, upto 15 m tall. Leaves alternately arranged. Leaflets broadly elliptic, deeply cordate, bilobed, subacute or obtuse at apex, veins - 9, minutely hairy beneath, rough. Inflorescence a raceme with few flowers. Flower buds fusiform. Calyx a spathe into 2 - lobes. Petals 5, pure white, light pink when in buds. Stamens 3, filament long, staminodes present. Pods 15 - 20 cm long, flat, linear-oblong.

Flowering & fruiting: September- November

Habitat & ecology: grows in sub-tropical forest or edges of roadside as landscaping.

Voucher specimen: Dzüdza, Kohima district, Nagaland, 1008 m 25^{o}41’17.376’’N 94^{o}2’50.135’’E, P. Konyak NU-PK-689.

Distribution: World: Africa, China, Bangladesh, Bhutan, Myanmar, Nepal, Pakistan, Thailand, Sri Lanka, Vietnam. India: throughout, Nagaland.

Bauhinia variegata L. Sp. Pl. 1: 375, 1753; Baker in Hook.f. Fl. Brit. India 2: 284, 1878; Grierson & Long Fl. Bhut. 1.3: 634, 1987; Sanjappa Legum. India 6, 1992.

A medium size tree, 10 - 15 m tall. Bark rough, brown branches. Leaves 5 - 8 cm long, deeply cordate or bilobed, glabrous, round apex, green in color. Inflorescence large, subsessile, calyx open as spathe, 2-lobed. Petals 5, 4 - white, 1- stain with pink or purple, obovate. Stamens 5, filament pink as long as petals, little curved. Pods 18 - 20 cm long, flat, reddish brown, slightly falcate. Seeds 10 - 15.

Flowering & fruiting: March- May

Habitat & ecology: grows in evergreen mixed forest.

Voucher specimen: Shiyong village, Mon district, Nagaland 1105 m 26^{o}41’47.465’’N 94^{o}55’4.212’’E, P. Konyak NU-PK- 194.

Distribution: World: China, Bhutan, Myanmar, Nepal, America, Pakistan. India: throughout, Nagaland.

Bauhinia acuminata L., Sp. Pl. 1: 376, 1753; Baker in Hook.f. Fl. of Brit. India 2: 276, 1878; Kanjilal *et al*., Fl. of Assam 2: 139, 1938; *Bauhinia candida auct., non* Ait.; DC., Prod.2: 513, 1825**.**

Shrubs or small size trees, 2-3 m tall. Branches glabrous, not straight. Petioles 2.5 - 4 cm long, pubescent. Leaves alternately arranged, leaflets 9 - 12 x 8 - 12.5 cm, sub-leathery cordate, grayish pubescent beneath and glabrous above. Inflorescence a raceme, with few flowers, axillary. Calyx spathe, 5 - toothed. Corolla white, obovate - elliptic. Fertile stamens 10 in 2 whorls, subequal. Ovary prominently stalked. Legume 6 - 10 cm long, slightly curved, linear- oblanceolate, compressed. 5 - 10 seeded.

Flowering & fruiting: May- July

Habitat & ecology: grows in secondary forests.

Voucher specimen: Tizit, Mon district, Nagaland, 123 m, 26^{o}55’10.31’’N 95^{o}3’25.763’’E, P. Konyak NU-PK-19.

Distribution: World: Sri Lanka, Myanmar, China, Vietnam, Malaysia, Philippines. India: Peninsular, North-West India, Andaman Islands, Assam, Bihar, Meghalaya, West Bengal, Nagaland.

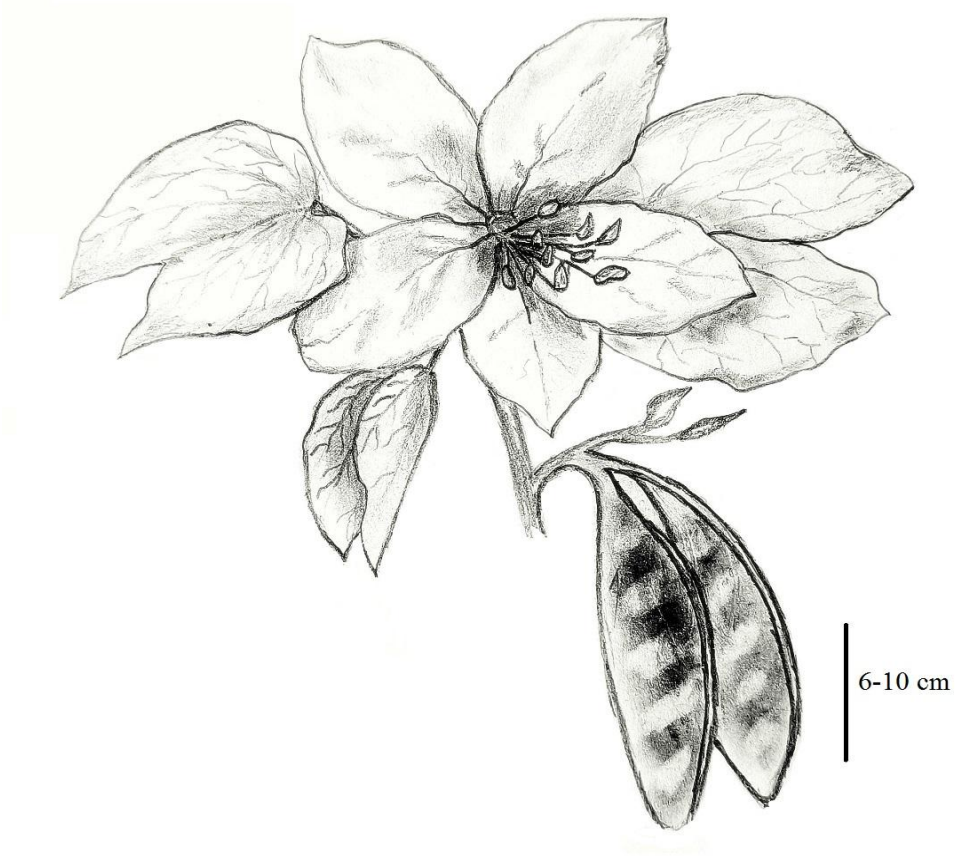


Fig.17. Flower and Pods of *Bauhinia acuminata* L.

CHAPTER - 4

RESULTS AND DISCUSSIONS

The present work was carried out from the year 2017- 2023, and the following are the results and observations.

Species compositions of the family Leguminosae

The survey was conducted in three districts of the study areas, namely Kohima, Mokokchung, and Mon districts, within the period consecutively. The study recorded the Leguminosae family with a total of 116 taxa, with 113 species, 3 varieties, and 63 genera, and classifying them into three available subfamilies (Table.2). Papilionoideae has the highest representation with 87 species, 2 varieties, and 48 genera, Caesalpinioideae with 23 species, 1 variety, and 14 genera, Cercidoideae with 3 species and 1 genus (Fig.18)

The life forms were trees 18 (16%), woody climbers 14 (12%), climbers 26 (22%), shrubs 33 (28%), and herbs 25 (22%). (Fig.22). In the sub-family Cercidoideae, 2 species are trees and 1 shrub; in Caesalpinoideae, 10 species are trees, 7 are shrubs, 2 are woody climbers, and 5 are herbs. In Papilionoideae, 6 species are trees, 25 are shrubs, 12 are woody climbers, 26 are climbers, and 20 are herbs (Table.2). 94 (81%) species are naturally found in the wild, while 22 (19%) species were cultivated (Fig.24).

In Kohima, a total of 62 taxa were recorded with 40 genera and 61 species, and 1 variety of Leguminosae. Out of which subfamily Cercidoideae with 1 genus and 1 species, Caesalpinioideae with 4 genera and 4 species, and Papilionoideae with 35 genera and 56 species, 1 variety respectively. (Fig.19)

In Mokokchung, a total of 30 taxa were recorded with 24 genera and 28 species, 2 varieties. Out of which 8 genera with 11 species, 1 variety belong to Caesalpinioideae and 16 genera with 17 species, 1 variety belong to Papilionoideae. (Fig.20).

In Mon, a total of 24 species with 20 genera were recorded, of which 1 genus and 2 species belong to Cercidoideae, 7 genera and 8 species of Caesalpinioideae, and 12 genera with 14 species belong to Papilionoideae (Fig.21).

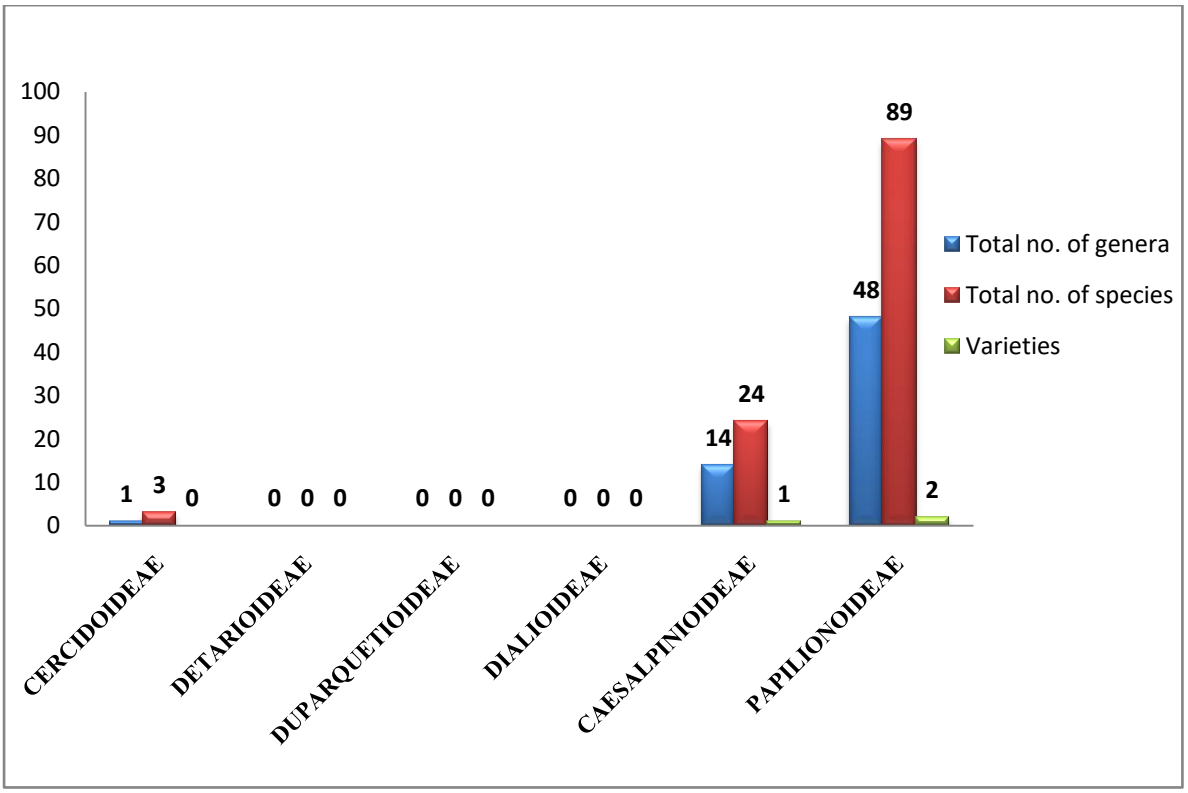


Fig.18. Graphical representation of total no. of genera, species, and varieties in the study areas.

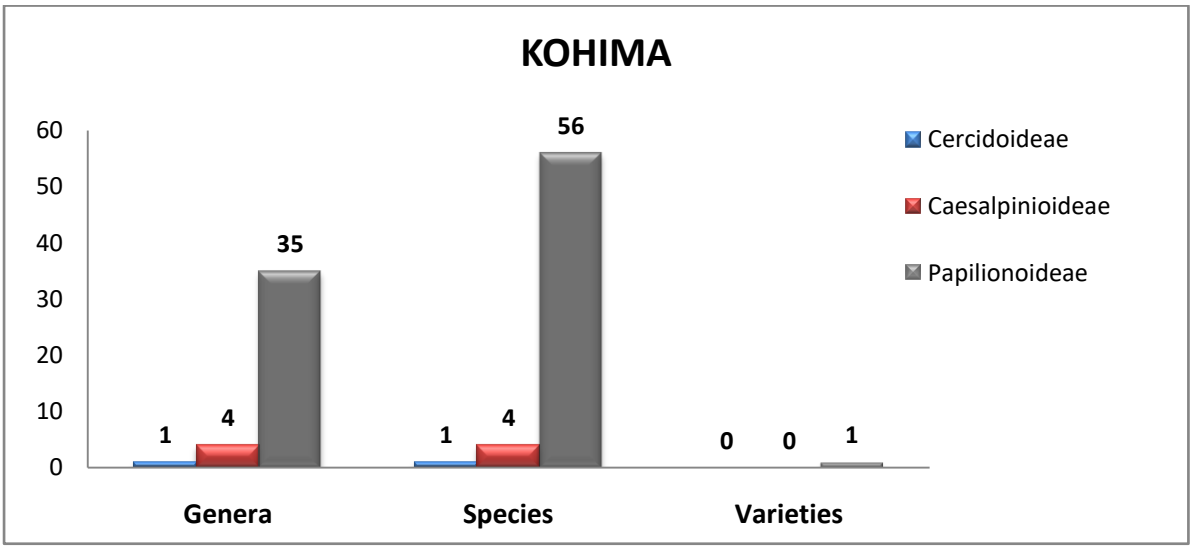


Fig.19. Graphical representation of total no. of Genera, species and varieties of Kohima.

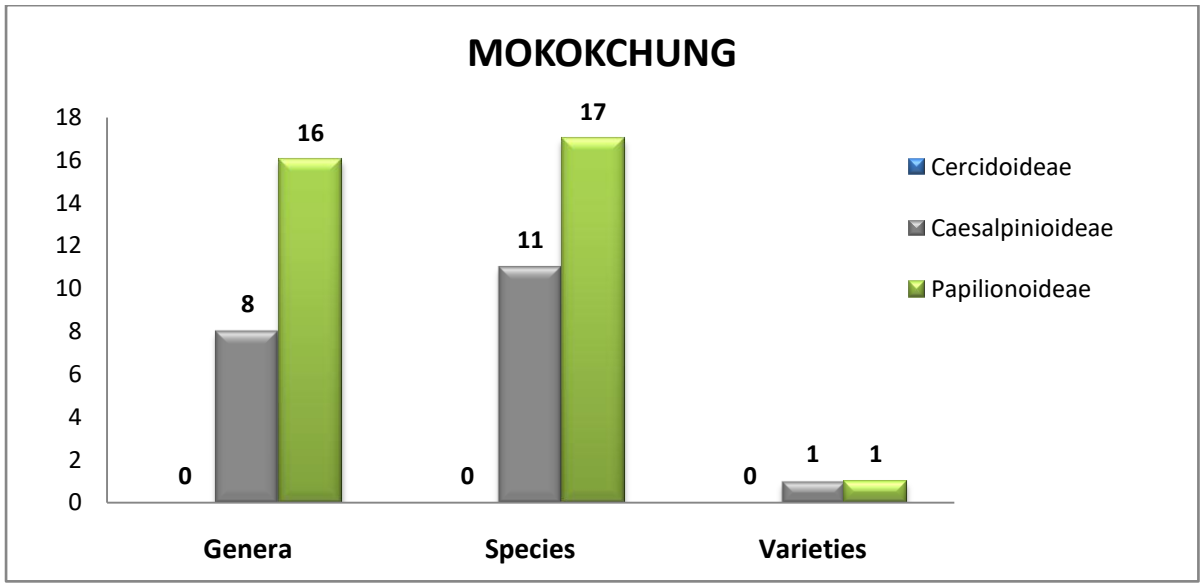


Fig.20. Graphical representation of total no. of Genera species and varieties of Mokokchung.

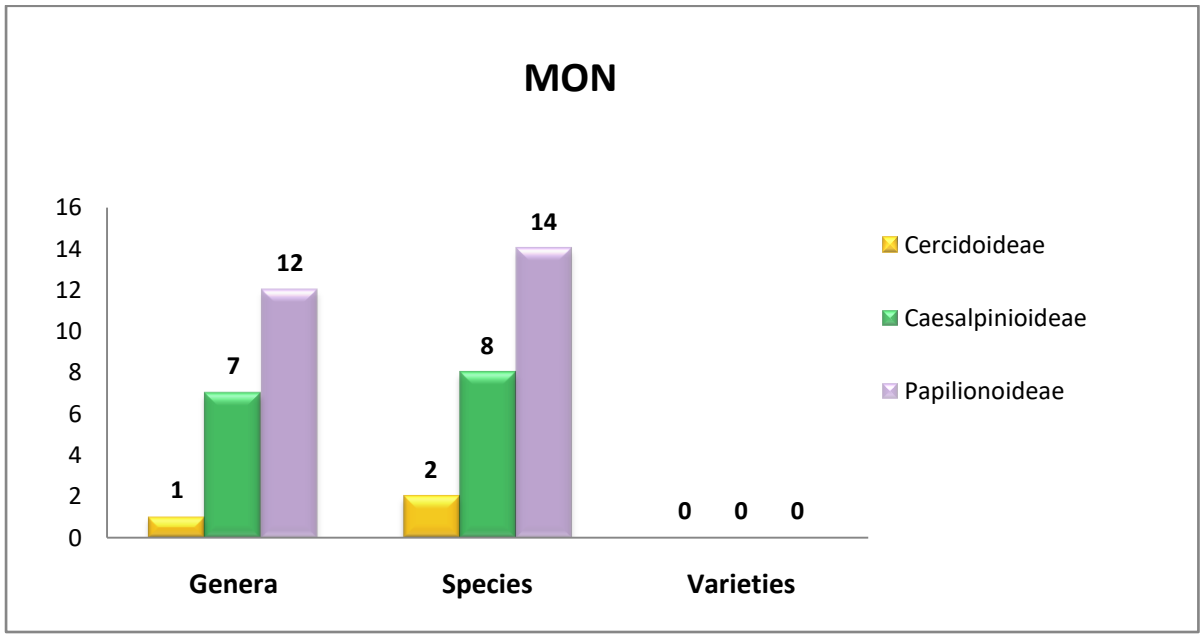


Fig.21. Graphical representation of total no. of Genera species and varieties of Mon.

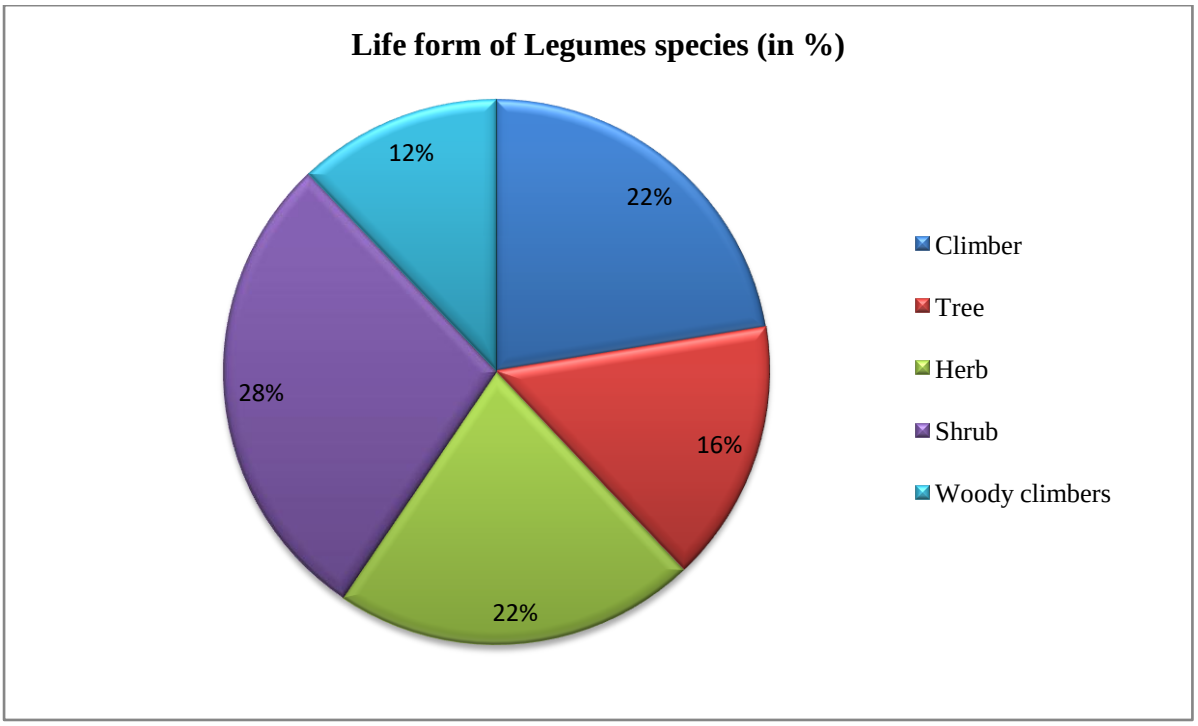


Fig.22. Pie-chart representation of life forms of Leguminosae species (%).

The recorded list of 116 Legumes species with the subfamilies classification viz., Cercidoideae, Caesalpinioideae, and Papilionoideae, distributions, and habits are mentioned below in tables.

Table 2. Lists of plant species of the family Leguminosae with distribution, habits, flowering & fruiting seasons, specimen number, and IUCN status.

Abbreviations, Khm = Kohima, Mkg = Mokokchung, Mar = March, Apr = April, Aug = August, Sep = September, Oct = October, Nov = November, Dec = December; NU= Nagaland University, PK= Phejin Konyak; LC= Least Concern, NE= Not Evaluated, VU= Vulnerable.

Sl. No.	**Botanical Names**	**Distribution**	**Habits**	**Fl & Fr.**	**Specimen examined**	**IUCN Status**
1.	**Sub-family: CERCIDIOIDEAE**					
1	*Bauhinia variegata* L.	Mon	Tree	Mar- May	NU-PK-194	LC
2	*Bauhinia purpurea* L.	Khm	Tree	Sep- Nov	NU-PK-689	LC
3	*Bauhinia acuminata* L.	Mon	Shrub	May- July	NU-PK-19	NE
2	**Sub-family: CAESALPINIOIDEAE**					
1	*Acacia pennata* (L.) Willd.	Khm	Woody climber	May- Sep	NU-PK-971	LC
2	*Adenanthera pavonina* L.	Mkg	Tree	May- Aug	NU-PK-679	LC
3	*Albizia chinensis* (Osb.) Merr.	Mkg	Tree	Apr- July	NU-PK-167	NE
4	*Albizia julibrissin* Durazz.	Mon	Tree	May- Aug	NU-PK-01	VU

5	*Albizia lebbeck* (L.) Benth.	Khm	Tree	Aug- Oct	NU-PK-963	LC
6	*Albizia procera* (Roxb.) Benth.	Mon	Tree	June- Aug	NU-PK-964	LC
7	*Archidendron clypearia* (Jack.) Nielson.	Mkg	Tree	Apr- June	NU-PK-174	LC
8	*Caesalpinia decapetala* (Roth.) Alston	Mon	Shrub	Apr- Oct	NU-PK-04	LC
9	*Caesalpinia pulcherrima* (L.) Sw.	Mkg	Shrub	July- Sep	NU-PK-185	LC
10	*Calliandra umbrosa* (Benth.) S.R. Paul	Mon	Shrub	Oct- Jan	NU-PK-181	NE
11	*Cassia fistula* DC.	Mkg	Tree	May- June	NU-PK-17	LC
12	*Cassia javanica* L.	Mkg	Tree	June- Aug	NU-PK-168	LC
13	*Chamaecrista mimosoides* (L.) Greene	Khm	Herb	Sep- Oct	NU-PK-159	LC
14	*Delonix regia* (Bojer ex Hook.) Rafin	Mon	Tree	June- Sep	NU-PK-193	LC
15	*Entada phaseoiloides* (L.) Merr	Mon	Woody climbers	Apr- Aug	NU-PK-171	NE
16	*Leucaena leucocephala* (Lam.) de Wit	Mkg	Shrub	June- Sep	NU-PK-170	NE
17	*Mimosa diplotricha var. Inermis* (Adelb.)	Mkg	Herb	Oct- Dec	NU-PK-957	NE
18	*Mimosa pudica* L.	Mkg	Herb	Mar- June	NU-PK-169	LC
19	*Parkia timoriana* (DC.) Merr.	Mon	Tree	Oct- Mar	NU-PK-198	LC
20	*Senna alata* (L.) Roxb.	Mkg	Shrub	Aug- Oct	NU-PK-179	LC
21	*Senna floribunda* (Cav.) H.S. Irwin & Barneby	Khm	Shrub	May- Aug	NU-PK-153	NE
22	*Senna hirsuta* (L.) H.S. Irwin & Barneby	Mkg	Herb	Oct- Nov	NU-PK-157	NE
23	*Senna occidentalis* L.	Mon	Herb	Apr- Sep	NU-PK-199	LC
24	*Senna tora* (L.) Roxb.	Mkg	Shrub	Aug- Oct	NU-PK-175	NE
3	**Sub-family: PAPILIONOIDEAE**					
1	*Abrus pulchellus* Wall. Ex Thwaites.	Khm	Climber	Sep- Nov	NU-PK-191	NE
2	*Aeschynomene americana* L.	Khm	Herb	Oct- Nov	NU-PK-683	NE
3	*Aeschynomene indica* L.	Khm	Shrub	Oct- Nov	NU-PK-684	LC
4	*Amphicarpaea bracteata* (L.) Fernald	Khm	Climber	Oct- Nov	NU-PK-965	NE
5	*Apios carnea* (Wall.) Benth.	Khm	Climber	July- Nov	NU-PK-158	NE
6	*Arachis hypogaea* L.	Khm	Herb	Mar-May	NU-PK-956	NE
7	*Astragalus concretus* Benth.	Khm	Shrub	Aug- Oct	NU-PK-162	NE
8	*Cajanus cajan* (L.) Milsp.	Khm	Shrub	May- July	NU-PK-972	NE
9	*Cajanus scarabaeoides* (L.) Thouars	Khm	Climber	Mar- June	NU-PK-06	LC
10	*Callerya cinerea* Benth.	Mkg	Woody climber	June- Aug	NU-PK-976	NE
11	*Canavalia ensiformis* (L.) DC.	Khm	Climber	May- Aug	NU-PK-190	LC
12	*Canavalia gladiata* (Jacq.) DC.	Mon	Climber	July- Oct	NU-PK-700	NE
13	*Clitoria mariana* L.	Khm	Climber	July– Sep	NU-PK-166	NE
14	*Codariocalyx gyroides* (Roxb. ex Link) Hassk.	Khm	Shrub	Aug- Nov	NU-PK-969	NE
15	*Codariocalyx motorius* (Houtt.) H. Ohashi	Khm	Herb	Oct- Nov	NU-PK-952	NE
16	*Crotalaria cytisoides* Roxb.	Khm	Shrub	Aug- Nov	NU-PK-685	NE
17	*Crotalaria ferruginea Benth.*	Khm	Herb	Oct- Nov	NU-PK-677	NE
18	*Crotalaria humifusa* Grah.	Khm	Herb	Aug- Nov	NU-PK-687	NE
19	*Crotalaria juncea* L.	Khm	Shrub	Sep-Oct	NU-PK-160	NE
20	*Crotalaria micans* Link.	Khm	Shrub	Mar-May	NU-PK-05	LC
21	*Crotalaria mysorensis* Roth.	Khm	Herb	Sep- Nov	NU-PK-695	NE
22	*Crotalaria pallida* Aiton	Khm	Shrub	Aug- Oct	NU-PK-688	NE
23	*Crotalaria tetragona* Roxb ex.	Mkg	Shrub	Sep-Dec	NU-PK-176	NE

	Andrews					
24	*Dalbergia pinnata* (Lour.) Prain	Mon	Woody climber	Jan- May	NU-PK-14	LC
25	*Dalbergia stipulacea* Roxb.	Mkg	Woody climber	May- June	NU-PK-974	LC
26	*Dalhousiea bracteata* (Roxb.) Benth.	Mkg	Woody climber	June- Aug	NU-PK-172	NE
27	*Dendrolobium triangulare* (Retz.) Schindl.	Khm	Shrub	July- Sep	NU-PK-959	NE
28	*Derris scandens* (Roxb.) Benth.	Mon	Woody climber	June- Aug	NU-PK-954	NE
29	*Derris elliptica* (Wall.) Benth.	Mkg	Woody climber	Apr- June	NU-PK-980	NE
30	*Derris robusta* Benth.	Mkg	Tree	June- Oct	NU-PK-697	NE
31	*Desmodium concinnum* DC.	Khm	Shrub	Sep-Oct	NU-PK-161	NE
32	*Desmodium confertum* (DC.)	Khm	Shrub	Aug- Nov	NU-PK-951	NE
33	*Desmodium gangeticum* (L.) DC.	Khm	Shrub	Aug- Nov	NU-PK-02	NE
34	*Desmodium griffithianum* Benth.	Khm	Herb	Sep- Nov	NU-PK-969	NE
35	*Desmodium heterocarpon* (L.) DC.	Khm	Herb	Sep- Nov	NU-PK-186	NE
36	*Desmodium heterophyllum* (Willd.) DC.	Mon	Herb	June- Aug	NU-PK-977	NE
37	*Desmodium laxiflorum* DC.	Khm	Herb	Sep- Nov	NU-PK-164	NE
38	*Desmodium microphyllum* (Thunb.) DC.	Khm	Herb	Oct- Nov	NU-PK-960	NE
39	*Desmodium sequax* wall.	Mon	Shrub	Aug- Oct	NU-PK-180	NE
40	*Desmodium triflorum* (L.) DC.	Mkg	Herb	June-Aug	NU-PK-975	LC
41	*Desmodium velutinum* (Willd.) DC.	Khm	Shrub	Apr- June	NU-PK-07	NE
42	*Dumasia villosa* DC.	Khm	Climber	Sep- Oct	NU-PK-18	LC
43	*Eriosema himalaicum* H. Ohashi	Khm	Herb	Aug- Oct	NU-PK-690	NE
44	*Erythrina arborescens* Roxb.	Khm	Tree	Sep- Dec	NU-PK-156	NE
45	*Erythrina stricta* Roxb.	Mkg	Tree	Mar- July	NU-PK-195	NE
46	*Flemingia macrophylla* (Willd.)O. Kuntze ex Merr.	Khm	Shrub	Sep- Nov	NU-PK-187	NE
47	*Glycine max* (L.) Merr.	Mon	Climber	Sep- Oct	NU-PK-11	NE
48	*Hylodesmum podocarpum* (DC.) H. Ohashi & R.R. Mill.	Mon	Herb	Aug- Oct	NU-PK-698	NE
49	*Hylodesmum repandum* (Vahl) H. Ohashi & R. R. Mill	Khm	Herb	Sep- Nov	NU-PK-680	NE
50	*Indigofera atropurpurea* Buch. -Ham. Ex Hornem	Khm	Shrubs	Aug- Sep	NU-PK-958	NE
51	*Indigofera nigrescens* Kurz ex King & Prain	Khm	Shrub	Aug- Oct	NU-PK-163	NE
52	*Kummerowia striata* (Thunb.) Schindl.	Khm	Herb	Aug- Oct	NU-PK-961	NE
53	*Lablab purpureus* (L.)	Khm	Climber	Sep- Oct	NU-PK-681	NE
54	*Mastersia assamica* Benth.	Mkg	Woody climber	Sep- Dec	NU-PK-12	NE
55	*Meizotropis buteiformis* Voigt.	Khm	Shrub	Aug- Oct	NU-PK-154	NE
56	*Millettia pachycarpa* Benth.	Mkg	Woody climber	June- Oct	NU-PK-182	NE
57	*Millettia pinnata* (L.) Panigrahi	Mon	Tree	May- June	NU-PK-678	LC
58	*Millettia pulchra* Kurz.	Khm	Shrub	Apr- Aug	NU-PK-189	LC
59	*Mucuna imbricata* Baker	Mkg	Woody	June- Oct	NU-PK-183	LC

			climber			
60	*Mucuna pruriens* (L.) DC.	Khm	Climber	Sep- Nov	NU-PK-682	NE
61	*Mucuna pruriens var. Utilis* (Wall. Ex Wight) Baker ex Burck.	Mkg	Climber	Aug- Oct	NU-PK-09	NE
6 2	*Ormosia robusta* Baker.	Mon	Tree	Dec- Feb	NU-PK-970	NE
63	*Pachyrhizus erosus* (L.) Urb.	Mon	Woody climber	May- July	NU-PK-13	NE
64	*Parochetus communis* D.Don	Khm	Herb	Sep- Oct	NU-PK-155	LC
65	*Phaseolus lunatus* L.	Mon	Climber	Mar- June	NU-PK-155	NE
66	*Phaseolus vulgaris* L.	Mon	Climber	Apr- July	NU-PK-196	LC
67	*Phyllodium pulchellum* (L.) Desv.	Mkg	Shrub	Aug- Oct	NU-PK-10	LC
68	*Piptanthus nepalensis* (Hook.) D. Don.	Khm	Shrub	May- Sep	NU-PK-200	NE
69	*Psophocarpus tetragonolobus* (L.) DC.	Mkg	Climber	Aug- Nov	NU-PK-178	NE
70	*Pueraria peduncularis* (Benth.) Benth.	Khm	Climber	Aug- Oct	NU-PK-966	NE
71	*Pueraria montana var. Thomsonii* Benth.	Khm	Climber	Aug- Oct	NU-PK-184	NE
72	*Pueraria phaseoloides* (Roxb.) Benth.	Khm	Climber	Oct- Nov	NU-PK-968	NE
73	*Pueraria tuberosa* (Willd.) DC.	Khm	Woody climber	Aug- Oct	NU-PK-696	NE
74	*Rhyncosia minima* (L.) DC.	Khm	Climber	May- Sep	NU-PK-15	LC
75	*Robinia pseudoacacia* L.	Mon	Tree	May- Aug	NU-PK-973	NE
76	*Sesbania bispinosa* (Jacq.) W.Wight	Khm	Shrub	Oct- Nov	NU-PK-188	LC
77	*Shuteria hirsuta* Baker	Khm	Climber	Oct- Dec	NU-PK-699	NE
78	*Shuteria involucrata* (Wall.) Wight & Arn. ex Walp.	Mkg	Climber	Nov- Mar	NU-PK-686	NE
79	*Smithia ciliata* Royle.	Khm	Herb	August- Oct	NU-PK-962	NE
80	*Spatholobus suberectus* Dunn.	Mkg	Woody climber	Apr- June	NU-PK-08	NE
81	*Tadehagi triquetrum* (L.) H. Ohashi	Mkg	Shrub	Oct- Nov	NU-PK-192	LC
82	*Tephrosia candida* DC.	Mkg	Shrub	Aug- Oct	NU-PK-177	NE
83	*Tephrosia purpurea* (L.) Pers.	Khm	Herb	June- Aug	NU-PK-173	NE
84	*Trifolium repens* L.	Khm	Herb	Apr- July	NU-PK-955	LC
85	*Vigna mungo* (L.) Hepper	Khm	Climber	Sep- Nov	NU-PK-03	NE
86	*Vigna umbellata* (Thunb.) Ohwi & Ohashi	Khm	Climber	Sep- Oct	NU-PK-691	NE
87	*Vigna unguiculata* (L.) Walp.	Mon	Climber	Oct- Nov	NU-PK-967	NE
88	*Vigna radiata* (L.) R. Wilczek	Khm	Climber	Sep- Nov	NU-PK-165	LC
89	*Vigna vexillata* (L.) A. Rich.	Khm	Climber	Aug- Oct	NU-PK-16	NE

Table.3. District-wise distribution of species of Leguminosae family.

Sl. No.	Botanical Names	Kohima	Mokokchung	Mon
1.	**Sub-family: CERCIDIOIDEAE**			
1	*Bauhinia variegata* L.	+	+	+
2	*Bauhinia purpurea* L.	+	-	-
3	*Bauhinia acuminata* L.	-	-	+
2	**Sub-family: CAESALPINIOIDEAE**			
1	*Acacia pennata* (L.) Willd.	+	+	+
2	*Adenanthera pavonina* L.	-	+	-
3	*Albizia chinensis* (Osb.) Merr.	+	+	+
4	*Albizia julibrissin* Durazz.	-	+	+
5	*Albizia lebbeck* (L.) Benth.	+	+	+
6	*Albizia procera* (Roxb.) Benth.	+	+	+
7	*Archidendron clypearia* (Jack.) Nielson.	+	+	+
8	*Caesalpinia decapetala* (Roth.) Alston	-	-	+
9	*Caesalpinia pulcherrima* (L.) Sw.	-	+	-
10	*Calliandra umbrosa* (Benth.) S.R. Paul	+	+	+
11	*Cassia fistula* DC.	-	+	+
12	*Cassia javanica* L.	+	+	+
13	*Chamaecrista mimosoides* (L.) Greene	+	-	-
14	*Delonix regia* (Bojer ex Hook.) Rafin	+	+	+
15	*Entada phaseoiloides* (L.) Merr.	+	+	+
16	*Leucaena leucocephala* (Lam.) de Wit	+	+	+
17	*Mimosa diplotricha var. Inermis* (Adelb.)	-	+	+
18	*Mimosa pudica* L.	+	+	+
19	*Parkia timoriana* (DC.) Merr.	+	+	+
20	*Senna alata* (L.) Roxb.	+	+	+
21	*Senna floribunda* (Cav.) H.S. Irwin & Barneby	+	+	+
22	*Senna hirsuta* (L.) H.S. Irwin & Barneby	+	+	-
23	*Senna occidentalis* L	+	+	+
24	*Senna tora* (L.) Roxb.	+	+	+
3	**Sub-family: PAPILIONOIDEAE**			
1	*Abrus pulchellus* Wall. Ex Thwaites.	+	+	+
2	*Aeschynomene americana* L.	+	+	-
3	*Aeschynomene indica* L.	+	-	-
4	*Amphicarpaea bracteata* (L.) Fernald	+	-	-
5	*Apios carnea* (Wall.) Benth.	+	-	-
6	*Arachis hypogea* L.	+	+	-
7	*Astragalus concretus* Benth.	+	-	-
8	*Cajanus cajan* (L.) Milsp.	+	+	+
9	*Cajanus scarabaeoides* (L.) Thouars	+	-	-
10	*Callerya cinerea* Benth.	-	+	-

11	*Canavalia ensiformis* (L.) DC.	+	+	+
12	*Canavalia gladiata* (Jacq.) DC.	+	+	+
13	*Clitoria mariana* L.	+	-	-
14	*Codariocalyx gyroides* (Roxb. ex Link) Hassk.	+	-	-
15	*Codariocalyx motorius* (Houtt.) H. Ohashi	+	-	-
16	*Crotalaria cytisoides* Roxb.	+	+	-
17	*Crotalaria ferruginea Benth.*	+	+	+
18	*Crotalaria humifusa* Grah.	+	-	-
19	*Crotalaria juncea* L.	+	+	+
20	*Crotalaria micans* Link.	+	-	-
21	*Crotalaria mysorensis* Roth.	+	+	+
22	*Crotalaria pallida* Aiton	+	+	+
23	*Crotalaria tetragona* Roxb ex. Andrews	+	+	+
24	*Dalbergia pinnata* (Lour.) Prain	+	+	+
25	*Dalbergia stipulacea* Roxb.	+	+	+
26	*Dalhousiea bracteata* (Roxb.) Benth.	-	+	-
27	*Dendrolobium triangulare* (Retz.) Schindl.	+	-	-
28	*Derris scandens* (Roxb.) Benth.	-	+	+
29	*Derris elliptica* (Wall.) Benth.	-	+	+
30	*Derris robusta* Benth.	+	+	+
31	*Desmodium concinnum* DC.	+	-	-
32	*Desmodium confertum* (DC.)	+	-	-
33	*Desmodium gangeticum* (L.) DC.	+	-	-
34	*Desmodium griffithianum* Benth.	+	-	-
35	*Desmodium heterocarpon* (L.) DC.	+	+	+
36	*Desmodium heterophyllum* (Willd.) DC.	-	-	+
37	*Desmodium laxiflorum* DC.	+	+	+
38	*Desmodium microphyllum* (Thunb.) DC.	+	+	+
39	*Desmodium sequax* wall.	+	+	+
40	*Desmodium triflorum* (L.) DC.	-	+	-
41	*Desmodium velutinum* (Willd.) DC.	+	-	-
42	*Dumasia villosa* DC.	+	-	-
43	*Eriosema himalaicum H. Ohashi*	+	-	-
44	*Erythrina arborescens* Roxb.	+	-	-
45	*Erythrina stricta* Roxb.	+	+	+
46	*Flemingia macrophylla* (Willd.)O. Kuntze ex Merr.	+	+	+
47	*Glycine max* (L.) Merr.	+	+	+
48	*Hylodesmum podocarpum* (DC.) H. Ohashi & R.R. Mill.	-	-	+
49	*Hylodesmum repandum* (Vahl) H. Ohashi & R. R. Mill	+	-	-
50	*Indigofera atropurpurea* Buch. -Ham. Ex Hornem	+	-	-
51	*Indigofera nigrescens* Kurz ex King & Prain	+	-	-
52	*Kummerowia striata* (Thunb.)	+	-	-

	Schindl.			
53	*Lablab purpureus* (L.)	+	+	+
54	*Mastersia assamica* Benth.	+	+	+
55	*Meizotropis buteiformis* Voigt.	+	-	-
56	*Millettia pachycarpa* Benth.	+	+	+
57	*Millettia pinnata* (L.) Panigrahi	-	+	+
58	*Millettia pulchra* Kurz.	+	+	-
59	*Mucuna imbricata* Baker	-	+	-
60	*Mucuna pruriens* (L.) DC.	+	+	+
61	*Mucuna pruriens var. Utilis* (Wall. Ex Wight) Baker ex Burck.	+	+	+
62	*Ormosia robusta* Baker.	-	-	+
63	*Pachyrhizus erosus* (L.) Urb.	-	-	+
64	*Parochetus communis* D.Don	+	-	-
65	*Phaseolus lunatus* L.	+	+	+
66	*Phaseolus vulgaris* L.	+	+	+
67	*Phyllodium pulchellum* (L.) Desv.	-	+	+
68	*Piptanthus nepalensis* (Hook.)D.Don.	+	-	-
69	*Psophocarpus tetragonolobus* (L.) DC.	+	+	+
70	*Pueraria peduncularis* (Benth.) Benth.	+	+	-
71	*Pueraria montana var. Thomsonii* Benth.	+	+	+
72	*Pueraria phaseoloides* (Roxb.) Benth.	+	+	-
73	*Pueraria tuberosa* (Willd.) DC.	+	-	-
74	*Rhyncosia* minima (L.) DC.	+	-	-
75	*Robinia pseudoacacia* L.	-	-	+
76	*Sesbania bispinosa* (Jacq.) W.Wight	+	+	+
77	*Shuteria hirsuta* Baker	+	+	-
78	*Shuteria involucrata* (Wall.) Wight & Arn. ex Walp.	+	+	+
79	*Smithia ciliata* Royle.	+	-	-
80	*Spatholobus suberectus*	-	+	-
81	*Tadehagi triquetrum* (L.) H. Ohashi	-	+	-
82	*Tephrosia candida* DC.	+	+	+
83	*Tephrosia purpurea* (L.) Pers.	+	-	-
84	*Trifolium repens* L.	+	-	-
85	*Vigna mungo* (L.) Hepper	+	-	-
86	*Vigna umbellata* (Thunb.) Ohwi & Ohash	+	+	+
87	*Vigna unguiculata* (L.) Walp.	+	+	+
88	*Vigna radiata* (L.) R. Wilczek	+	+	-
89	*Vigna vexillata* (L.) A. Rich.	+	-	-

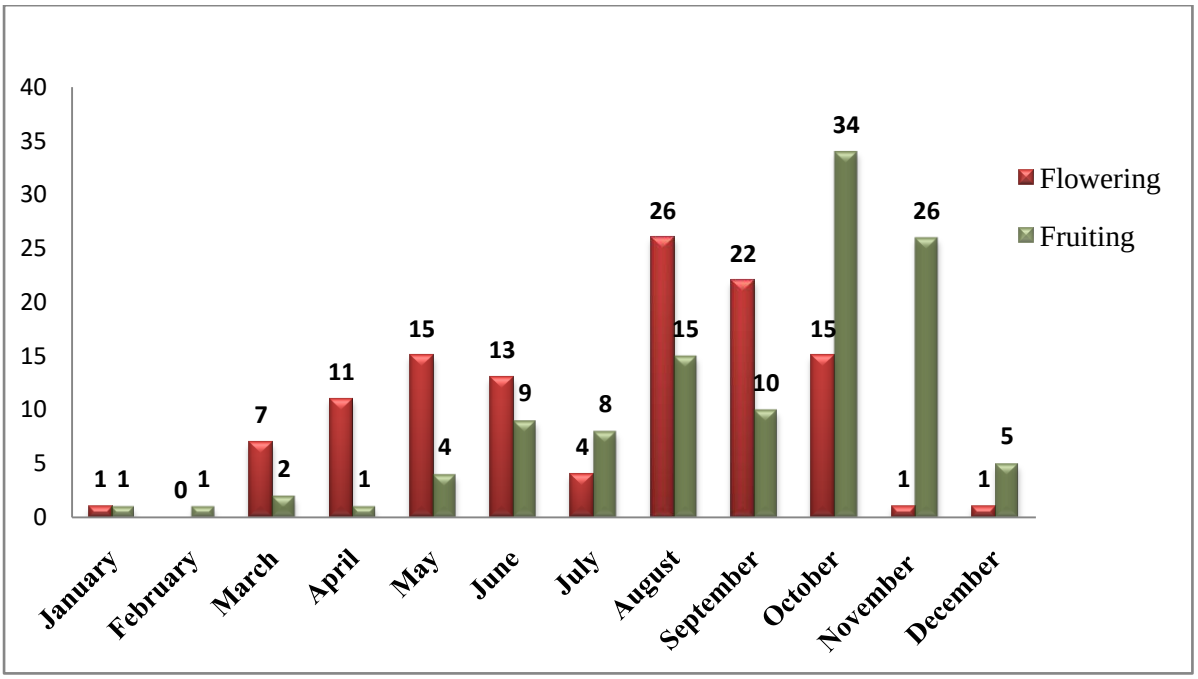


Fig.23. Graphical representation of Flowering & Fruiting phenology of species of Leguminosae family.

The flowering and fruiting season of Leguminous species was mostly seen from August to November. Most of the flowering plants were largely collected in August, September, October, and May, and some in June and April. The fruiting is highest in October and November.

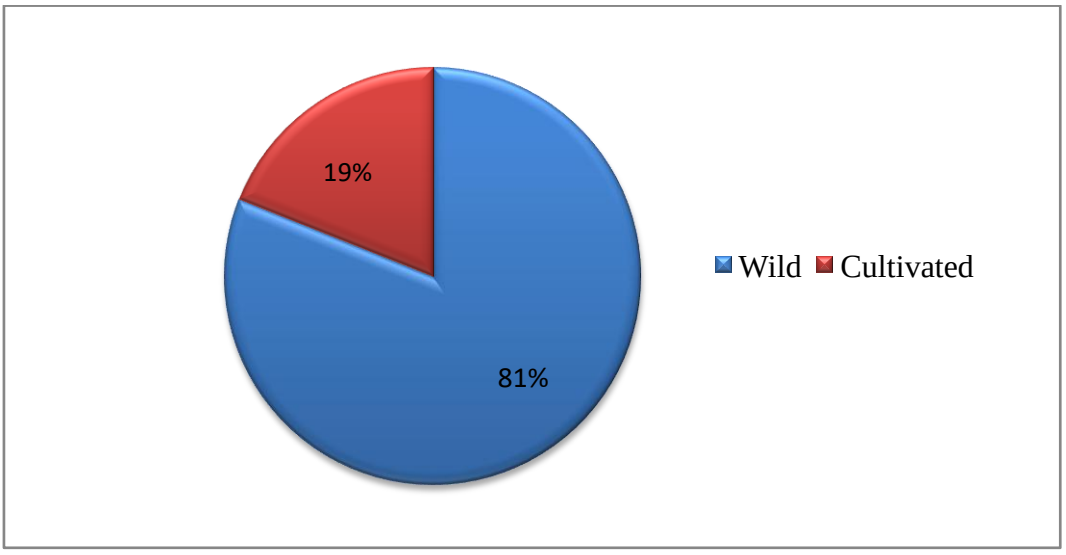


Fig.24. Pie-chart representation in % of wild and cultivated legume species.

Table.4. Lists of cultivated species of Leguminosae family with its purpose.

Sl. no.	Botanical Names- subfamilies	Purpose
1	*Adenanthera pavonina* L. Caesalpinioideae	For ornamental
2	*Cajanus cajan* (L.) Milsp. Papilionoideae	Cultivated for legumes
3	*Caesalpinia pulcherrima* (L.) Sw. Caesalpinioideae	For ornamental
4	*Calliandra umbrosa* (Wall.) Benth. Caesalpinioideae	For ornamental
5	*Canavalia ensiformis* (L.) DC. Papilionoideae	Cultivated for legumes
6	*Canavalia gladiata* (Jacq.) DC. Papilionoideae	Cultivated for legumes
7	*Cassia fistula* L. Caesalpinioideae	For ornamental
8	*Cassia javanica* L. Caesalpinioideae	For ornamental
9	*Crotalaria tetragona* Roxb. ex Andrews Papilionoideae	Flowers as vegetables
10	*Delonix regia* (Bojer ex Hook.) Rafin Caesalpinioideae	For ornamental
11	*Glycine max* (L.) Merr. Papilionoideae	Cultivated for legumes
	Lablab purpureus (L.) Sweet. Papilionoideae	Cultivated for legumes
12	*Leucaena leucocephala* (Lam.) de Wit. Caesalpinioideae	For ornamental and legumes edible
13	*Millettia pinnata* (L.) Panigrahi Papilionoideae	For ornamental
14	*Mucuna pruriens* var. *Utilis* (Wall. Ex Wight) Baker ex Burck Papilionoideae	Cultivated for legumes
15	*Parkia timoriana* (DC.) Merr. Caesalpinioideae	Cultivated for legumes
16	*Phaseolus lunatus* L. Papilionoideae	Cultivated for legumes
17	*Phaseolus vulgaris* L. Papilionoideae	Cultivated for legumes
18	*Psophocarpus tetragonolobus* (L.) DC. Papilionoideae	Cultivated for legumes
19	*Senna alata* (L.)Roxb Caesalpinioideae	Cultivated as ornaments and medicines.
20	*Vigna umbellata* (Thunb.) Ohwi & Ohashi) Papilionoideae	Cultivated for legumes
21	*Vigna mungo* (L.) Hepper	Cultivated for legumes
22	*Vigna unguiculata* (L.) Walp. Papilionoideae	Cultivated for legumes

Table.5. Lists of genera with a total number of species.

Sl.no.	Genus names	Total no. of species	Sl.no.	Genus names	Total no. of species
1	*Bauhinia*	3	33	*Dumasia*	1
2	*Acacia*	1	34	*Eriosema*	1
3	*Adenanthera*	1	35	*Erythrina*	2
4	*Albizia*	4	36	*Flemingia*	1
5	*Archidendron*	1	37	*Glycine*	1
6	*Caesalpinia*	2	38	*Hylodesmum*	2
7	*Calliandra*	1	39	*Indigofera*	2
8	*Cassia*	2	40	*Kummerowia*	1
9	*Chamaecrista*	1	41	*Lablab*	1
10	*Delonix*	1	42	*Mastersia*	1
11	*Entada*	1	43	*Meizotropis*	1
12	*Leucaena*	1	44	*Millettia*	3
13	*Mimosa*	2	45	*Mucuna*	3
14	*Parkia*	1	46	*Ormosia*	1
15	*Senna*	5	47	*Pachyrhizuz*	1
16	*Abrus*	1	48	*Parochetus*	1
17	*Aeschynomene*	2	49	*Phaseolus*	2
18	*Amphicarpaea*	1	50	*Phyllodium*	1
19	*Apios*	1	51	*Piptanthus*	1
20	*Arachis*	1	52	*Psophocarpus*	1
21	*Astragalus*	1	53	*Pueraria*	4
22	*Cajanus*	2	54	*Rhynchosia*	1
23	*Callerya*	1	55	*Robinia*	1
24	*Canavalia*	2	56	*Sesbania*	1
25	*Clitoria*	1	57	*Shuteria*	2
26	*Codariocalyx*	2	58	*Smithia*	1
27	*Crotalaria*	8	59	*Spatholobus*	1
28	*Dalbergia*	2	60	*Tadehagi*	1
29	*Dalhousiea*	1	61	*Tephrosia*	2
30	*Dendrolobium*	1	62	*Trifolium*	1
31	*Derris*.	3	63	*Vigna*	5
32	*Desmodium*	11			

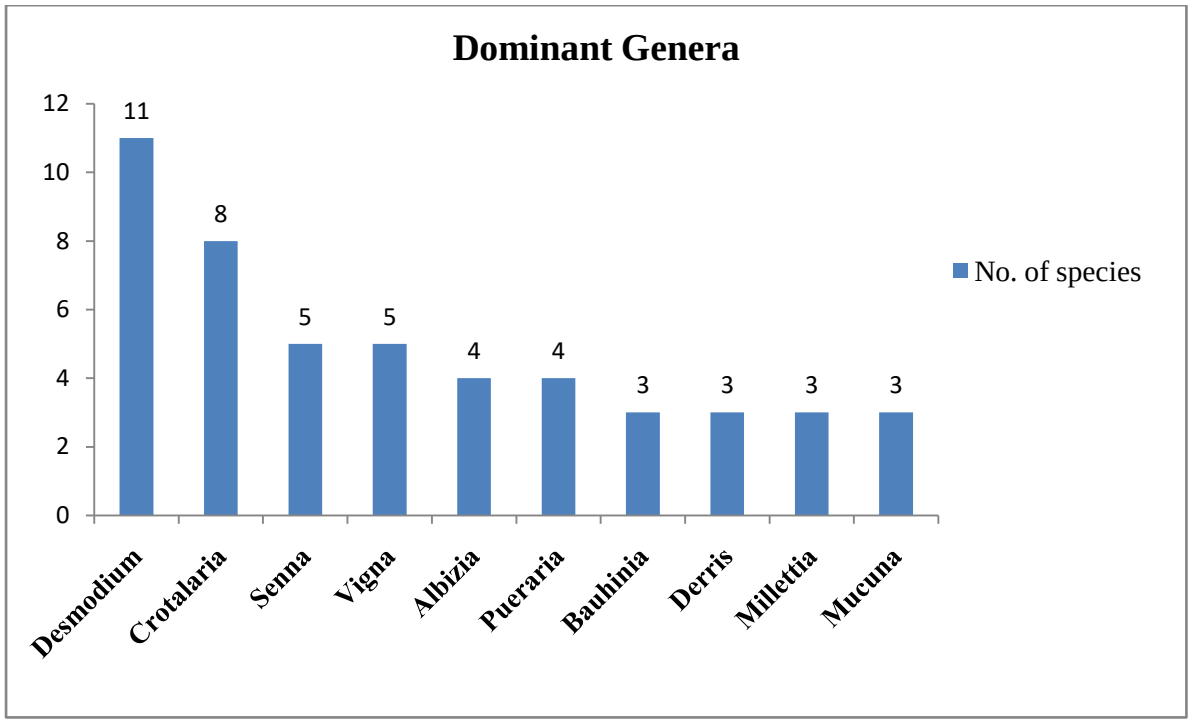


Fig.25. Graphical representation of 10 dominant genera with total no. of species.

DISCUSSIONS

The taxonomic studies of the family Leguminosae in Kohima, Mokokchung, and Mon districts recorded a total of 116 taxa, with 113 species and 63 genera belonging to three sub-families, namely Cercidoideae with 3 species and 1 genus, Caesalpinioideae with 23 species 1 variety and 14 genera and Papilionoideae with 87 species, 2 varieties, and 48 genera respectively. Deterioideae and Dialioideae subfamilies were not observed in the study areas. Duparquetioideae is a single genus with 1 species native to tropical Africa only. Similar work has not been reported in the region so far, but several workers have contributed to their studies.

Clarke (1887), on the plants of Kohima and Muneypore reported 31 species of Legumes specific to Kohima district. Changkija, S. (2017), in his work "Flora of Nagaland," enumerated 27 genera and 54 species and 10 cultivated plant species of the Leguminosae family. Mao A. A. & Gogoi R. (2010), in their work "Floristic study of Dzuko valley and surrounding hills, Manipur and Nagaland India recorded 4 taxa in Fabaceae and 1 species, 1

subspecies in Caesalpinaceae. Out of which, 3 species of Fabaceae were reported in the present study. Mao A. A. *et al*., BSI, (2017), in "Checklist of the flora of Nagaland," enumerated Leguminosae with 33 genera, 63 species, 2 subspecies, and 1 variety, of which 30 genera and 40 species were found in the present study. BSI (2023) maintain an e-flora of Fabaceae with 250 taxa in India.

Similar work on Leguminosae was also done in several states. Dhami, D. *et al*. (2023) recorded 130 species with 3 subspecies and 69 genera in Pantnagar, Uttarakhand. Balan & Predeep (2021) reported 448 taxa under 5 sub-families and 115 genera in Kerala. Kumar A. (2020) recorded 63 taxa and 42 genera in Gautum Budha Wildlife Sanctaury, Bihar & Jharkhand. Bandyopadhyay S. (2018) reported 81 species under 36 genera in Koch Bihar district, West Bengal. Kalita B.C. (2015) recorded 59 species in the Papum Pare district of Arunachal Pradesh. Patel *et al*. (2012) recorded 115 species of Leguminosae in Gujarat state. Pullaiah & Ramamurty (2000) reported 15 genera of Mimosoideae, 10 genera of Caesalpinioideae, and 48 genera of Papilionoideae in the Eastern Ghats.

Sanjappa (1992), in his work "Legumes of India," reported 1152 taxa under 179 genera, 35 subspecies, 103 varieties, and 7 forma, including 170 species and 2 varieties, 44 genera introduced and cultivated. 23 % were confined to the Indian Political boundary.

The forest vegetation of Kohima ranges from Northern-Montanae Wet-Temperate Forest to Sub-Tropical Broad Leaved Wet Hill Forest. Besides, there are important biodiversity hotspots or protected areas in the district. Mount Japfü, the second-highest peak in Nagaland with an altitude of 3048 m AMSL, is also located in this district. They are alpine vegetation covered with snow in winter, and legume species are less known in this type of vegetation. The wet temperate forest is found in higher elevations or Dzükou Valley of 2500 m AMSL and above. The valley is majorly covered with a dwarf bamboo *Sinarundinaria rolloana*, along with other species; legume species found in this valley are *Piptanthus nepalensis* (Hook.) D. Don, *Astragalus concretus* Benth., and *Parochetus communis* D. Don. Sub-tropical forest in Kohima district was observed in the base of Japfü, ranging from 1000- 2400 m. A large number of Legume species was found in this type of vegetation, for example, *Tephrosia purpurea* (L.) Pers., *Senna floribunda* (Cav.) H.S. Irwin & Barneby, *Meizotropis buteiformis* Voigt., *Erythrina arborescens* Roxb., *Apios carnea* (Wall.) Benth., *Chamaecrista mimosoides* (L.) Greene, *Crotalaria juncea* L., *Desmodium concinnum* DC., *Indigofera nigrescens* Kurz ex King & Prain, *Desmodium laxiflorum* DC.,

Vigna radiata (L.) R. Wilczek, *Hylodesmum repandum* (Vahl) H. Ohashi & R. R. Mill., *Pueraria peduncularis* (Benth.) Benth., *Pueraria tuberosa* (Willd.) DC. etc. Small patches of evergreen mixed deciduous forest or open forest were also observed in this study sites with the elevation ranging from 800 - 1400 m. Some of the species found in this type of vegetation are *Clitoria mariana* L., *Pueraria montana var. Thomsonii* Benth., *Desmodium confertum* (DC.), *Desmodium heterocarpon* (L.) DC., *Flemingia macrophylla* (Willd.)O. Kuntze ex Merr., *Millettia pulchra* Kurz., *Abrus pulchellus* Wall. Ex Thwaites., *Crotalaria ferruginea* Benth., *Mucuna pruriens* (L.) DC., *Aeschynomene americana* L., *Crotalaria cytisoides* Roxb., *Crotalaria pallida* Aiton, *Codariocalyx motorius* (Houtt.) H. Ohashi, *Smithia ciliata* Royle., *Cajanus scarabaeoides* (L.) Thouars etc.

Mokokchung district has a vegetation of Northern Tropical semi-evergreen forest and sub-tropical broad-leaf forest. The dense tropical forests are observed in Longkhum village areas and Meinkong forest in the Chuchuyimpang range. The species are collected from the elevation ranging from 150 - 1500 m. The lower elevations have patches of mixed deciduous forest or semi-evergreen forest from 150 - 1000 m above sea levels from Tuli up to Changki village areas. Some of the legume species collected from these areas are *Albizia chinensis* (Osb.) Merr., *Cassia javanica* L., *C. fistula* DC., *Dalhousiea bracteata* (Roxb.) Benth. *Mimosa pudica* L., *Senna tora* (L.) Roxb., *Archidendron Clypearia* (Jack.) Nielson, *Adenanthera pavonina* L. Legumes species collected from 1000 - 1500 m were *Leucaena leucocephala* (Lam.) de Wit., *Crotalaria tetragona* (L.) DC., *Tephrosia candida* DC. *Senna alata* (L.) Roxb. *Millettia pachycarpa* Benth., *Mucuna imbricata* Baker, *Tadehagi triquetrum* (L.) H. Ohashi, *Senna hirsuta* (L.) H.S. Irwin & Barneby, *Dalbergia stipulaceae* Roxb., *Desmodium triflorum* (L.) DC., *Callerya cinerea* Benth., *Derris robusta* Benth., *Spatholobus suberectus* Dunn. etc.

Mon district lies in the low-lying areas in the easternmost part of the state. The district has a Northern tropical wet evergreen forest in parts of the district and a Northern sub-tropical broad leave wet hill forest. The district also shares the Indo-Myanmar border in Longwa village. The legume species are collected from the altitudinal ranges between 100 - 1500 m. The low elevations are found in Tizit and Naginimora areas, adjacent to Assam state. Some of the species recorded during the studies are *Entada phaseoloides* (L.) Merr., *Bauhinia variegata* L., *B. acuminata* L., *Ormosia robusta* Baker, *Desmodium sequax* Wall., *D. heterophyllum* (Willd.) DC., *Derris scandens* (Roxb.) Benth., *Hylodesmum podocarpum* (DC.) H.Ohashi & R.R. Mill., *Erythrina stricta* Roxb., *Parkia timoriana* (DC.) Merr., *Senna*

occidentalis L., *Albizia procera* (Roxb.) Benth., *A. julibrissin* Durazz. *Robinia pseudoacacia* L., *Pachyrhizus erosus* (L.) Urb. etc.

Dominant genera

From the study, the genus *Desmodium* is represented with 11 species, as the highest record followed by the genus *Crotalaria* with 8 species, the genus *Senna* and *Vigna* with 5 species each, genus *Albizia* and *Pueraria* with 4 species each, the genus *Bauhinia, Derris, Millettia* and *Mucuna* with 3 species each and *Caesalpinia, Mimosa, Cajanus, Canavalia, Dalbergia, Erythrina, Hylodesmum, Indigofera, Phaseolus, Shuteria* and *Tephrosia* with 2 species each respectively. The remaining genus is represented by 1 species each.

Invasive Legumes

10 invasive plant species have been reported in the study areas. They are *Leucaena leucocephala* (Lam.) de Wit., *Mimosa diplotricha* var. *inermis* (Adelb.), *Mimosa pudica* L., *Senna alata* (L.) Roxb., *Senna hirsuta* (L.) H.S. Irwin & Barneby, *Senna occidentalis* L., *Senna tora* (L.) Roxb., *Aeschynomene americana* L., *Crotalaria pallida* Aiton, *Pueraria montana* var. *thomsonii* Benth. These species are widely distributed in degraded forest areas along the roadside or open wastelands in lower elevations ranging from 500 - 1020 m.

IUCN status

The IUCN status of most Legumes species falls under Least Concern = LC; some species are 'Not Evaluated' = NE. *Albizia julibrissin* Durazz. are found to be vulnerable (IUCN, 2023).

Economically Important Legumes species

Cajanus cajan (L.) Milsp., *Canavalia ensiformis* (L.) DC., *Canavalia gladiata* (Jacq.) DC., *Crotalaria tetragona* Roxb. ex Andrews, *Glycine max, Lablab purpureus* (L.) Sweet, *Mucuna pruriens var. utilis, Phaseolus lunatus* L., *Phaseolus vulgaris* L., *Psophocarpus tetragonolobus* (L.) DC., *Vigna umbellata* (Thunb.) Ohwi & Ohashi, *Vigna unguiculata* (L.) Walp., and *Parkia roxbhurghii* (DC.) Merr. were widely cultivated in the study areas for pulses and vegetables and commercially available in the local markets.

There are wild legumes that are not commonly used but consumed by local native people within the study areas. For example, *Entada phaseoloides* (L.) Merr., the seed

kernels are edible after necessary processing; *Bauhinia variegata* L. flowers are eaten as vegetables; *Leucaena leucocephala* (Lam.) de Wit., the seeds are eaten as vegetables.

Many species of the Leguminosae family provide valuable timbers, ornaments, insecticides, medicines, and fibers. *Adenanthera pavonina* L., *Albizia spp.*, *Bauhinia spp.*, *Caesalpinia pulcherrima* (L.) SW., *Calliandra umbroso* (Wall.) Benth., *Cassia fistula* L., *Cassia javanica* L., *Delonix regia* (Bojer. ex Hook.) Rafin., *Leucaena leucocephala* (Lam.) de Wit., *Millettia pinnata* (L.) Panigrahi and *Senna alata* (L.) Roxb. was introduced through agroforestry for soil restoration, timbers, ornamental trees, landscaping, etc. Species like *sesbania bispinosa* (Jacq.) W. Wight, *Leucaena leucocephala* (Lam.) de Wit. also planted to provide green manure for crops.

Many wild and cultivated legumes of the region were known for their high medicinal properties; they were traditionally used or consumed by the people. These include *Acacia pennata* (L.) Willd., *Albizia procera* (Roxb.) Benth., *Bauhinia racemosa* L., *Bauhinia variegata* L., *Crotalaria pallida* Aiton., *Desmodium heterocarpon* (L.) DC., *Entada phaseoloides* (L.) Merr. *Erythrina stricta* L., *Leucaena leucocephala* (Lam.) de Wit., *Mimosa pudica* L., *Senna alata* (L.) Roxb., *Senna tora* (L.) Roxb., *Senna floribunda* (Cav.) H.S. Irwin & Barneby, and *Tephrosia candida* DC., etc.

The uses of legumes vary from village to village or community. There are many other valuable traditional uses of wild legumes. The species like *Millettia pachycarpa* Benth., *Dalhousiea bracteata* (Roxb.) Benth., *Acacia pennata* (L.) Willd. were used to stupefy fish. *Pueraria montana var. Thomsonii* Benth., *Mucuna pruriens* (L.) DC. Vines and lianas of many wild legumes were also used as fibers for making ropes.

Commonly distributed Legumes species

Common tree species of legumes widely distributed in all study areas were *Bauhinia variegata* L. *and Albizia chinensis* (Osb.) Merr., *Albizia lebbeck* (L.) Benth, *Albizia procera* (Roxb.) Benth., *Archidendron clypearia* (Jack.) Nielson., *Cassia javanica* L., *Delonix regia* (Bojer ex Hook.) Rafin, *Parkia timoriana* (DC.) Merr., *Derris robusta* Benth., *Erythrina stricta* Roxb.

Small trees or woody climbers commonly distributed were *Acacia pennata* (L.) Willd., *Entada phaseoiloides* (L.) Merr., *Calliandra umbrosa* (Benth.) S.R. Paul, *Leucaena*

leucocephala (Lam.) de Wit., *Dalbergia pinnata* (Lour.) Prain, *Dalbergia stipulacea* Roxb. *Mastersia assamica* Benth., *Millettia pachycarpa* Benth., *Millettia pulchra* Kurz.

Legumes widely found as shrubs or herbs or wildly spreading as weeds are *Mimosa pudica* L., *Senna alata* (L.) Roxb., *Senna floribunda* (Cav.) H.S. Irwin & Barneby, *Senna occidentalis* L., *Senna tora* (L.) Roxb., *Abrus pulchellus* Wall. Ex Thwaites., *Aeschynomene americana* L., *Arachis hypogea* L., Milsp., *Crotalaria ferruginea* Benth., *Crotalaria juncea* L., *Crotalaria mysorensis* Roth., *Crotalaria pallida* Aiton, *Crotalaria tetragona* Roxb ex. Andrews, *Desmodium heterocarpon* (L.) DC., *Desmodium laxiflorum* DC., *Desmodium microphyllum* (Thunb.) DC., *Desmodium sequax* wall., *Flemingia macrophylla* (Willd.) O. Kuntze ex Merr., *Mucuna pruriens* (L.) DC., *Pueraria montana var. Thomsonii* Benth., *Sesbania bispinosa* (Jacq.) W.Wight, *Shuteria involucrata* (Wall.) Wight & Arn. ex Walp., *Tephrosia candida* DC.

CHAPTER-5

SUMMARY AND CONCLUSION

The present study represented a total of 116 taxa with 113 species, 3 varieties, and 63 genera. Out of six subfamilies, only three were recorded in the study areas. They are Papilionoideae, with 87 species, 2 varieties, and 48 genera, which show the highest record, Caesalpinioideae with 23 species, 1 variety, and 14 genera, and Cercidoideae, with 3 species and 1 genus. Deterioideae and Dialioideae subfamily was not observed in the study areas. Duparquetioideae is a single genus with 1 species native to tropical Africa only.

The life forms distribution in the study areas were trees 18 (16%), woody climbers 14 (12%), climbers 26 (22%), shrubs 33 (28%), and herbs 25 (22%). In the sub-family Cercidoideae, 2 species are trees and 1 shrub; in Caesalpinoideae, 10 species are trees, 7 are shrubs, 2 are woody climbers, and 5 herbs. In Papilionoideae, 6 species are trees, 25 are shrubs, 12 are woody climbers, 26 are climbers, and 20 are herbs. 94 (81%) species are naturally found in the wild, while 22 (19%) species were cultivated.

In Kohima, 40 genera with 62 species and 1 variety of Leguminosae were recorded. Out of which subfamily Cercidoideae with 1 genus and 1 species, Caesalpinioideae with 4 genera and 4 species, and Papilionoideae with 35 genera with 57 species and 1 variety, respectively.

In Mokokchung, 24 genera with 30 species and 2 varieties were recorded, of which 8 genera with 12 species and 1 variety belongs to Caesalpinioideae and 16 genera with 18 species and 1 variety belong to Papilionoideae.

In Mon, 24 species with 20 genera were recorded, of which 1 genus and 2 species belong to Cercidoideae, 7 genera and 8 species of Caesalpinioideae, and 12 genera with 14 species belong to Papilionoideae.

The flowering and fruiting season of Leguminous species was mostly seen from August to November. Most of the flowering plants were largely collected in August, September, October, and May, and some in June and April. The fruiting is highest in October and November.

Out of 63 genera recorded, the genus *Desmodium* is represented with 11 species, as the highest record, followed by the genus *Crotalaria* with 8 species, the genus *Senna* and *Vigna* with 5 species each, genus *Albizia* and *Pueraria* with 4 species each, the genus *Bauhinia, Derris*, *Millettia* and *Mucuna* with 3 species each and *Caesalpinia, Mimosa, Cajanus, Canavalia, Dalbergia, Erythrina, Hylodesmum, Indigofera, Phaseolus, Shuteria* and *Tephrosia* with 2 species each respectively. The remaining genus is represented by 1 species each.

The Leguminosae family is widely distributed in all types of vegetation. The present study shows a wide range of vegetation and the growth of legume species found in different extend of vegetation. The forest vegetation of Kohima ranges from Northern-Montanae Wet-Temperate Forest to Sub-Tropical Broad Leaved Wet Hill Forest. The wet temperate forest is found in higher elevations or Dzükou Valley of 2500m AMSL and above. The species found in this type of vegetation are *Piptanthus nepalensis* (Hook.) D. Don, *Astragalus concretus* Benth., and *Parochetus communis* D. Don. A large number of Legumes species was found in sub-tropical forests ranging from 1000 - 2400 m. They are *Tephrosia purpurea* (L.) Pers., *Senna floribunda* (Cav.) H.S. Irwin & Barneby, *Meizotropis buteiformis* Voigt., *Erythrina arborescens* Roxb., *Apios carnea* (Wall.) Benth., *Chamaecrista mimosoides* (L.) Greene, *Crotalaria juncea* L., *Desmodium concinnum* DC., *Indigofera nigrescens* Kurz ex King & Prain, *Desmodium laxiflorum* DC., *Vigna radiata* (L.) R. Wilczek, *Hylodesmum repandum* (Vahl) H. Ohashi & R. R. Mill., *Pueraria peduncularis* (Benth.) Benth., *Pueraria tuberosa* (Willd.) DC. etc. Species found in an evergreen mixed deciduous forest or open forest with an elevation ranging from 800- 1400m are *Clitoria mariana* L., *Pueraria montana var. Thomsonii* Benth., *Desmodium confertum* (DC.), *Desmodium heterocarpon* (L.) DC., *Flemingia macrophylla* (Willd.)O. Kuntze ex Merr., *Millettia pulchra* Kurz., *Abrus pulchellus* Wall. Ex Thwaites., *Crotalaria ferruginea* Benth., *Mucuna pruriens* (L.) DC., *Aeschynomene americana* L., *Crotalaria cytisoides* Roxb., *Crotalaria pallida* Aiton, *Codariocalyx motorius* (Houtt.) H. Ohashi, *Smithia ciliata* Royle., *Cajanus scarabaeoides* (L.) Thouars etc.

Mokokchung district has a vegetation of Northern Tropical semi-evergreen forest and sub-tropical broad-leaf forest. The lower elevations have patches of mixed deciduous forest or semi-evergreen forest from 150 - 1000 m above sea levels from Tuli up to Changki village areas. Some of the legume species collected from these areas are *Albizia chinensis* (Osb.) Merr., *Cassia javanica* L., *C. fistula* DC., *Dalhousiea bracteata* (Roxb.) Benth. *Mimosa*

pudica L., *Senna tora* (L.) Roxb., *Archidendron Clypearia* (Jack.) Nielson, *Adenanthera pavonina* L. Legumes species collected from 1000 - 1500 m were *Leucaena leucocephala* (Lam.) de Wit., *Crotalaria tetragona* (L.) DC., *Tephrosia candida* DC. *Senna alata* (L.) Roxb. *Millettia pachycarpa* Benth., *Mucuna imbricata* Baker, *Tadehagi triquetrum* (L.) H. Ohashi, *Senna hirsuta* (L.) H.S. Irwin & Barneby, *Dalbergia stipulaceae* Roxb., *Desmodium triflorum* (L.) DC., *Callerya cinerea* Benth., *Derris robusta* Benth., *Spatholobus suberectus* Dunn. etc.

Mon district has a Northern tropical wet evergreen forest in parts of the district and a Northern sub-tropical broad leave wet hill forest. The district also shares the Indo-Myanmar border in Longwa village. The legume species are collected from the altitudinal ranges between 100 - 1500 m. The low elevations are found in Tizit and Naginimora areas, adjacent to Assam state. Some of the species recorded during the studies are *Entada phaseoloides* (L.) Merr., *Bauhinia variegata* L., *B. acuminata* L., *Ormosia robusta* Baker, *Desmodium sequax* Wall., *D. heterophyllum* (Willd.) DC., *Derris scandens* (Roxb.) Benth., *Hylodesmum podocarpum* (DC.) H.Ohashi & R.R. Mill., *Erythrina stricta* Roxb., *Parkia timoriana* (DC.) Merr., *Senna occidentalis* L., *Albizia procera* (Roxb.) Benth., *A. julibrissin* Durazz. *Robinia pseudoacacia* L., *Pachyrhizus erosus* (L.) Urb. etc.

Invasive plant species reported in the study areas are *Leucaena leucocephala* (Lam.) de Wit., *Mimosa diplotricha* var. *inermis* (Adelb.), *Mimosa pudica* L., *Senna alata* (L.) Roxb., *Senna hirsuta* (L.) H.S. Irwin & Barneby, *Senna occidentalis* L., *Senna tora* (L.) Roxb., *Aeschynomene americana* L., *Crotalaria pallida* Aiton, *Pueraria montana* var. *thomsonii* Benth. These species are widely distributed in degraded forest areas along the roadside or open wastelands in lower elevations ranging from 500 - 1020 m.

The IUCN status of most Legumes species falls under Least Concern = LC; some species are 'Not Evaluated' = NE. *Albizia julibrissin* Durazz. are vulnerable.

Legumes are highly nutritional, and some of the species are widely cultivated in the study areas. *Cajanus cajan* (L.) Milsp., *Canavalia ensiformis* (L.) DC., *Canavalia gladiata* (Jacq.) DC., *Crotalaria tetragona* Roxb. ex Andrews, *Glycine max, Lablab purpureus* (L.) Sweet, *Mucuna pruriens var. utilis, Phaseolus lunatus* L., *Phaseolus vulgaris* L., *Psophocarpus tetragonolobus* (L.) DC., *Vigna umbellata* (Thunb.) Ohwi & Ohashi, *Vigna unguiculata* (L.) Walp., and *Parkia roxbhurghii* (DC.) Merr.,

Wild legumes are also consumed as food in some regions of the study areas. *Entada phaseoloides* (L.) Merr., the seed kernels are edible; *Bauhinia variegata* L. flowers are eaten as vegetables; *Leucaena leucocephala* (Lam.) de Wit., the seeds are eaten as vegetables.

Many species of the Leguminosae family are valuable timbers, ornaments, insecticides, medicines, and fibers. *Adenanthera pavonina* L., *Albizia spp.*, *Bauhinia spp.*, *Caesalpinia pulcherrima* (L.) SW., *Calliandra umbroso* (Wall.) Benth., *Cassia fistula* L., *Cassia javanica* L., *Delonix regia* (Bojer. ex Hook.) Rafin., *Leucaena leucocephala* (Lam.) de Wit., *Millettia pinnata* (L.) Panigrahi and *Senna alata* (L.) Roxb. was introduced through agroforestry for soil restoration, timbers, ornamental trees, landscaping, etc. Species like *sesbania bispinosa* (Jacq.) W. Wight, *Leucaena leucocephala* (Lam.) de Wit. also planted to provide green manure for crops.

Many wild and cultivated legume species were considered highly medicinal in the study areas. The traditional methods were applied by the people for different forms as for consumption or external uses. The medicinal species studied include *Acacia pennata* (L.) Willd., *Albizia procera* (Roxb.) Benth., *Bauhinia racemosa* L., *Bauhinia variegata* L., *Crotalaria pallida* Aiton., *Desmodium heterocarpon* (L.) DC., *Entada phaseoloides* (L.) Merr. *Erythrina stricta* L., *Leucaena leucocephala* (Lam.) de Wit., *Mimosa pudica* L., *Senna alata* (L.) Roxb., *Senna tora* (L.) Roxb., *Senna floribunda* (Cav.) H.S. Irwin & Barneby, and *Tephrosia candida* DC., etc.

There are many other valuable traditional uses of wild legumes. The species like *Millettia pachycarpa* Benth., *Dalhousiea bracteata* (Roxb.) Benth., *Acacia pennata* (L.) Willd. were used to stupefy fish or traditional fishing methods. *Pueraria montana var. Thomsonii* Benth., *Mucuna pruriens* (L.) DC. Vines and lianas of many wild legumes were used as fibers for making ropes.

Common tree species of legumes widely distributed in all study areas were *Bauhinia variegata* L. *and Albizia chinensis* (Osb.) Merr., *Albizia lebbeck* (L.) Benth, *Albizia procera* (Roxb.) Benth., *Archidendron clypearia* (Jack.) Nielson., *Cassia javanica* L., *Delonix regia* (Bojer ex. Hook.) Rafin, *Parkia timoriana* (DC.) Merr., *Derris robusta* Benth., *Erythrina stricta* Roxb.

Small trees or woody climbers commonly distributed were *Acacia pennata* (L.) Willd., *Entada phaseoiloides* (L.) Merr., *Calliandra umbrosa* (Benth.) S.R. Paul, *Leucaena leucocephala* (Lam.) de Wit., *Dalbergia pinnata* (Lour.) Prain, *Dalbergia stipulacea* Roxb. *Mastersia assamica* Benth., *Millettia pachycarpa* Benth., *Millettia pulchra* Kurz.

Legumes widely found as shrubs or herbs or wildly spreading as weeds are *Mimosa pudica* L., *Senna alata* (L.) Roxb., *Senna floribunda* (Cav.) H.S. Irwin & Barneby, *Senna occidentalis* L., *Senna tora* (L.) Roxb., *Abrus pulchellus* Wall. Ex Thwaites., *Aeschynomene americana* L., *Arachis hypogea* L., Milsp., *Crotalaria ferruginea* Benth., *Crotalaria juncea* L., *Crotalaria mysorensis* Roth., *Crotalaria pallida* Aiton, *Crotalaria tetragona* Roxb ex. Andrews, *Desmodium heterocarpon* (L.) DC., *Desmodium laxiflorum* DC., *Desmodium microphyllum* (Thunb.) DC., *Desmodium sequax* wall., *Flemingia macrophylla* (Willd.)O. Kuntze ex Merr., *Mucuna pruriens* (L.) DC., *Pueraria montana var. Thomsonii* Benth., *Sesbania bispinosa* (Jacq.) W.Wight, *Shuteria involucrata* (Wall.) Wight & Arn. ex Walp., *Tephrosia candida* DC.

From the present study, it is concluded that Leguminosae is also one dominant family in the study areas. It is also recorded as the third dominant family in the state after Orchidaceae and Gramininеae, as per the checklist of the flora of Nagaland.

Kohima district shows the highest diversity of the Leguminosae family. Since, the district shows more diverse vegetation and the preferable climatic condition for all types of species as compared to the Mokokchung and Mon districts of Nagaland. The land use pattern also varies in the study areas. The majority population of Kohima district follows terrace farming, and Mokokchung and Mon districts follow Jhum or shifting cultivation in which Jhum farming occupies the land for a few years until the land is fertile and shifts to another fertile land which keeps the mass of land as barren or the regeneration time is slow.

Anthropogenic activities are the biggest threat to the loss and destruction of species in the study areas. Population exploitation and urbanization led to destruction in the forest areas. Highway constructions, deforestations, building bridges, rail tracks, mining, coal deposits, etc., are some major destruction observed in the study areas, where the same species could not be observed again in the localities.

The study also concludes that the majority of the people in rural areas depend on wild legumes for food, medicine, forage, timbers, fibers, etc. But rapid urbanization and an

increase in population led to major threats to these plant species. Moreover, indigenous knowledge is also lost due to modernization. So, the present study is taken up to document the richness of legume species and to preserve their traditional importance in the study areas. There is an urgent need to protect and save the Leguminosae flora in the region to impart knowledge of its importance to the younger generations and to meet future sustainability.

The present research work, "Taxonomic studies on the family Legumininosae Juss. (= Fabaceae Lindl. in Kohima, Mokokchung and Mon districts of Nagaland." has initiated to document the Legumes species in Kohima, Mokokchung, and Mon districts of Nagaland and provides a baseline data for references to any research taken up in the areas, students for understanding the floras in the localities and any individuals who are interested in the field of floras.

FUTURE SCOPE

- Taxonomic studies of the Leguminosae family can be used to add up in district floras and comparison for state floras.
- For proper utilization of this species, proper ethno-botanical studies can be taken up.
- Information on Traditional uses of medicine of this species can be thoroughly studied for its medicinal properties.
- Ecologically the legume species are a source of fixing nitrogen and increase soil fertility. So, with this concern, more studies can be taken up to improve the soil quality.

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LIST OF PAPER PUBLICATIONS, PRESENTATION, CONFERENCES AND WORKSHOPS ATTENDED

Book chapter published

1. **Konyak, P. and Limasenla, 2021.** Ethnobotanical studies on some Legumes used by Angami, Ao and Konyak Tribes of Nagaland, North-East India. *Bioresouces and Sustainable Livelihood of Rural India*. Mittal publications. pp. 371-380. ISBN-10 9390692571, ISBN-13 978-93906925761.

Paper published

1. **Konyak P., Kuotsu R., Limasenla, 2022.** Traditional methods of processing seeds of *Entada phaseoloides* (L.) Merr. and *Gynocardia odorata* R. Br. for consumption by the Konyak Naga tribe of Nagaland, India. *Pleione.*16 (3): 313- 317. Doi:10.26679.

Papers presented

1. Presented Oral presentation on- "*Preliminary studies on the family Leguminosae juss. (=Fabaceae Lindl.) of Kohima, Mokokchung and Mon districts of Nagaland*", at International Symposium on Plant Taxonomy and Ethnobotany, organized by Botanical survey of India, Kolkata. 13th and 14th of February, 2020.

2. Presented oral presentation on- "*Ethnobotanical studies on some Legumes used by Angami, Ao and Konyak tribes of Nagaland, Northeast India, at* National e- Conference of Stakeholder on Conservation, Cultivation, Resource Development and Sustainable Utilization of Medicinal Plants of North-Eastern India, from September 28- 29th, 2020 jointly organised

by Department of Botany (UGC-SAP DRS-III), DBT- Advance Institutional Biotech Hub, Nagaland University Lumami & Society for Conservation and Resource Development of Medicinal Plants (SMP), New Delhi.

Conferences, Workshops and Trainings attended

1. Attended workshop on 'Skill and Entrepreneurial Development of the Tribal Youth' with the theme 'Value Additions to Rich Bio-resources with Special Reference to Medicinal and Aromatic Plants' jointly organized by Biotech Park, Lucknow and Institutional Biotech Hub, Department of Botany, Nagaland University, Lumami- 798627 from 25th - 28th July, 2018 at Nagaland University, Lumami.

2. Attended Workshop on **"Angiosperm Taxonomy, Bio-resource Conservation and its Utilization"** from 3rd to 7th December, 2018, at Indian Institute of Entrepreneurship, Guwahati organized by ATREE, Bangalore.

3. Hands on Training course on "**Classical and Modern Methods in Plant Taxonomy & Biosystematics"** from 14th – 21st, December, 2018 at CSIR-National Botanical Research Institute, Rana Pratap Marg, Lucknow.

4. Hands on training course on "**Molecular Taxonomy of Microbes and Higher Plants"** from 17th - 23rd July, 2019, organised by Department of Biotechnology, Ministry of Science & Technology, Govt. of India sponsored 'Advance Level Institutional Biotech Hub', Department of Botany, Nagaland University.

5. Attended Workshop on **"Curating and Exploring Biodiversity Data for researchers working on Bioresources of North-East India"** from 4th to 6th November, 2019 at Indian Institute of Bank Management, Khanapara, Jawahar Nagar Guwahati, organized by ATREE, Bangalore.

6. Attended workshop on **"Analysis and Management of Bioresources Data, using social science Methods"** from 7th to 9th November, 2019 at Indian Institute of Bank Management, Khanapara, Jawahar Nagar Guwahati, organized by ATREE, Bangalore.

7. Attended workshop on "**Research Ethics, Paper Writing and IPR"** on 14th and 15th, November, 2019 organised by Department of Botany and Advanced Level Institutional Biotech Hub, Nagaland University, Lumami.

8. Attended online GIS workshop on "**National Level One Week Online GIS Training Workshop"** from 10th- 15th August, 2020 organised by the Department of Geography in collaboration with PCGS, Pragjyotish College, Assam**.**

9. Participated conference on "**Wild Musa Species of Nagaland**" and "**Moss Flora of Nagaland**" as an organizing team, organized by the Department of Botany, Kohima Science College, Jotsoma, Nagaland on 8th November 2021.

10. Participated in International Workshop on "**Current and Traditional Practices for Sustainable Management of Aquatic Ecosystems"**. On 24th - 25th November, 2022 hosted by Kohima Science College, Jotsoma and sponsored by GIZ Deutsche Gesellschaft fur Internationale Zusammenarbeit GmbH.

11. Attended "**Botanical Nomenclature Course**" training conducted by Botanical Survey of India, Northern Regional Centre, Dehradun, in collaboration with Uttarakhand Sciences Education & Research Centre (USERC) and Association for Plant Taxonomy (APT) from 6th- 10th February 2023.

TYPES OF CULTIVATION **PLATE 1**

TERRACE CULTIVATION

SHIFTING CULTIVATION

TYPES OF VEGETATIONS **PLATE 2A**

SUB-TROPICAL FOREST VEGETATION

DZUKOU VALLEY (MONTANAE WET- TEMPERATE FOREST VEGETION)

TYPES OF VEGETATIONS **PLATE 2B**

DECIDUOUS FOREST VEGETATION

SEMI-EVERGREEN FOREST VEGETATION

ANTHROPOGENIC ACTIVITIES AREAS PLATE 3A

BRIDGE CONSTRUCTION SITE

COAL DEPOSIT SITE

ANTHROPOGENIC ACTIVITIES AREAS PLATE 3B

ROAD CONSTRUCTION SITE

LOGGING SITE

PLATE 4

Bauhinia variegata L (a) Tree

(b) Flower

(c) Pod

Bauhinia acuminata L.

(a)

(b)

Bauhinia purpurea L. (a) Flower (b) Pods

PLATE 5

(a)

(b)

Acacia pennata (L.) Willd. (a) Flowers (b) Pods

(a)

(b)

Albizia chinensis (Osb.) Merr. (a) Flowers (b) Pods

(a)

(b)

Albizia julibrissin Durazz. (a) Flowers (b) Pods

PLATE 6

Caesalpinia decapetala (Roth.) Alston

Adenanthera pavonina L.

(a)

(b)

Archidendron clypearia (Jack.) Neilson (a) Flowers (b) Pod and Leaf

Albizia procera (Roxb.) Benth.

Albizia lebbeck (L.) Benth.

PLATE 7

Caesalpinia pulcherrima (L.) Sw.

Calliandra umbroso (Benth.) S.R. Paul

Cassia fistula DC.

Cassia javanica L.

(a)

(b)

Entada phaseoloides (L.) Merr. (a) Flowers (b) Pods

PLATE 8

Chaemaecrista mimosoides (L.) Greene

Delonix regia (Bojer ex. Hook.) Rafin

Mimosa diplotricha var. *inermis* (Adelb.)

Mimosa pudica L.

(a)

(b)

Parkia timoriana (DC.) Merr. (a) Pods (b) Flower

PLATE 9

Leucaena leucocephala (Lam.) de. Wit.

Senna alata (L.) Roxb.

Senna floribunda (Cav.) H.S. Irwin & Barneby

Senna hirsuta H.S. Irwin & Barneby

Senna occidentalis L.

Senna tora (L.) Roxb.

PLATE 10

Aeschynomene indica L.

Abrus pulchellus Wall. ex Thwaites

Aeschynomene americana L.

Apios carnea (Wall.) Benth.

Arachis hypogaea L.

Amphicarpaea bracteata (L.) Fernald

PLATE 11

(a)

(b)

Cajanus scarabaeoides (L.) Thouars (a) Flowers and (b) Pods

Cajanus cajan (L.) Milsp.

Astragalus concretus Benth.

Clitoria mariana L.

Callerya cinerea Benth.

PLATE 12

(a)

(b)

Crotalaria cytisoides Roxb. (a) Flowers (b) Pods

(a)

(b)

Codariocalyx motorius (Houtt.) H. ohashi (a) Flowers (b) Pods

Canavalia gladiata (Jacq.) DC.

Canavalia ensiformis (L.) DC.

PLATE 13

(a)

(b)

Crotalaria juncea L. (a) Flowers (b) Pods

(a)

(b)

Crotalaria ferruginea Benth. (a) Flower (b) Pod

Codariocalyx gyroides (Roxb. ex. Link) Hassk.

Crotalaria humifusa Grah.

PLATE 14

Crotalaria pallida Aiton.

Crotalaria tetragona Roxb. ex. Andrews.

(a)

(b)

Crotalaria micans Link. (a) Flowers (b) Pods and leaf.

(a)

(b)

Crotalaria mysorensis Roth. (a) Flower (b) Pods

PLATE 15


(a) (b)

Dalbergia stipulaceae Roxb. (a) Pod (b) Flowers


(a) (b)

Dalhousiea bracteata (Roxb.) Benth. (a) Flowers (b) Pods


(a) (b)

Desmodium concinnum DC. (a) Leaves (b) Flowers

PLATE 16

Dalbergia pinnata (Lour.) Prain

Derris elliptica (Wall.) Benth.

(a)

(b)

Derris robusta Benth. (a) Flowers (b) Pods

(a)

(b)

Derris scandens (a) Pods and Leaves (b) Flowers

Dendrolobium triangulare (Retz.) Schindl.

Desmodium gangeticum (L.) DC.

(a)

(b)

Desmodium confertum DC. (a) Flowers (b) Pods

(a)

(b)

Desmodium griffithianum Benth. (a) Flowers (b) Pods

Desmodium heterocarpon (L.) DC.

Desmodium heterophyllum (Willd.) DC.

(a)

(b)

Desmodium laxiflorum DC. (a) Flowers (b) Pods

Desmodium microphyllum (Thunb.) DC.

Desmodium sequax Wall.

Desmodium triflorum (L.) DC.

Desmodium velutinum (Willd.) DC.

Dumasia villosa DC.

Eriosema himalaicum H. Ohashi

Erythrina arborescens Roxb.

Erythrina stricta Roxb.

(a)

(b)

Flemingia macrophylla (Willd.) O. Kuntze ex. Merr. (a) Flowers (b) Pods

Glycine max (L.) Merr.

Hylodesmum podocarpum (DC.) H. Ohashi & R.R Mill

Hylodesmum repandum (Vahl.) H. Ohashi & R.R Mill

Indigofera artropurpurea Buch.- Ham ex. Hornem

PLATE 21

Indigofera nigrescens Kurz ex. King & Prain

Kummerowia striata (Thunb.) Schindl.

Lablab purpureus (L.)

Mastersia assamica Benth.

(a)

(b)

Meizotropis buteiformis Voigt. (a) Flowers (b) Pods

(a)

(b)

Millettia pachycarpa Benth. (a) Flowers (b) Pod

(a)

(b)

Millettia pinnata (L.) Panigrahi (a) Flowers (b) Pods

Millettia pulchra Kurz.

Mucuna imbricata Baker.

PLATE 23

(a)

(b)

Mucuna pruriens (L.) DC. (a) Flowers (b) Pods

Mucuna pruriens var. *utilis* (Wall. ex. Wight)

Ormosia robusta Baker.

(a)

(b)

Pachyrhizus erosus (L.) Urb. (a) Flowers (b) Pods

(a)

(b)

Parochetus communis D.Don. (a) Leaf and flower (b) Root nodules

Phaseolus lunatus L.

Phyllodium pulchellum (L.) Desv.

(a)

(b)

Phaseolus vulgaris L. (a) Flower (b) Pods

(a)

(b)

Piptanthus nepalensis (Hook.) D. Don. (a) Flowers (b) Leaves

(a)

(b)

Pueraria Montana var. *thomsonii* Benth. (a) Flowers (b) Pods

(a)

(b)

Pueraria peduncularis (Grah. ex. Benth.) Benth. (a) Flowers (b) Pods

PLATE 26

Pueraria phaseoloides (Roxb.) Benth.

Robinia pseudoacacia L.

(a)

(b)

Pueraria tuberosa (Willd.) DC. (a) Flowers (b) Pods

(a)

(b)

Rhynchosia minima (L.) DC. (a) Flower (b) Leaves

(a)

(b)

Sesbania bispinosa (Jacq.) W. Wight (a) Flowers (b) Pods

Shuteria hirsuta Baker.

Shuteria involucrata (Wall.) Wight & Arn. ex. Walp

(a)

(b)

Spatholobus suberecuts Dunn. (a) Flowers (b) Pods

Smithia ciliata Royle.

Tadehagi triquetrum (L.) H. Ohashi

Tephrosia candida DC.

Tephrosia purpurea (L.) Pers.

Trifolium repens L.

Vigna radiata (L.) R. Wilczek.

Vigna mungo (L.) Hepper.

Vigna vexillata (L.) A. Rich.

(a)

(b)

Vigna umbellata (Thunb.) Ohwi. & Ohashi (a) Flowers (b) Pods

(a)

(b)

Vigna unguiculata (L.) Walp. (a) Plant (b) Pods