Cover: The critically endangered *Lilium polyphyllum* in watercolour and acrylics. © Aishwarya S Kumar.
Legumes (Fabaceae) from Satmala hills, Maharashtra, India

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Abstract: A floristic survey was carried out in Satmala hill range of Nasik district. The study area is dry throughout the year except monsoon period. During this survey, the authors recorded 74 taxa of the family Fabaceae or Leguminosae, belonging to three subfamilies and 38 genera. The majority of the legumes are herbs & shrubs, while few are climbers & trees. Updated nomenclature, habit, habitat, life forms, GPS coordinates, phenology, voucher specimens & images of legumes found in the study area are provided.

Keywords: Checklist, endemics, ethno medicine & economics, northern Western Ghats.

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Author contributions: SDW was carried out regular field tours, exploration, collection, photography, herbarium preparation, identification & data compilation. He wrote the draft of manuscript. MTP help for the collection.

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INTRODUCTION

The family Fabaceae or Leguminosae is one of the socio-economically important families in Angiosperms. It is commonly known as legume, pea, or bean family. This family members possess all types of habits such as herbs, trees, shrubs, and climbers. It is easily recognised by their pods (legume). Fabaceae Lindl. is the third largest family of angiosperms in terms of number of taxa. It is represented by 770 genera & 19,500 taxa worldwide (FAO 2016; LPWG 2017). In India, the family Fabaceae is represented by 174 genera, 1110 species & 256 intraspecific taxa (Sanjappa 2020). Legumes are very important source of proteins in developing countries. In tropical and temperate region wild beans used in the manufacture of resins, tannins, oils, varnishes, paints, dyes, and medicines (LPWG 2017). Other than socio-economic importance legumes are equally beneficial for ecosystems and recycling via nitrogen uptake, enhance soil porosity, recycling of nutrients, decreasing soil pH, reduction of soil compaction and in rotation with cereals they offer a source of slow-fixation of nitrogen to sustainable cropping (USDA 1998; Popelka et al. 2004). In brief, it is economically important family for development of the region therefore present study focuses on preparation of checklist of legumes from Satmala hill range for future advancement.

MATERIAL & METHODS

Study Area

Satmala is well known hill range in Nasik district, Maharashtra, India. Due to low rainfall & hot climatic condition, the hill range harbour seasonal vegetation. The co-ordinates of hill range is 20.3902° N & 73.9086° E. This hill range consist many high peaks with elevation of more than 1,200 m. Some of them are Dhodap (1,451 m), Achala (1,238 m), Ahivant (1,226 m), Saptashrungigad (1,240 m), Markandya (1,331 m), Indrai (1,475 m), Sadetin Rodaga (1,350 m), Chandreshwari (1,300 m), and Rajdher (1,325 m). Major habitats on this hill range are slopes, exposed rock surfaces, grasslands, ephemeral flush vegetation, soil covered areas & seasonal ponds. Average rainfall recorded during last decades ranges 900–1,200 mm and temperature is 28–45 °C. The climate of these plateaus is dry throughout the year except during the south-west monsoon season.

Data collection

Preliminary checklist of taxa belonging to the family Fabaceae from Nashik district was prepared from all the available floras & checklists (Cherian & Pataskar 1969; Lakshminarasimhan & Sharma 1991; Singh & Karthikeyan 2001; Yadav & Dhanke 2010; Pawar & Pokle 2011; Auti et al. 2021). Studies on herbarium specimens was carried out by visiting some important herbaria such as BSI, CAL, DD, and SUK, which is followed by extensive & intensive field visits from June 2020 to January 2022. All important microhabitats were covered by conducting more than 45 field tours and data. on habit, life form, endemism, ethno botany, microhabitat, distribution, and flowering phenology was recorded. Three herbarium specimens were prepared for every collected taxa following standard herbarium methodology (Jain & Rao 1976). Identification of specimens was carried out using local & regional floras as well as all available taxonomic literature (Hooker 1876; Lakshminarasimhan & Sharma 1991; Naik 1998; Singh & Karthikeyan 2001; Yadav & Dhanke 2010). Some doubtfull specimens identified by direct comparison with identified specimens deposited in BSI and CAL. Also digital images such as Kew herbarium catalogue (accessed from June 2020 to January 2022), JSTOR Global plants (accessed from June 2019 to February 2022) were consulted online. The names of species checked using POWO (Plants of the world online accessed from July 2020 to March 2022). All species were classified according to latest phylogenetic classification of leguminosae (LPWG 2017) and listed in Table 1. Study area map and pie diagram is provided for sub-family wise distribution of species. Colour photo plates of a few important taxa are given for easy identification (Images 1–3).

RESULTS

Checklist

A total of 69 species, four varieties, and one subspecies of family Fabaceae have been reported from Satmala hill range of Nashik district. All the species classified into three subfamilies of Fabaceae, viz., Cercidoideae, Caesalpinioideae, and Faboideae/ Papilionoideae. Among these subfamilies, Faboideae or Papilionoideae is the largest subfamily with 59 taxa under 27 genera followed by subfamily Caesalpinioideae with 13 species and nine genera, subfamily cercidoideae with two species and two genera (Figure 2). Crotalaria L. is the largest genus with eight taxa, followed by Alysicarpus Desv. with seven taxa, Indigofera L. & Vigna
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Savi with five taxa each. Fabaceae of Satmala hill range consists of 26 herbs, 21 shrubs, 14 trees, and 12 climbers. During field visits it is observed that Satmala hill range is dominated by species of Fabaceae family after family Poaceae.

**Endemism**

Few taxa are endemic to Peninsular India, viz., Alysicarpus bupleurifolius var. hybridus Burm.f. ex DC. found to be growing near edges of seasonal streams. Alysicarpus pubescens Law and Cajanus sericeus (Benth. ex Baker) Maesen were collected from soil rich areas on uppermost plateau. Clitoria annua J. Graham found to be growing inside bushes. It is observed that population of Vigna khandalensis (Santapau) Sundararagh. & Wadhwa is very small and restricted to uppermost plateau but Vigna indica T.M.Dixit. K.V.Bhat & S.R.Yadav is a dominant species found inside grasslands. Indigofera glandulosa var. sykesii Griff. ex Baker found to be growing on edges/cliffs of plateaus.

**Ethno Medicine & Economics**

Few wild legumes from study area used by local people/community to cure ailments. The decoction made from the leaf powder of Dichrostachys cinerea (L.) Wight & Arn. used to cure common fever. Ringworms were cured by powdered seeds of Senna Sophora (L.) Roxb. A juice made by leaves of Guilandina bondoc L. is taken to cure piles. Gum of Butea monosperma (Lam.) Kuntze used by tribal people in nearby villages to cure diarrhoea. Few plants are economically important, young pods of Vigna indica T.M.Dixit K.V.Bhat & S.R.Yadav are eaten as raw by local community & visitors directly. The leaves of Senna tora (L.) Roxb. used as a wild vegetable. The fruits of Tamarindus indica L. & Pithecellobium dulce (Roxb.) Benth. are edible. Also fruits of Mucuna pruriens (L.) DC. are used by tribal community as a wild vegetable. The whole plant of Crotalaria medicaginnea Lam. is used as cattle feed. The seeds of Crotalaria myorensis Roth used as manure. Dry pods of Vachellia nilotica (L.) P.H.J.Hurter are used to prepare tooth powder. Aeschynomene virginica (L.) Britton, Sterns & Poggenb., used as a fodder for milk cattle’s. Timber of Butea monosperma (Lam.) Kuntze, Tamarindus indica L., Cassia fistula L., Dalbergia sissoo Roxb. ex DC, Dichrostachys cinerea (L.) Wight & Arn., Pithecellobium dulce (Roxb.) Benth., Piliostigma

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Figure 1. Study area: A—Position of Maharashtra in India | B—Position of Nashik in Maharashtra | C—Position of Chandwad in Nashik | D—Position of collection localities in Nashik district.
Table 1. Checklist of Legumes from Satmala Hill Range as per latest classification of LPWG (2017).

<table>
<thead>
<tr>
<th>Botanical name</th>
<th>Vernacular name</th>
<th>Habit, habitat, life form</th>
<th>GPS coordinates</th>
<th>Phenology</th>
<th>Exsiccatea</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Latitude</td>
<td>Longitude</td>
<td></td>
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<tr>
<td><strong>Subfamily: CERCIDIOIDEAE (02 Genera &amp; 02 Species)</strong></td>
<td></td>
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</tr>
<tr>
<td>01</td>
<td>Pilostigma malabaricum (Roxb.) Benth.</td>
<td>Kanchan</td>
<td>Tree, Soil Rich Area, P</td>
<td>20.336 N</td>
<td>74.260 E</td>
</tr>
<tr>
<td>02</td>
<td>Sattarindus indica L.</td>
<td>Chinch</td>
<td>Tree, Hill Slopes, P</td>
<td>20.353 N</td>
<td>74.233 E</td>
</tr>
<tr>
<td><strong>Subfamily: CAESALPINIOIDEAE (09 Genera &amp; 13 Species)</strong></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>03</td>
<td>Biancera decapetala (Roth) O.Deg</td>
<td>Chilar</td>
<td>Shrub, Edges of Seasonal Streams, P</td>
<td>20.336 N</td>
<td>74.259 E</td>
</tr>
<tr>
<td>04</td>
<td>Cassia fistula L.</td>
<td>Bahawa</td>
<td>Tree, Hill Slopes, P</td>
<td>20.236 N</td>
<td>74.257 E</td>
</tr>
<tr>
<td>05</td>
<td>Chamaecrista absca (L.) H.S. Irwin &amp; Barneby</td>
<td>Chimar</td>
<td>Herb, Soil Covered Area, T</td>
<td>20.359 N</td>
<td>74.260 E</td>
</tr>
<tr>
<td>06</td>
<td>Chamaecrista mimosa (L.) Greene</td>
<td>Chinchani</td>
<td>Herb, Rock Crevices, T</td>
<td>20.386 N</td>
<td>74.195 E</td>
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<td>07</td>
<td>Guilandina bonduc L.</td>
<td>Sagargota</td>
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<td>20.336 N</td>
<td>74.257 E</td>
</tr>
<tr>
<td>08</td>
<td>Pithecellobium dulce (Roxb.) Benth.</td>
<td>Vilayatt chinch</td>
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<td>20.360 N</td>
<td>74.207 E</td>
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<td>09</td>
<td>Prosopis cineraria (L.) Druce</td>
<td>Shami</td>
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<td>20.353 N</td>
<td>74.232 E</td>
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<td>10</td>
<td>Senna auriculata (L.) Roxb.</td>
<td>Tarvod</td>
<td>Shrub, Hill Slopes, P</td>
<td>20.335 N</td>
<td>74.257 E</td>
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<tr>
<td>11</td>
<td>Senna osypophylla (Kunth) H.S. Irwin &amp; Barneby</td>
<td>Jangali takala</td>
<td>Shrub, Soil Rich Area, P</td>
<td>20.354 N</td>
<td>74.229 E</td>
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<tr>
<td>12</td>
<td>Senna sophora (L.) Roxb.</td>
<td>Jangali takala</td>
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<td>13</td>
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<td>Takala</td>
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<td>74.258 E</td>
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<td>14</td>
<td>Senegalia catechu (L.) P.J.H.Hurter &amp; Mabb.</td>
<td>Khair</td>
<td>Tree, Hill Slopes, P</td>
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<td><strong>Subfamily: FABOIDEAE (27 Genera &amp; 59 Species)</strong></td>
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<td>16</td>
<td>Abrus precatorius L.</td>
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<td>Climber, Inside Bushes, P</td>
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<td>74.227 E</td>
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<td>17</td>
<td>Aeschynomene aspera L.</td>
<td>Nalabi</td>
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<td>Alysicarpus bupleurifolius (L.) DC</td>
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<td>Herb, Inside Grasses, T</td>
<td>20.356 N</td>
<td>74.225 E</td>
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<td>19</td>
<td>Alysicarpus bupleurifolius var. hybridius Burm.f.ex DC.</td>
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<td>74.225 E</td>
</tr>
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<td>Alysicarpus heymannus Wight &amp; Arn.</td>
<td>Shevara</td>
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<td>20.388 N</td>
<td>74.189 E</td>
</tr>
<tr>
<td>21</td>
<td>Alysicarpus monilifer (L.) DC.</td>
<td>Shevara</td>
<td>Herb, Soil Covered Area, T</td>
<td>20.356 N</td>
<td>74.220 E</td>
</tr>
<tr>
<td>22</td>
<td>Alysicarpus pubescens Law</td>
<td>Durangi Shevara</td>
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<td>24</td>
<td>Alysicarpus vaginalis (L.) DC</td>
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<td>Herb, Exposed Rock Surfaces, T</td>
<td>20.355 N</td>
<td>74.219 E</td>
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<td>25</td>
<td>Butea monosperma (Lam.) Kunze</td>
<td>Palas</td>
<td>Tree, Cliffs, Hill Slopes, P</td>
<td>20.335 N</td>
<td>74.260 E</td>
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<tr>
<td>26</td>
<td>Cajanus sericeus (Benth. ex Baker) Maesen</td>
<td>Reshami Tur</td>
<td>Shrub, Soil Rich Area, T</td>
<td>20.389 N</td>
<td>74.190 E</td>
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<tr>
<td>28</td>
<td>Clitoria annua J. Graham</td>
<td>Gokarn</td>
<td>Sub-Shrub, Soil Rich Area, P</td>
<td>20.338 N</td>
<td>74.258 E</td>
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<tr>
<td>29</td>
<td>Clitoria ternatea L.</td>
<td>Nila Gokarn</td>
<td>Climber, Inside Bushes, C</td>
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<td>74.219 E</td>
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<td>31</td>
<td>Crotalaria gojrelana Gholavo, Madhav &amp; Gosavi</td>
<td>Kukhula</td>
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<td>20.386 N</td>
<td>74.195 E</td>
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<tr>
<td>32</td>
<td>Crotalaria hebecarpa (DC) Rudd</td>
<td>Piwali godhadi</td>
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<td>Vernacular name</td>
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<td>GPS coordinates</td>
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<td>33 Crotalaria juncea L</td>
<td>Tagada</td>
<td>Shrub, Soil Rich Area, T</td>
<td>20.339 N 74.254 E</td>
<td>Sep-Oct</td>
<td>SDW-764</td>
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<td>34 Crotalaria medicaginea Lam.</td>
<td>Rangas</td>
<td>Shrub, Soil Rich Area, T</td>
<td>20.389 N 74.194 E</td>
<td>Sep-Dec</td>
<td>SDW-943</td>
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<tr>
<td>35 Crotalaria myxospermis Roth</td>
<td>Khilkhula</td>
<td>Sub-Shrub, Soil Rich Area, T</td>
<td>20.363 N 74.209 E</td>
<td>Sep-Oct</td>
<td>SDW-1072</td>
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<td>37 Crotalaria triqueta Zalzeli</td>
<td>Ghati</td>
<td>Herb, Soil Rich Area, T</td>
<td>20.388 N 74.194 E</td>
<td>Sep-Oct</td>
<td>SDW-693</td>
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<tr>
<td>38 Dalbergia sisoos Roxb. ex DC.</td>
<td>Shisav</td>
<td>Tree, Hill Slopes, P</td>
<td>20.339 N 74.258 E</td>
<td>Sep-Feb</td>
<td>SDW-1358</td>
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<td>39 Desmodium dichotomum (Willd.) DC.</td>
<td>Asud, Lupti</td>
<td>Herb, Gravelly Hill Slopes, T</td>
<td>20.338 N 74.258 E</td>
<td>Sep- Oct</td>
<td>SDW-701</td>
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<td>40 Desmodium gangeticum (L.) DC.</td>
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<td>Herb, Gravelly Hill Slopes, T</td>
<td>20.352 N 74.220 E</td>
<td>Sep-Oct</td>
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<td>42 Dolichos triobus L.</td>
<td>Ran Pawata</td>
<td>Climber, Inside Bushes, C</td>
<td>20.338 N 74.257 E</td>
<td>Oct-Nov</td>
<td>SDW-688</td>
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<td>43 Erythrina stricta Roxb.</td>
<td>Pangara</td>
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<td>20.338 N 74.213 E</td>
<td>Jan-Mar</td>
<td>SDW-1301</td>
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<td>44 Gliricidia sepium (Jacq.) Kunth</td>
<td>Undirmari</td>
<td>Tree, Hill Slopes, P</td>
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<td>Jan-Feb</td>
<td>SDW-1227</td>
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<td>46 Indigofera cordifolia B. Heyne ex Roth</td>
<td>Godhadi</td>
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<td>20.221 N 74.196 E</td>
<td>Sep-Oct</td>
<td>SDW-698</td>
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<td>48 Indigofera glanduliflora var. sykesi Baker</td>
<td>Borupdi</td>
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<td>20.387 N 74.196 E</td>
<td>Aug-Oct</td>
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<td>49 Indigofera linifolia (L.f) Retz.</td>
<td>Pandarphali</td>
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<td>20.363 N 74.194 E</td>
<td>Aug-Sep</td>
<td>SDW-377</td>
</tr>
<tr>
<td>50 Indigofera trifoliata var. duthiei (L.Drumm. ex Naik) Sanjappa</td>
<td>Borupdi</td>
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<td>20.355 N 74.212 E</td>
<td>Oct-Nov</td>
<td>SDW-600</td>
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<td>51 Macrotyloma uniflorum (Lam.) Verdc.</td>
<td>Ran Kulid</td>
<td>Twinning Herb, Gravelly Hill Slopes, C</td>
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<td>Sep-Oct</td>
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<td>52 Macuna pruriens (L.) DC.</td>
<td>Kachkuyari</td>
<td>Climber, Edges of Seasonal Streams, P</td>
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<td>Sep-Dec</td>
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<td>53 Mucuna sericea (Wild) A.Chev.</td>
<td>Supli</td>
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<td>May-Jun</td>
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<td>55 Pongamia pinnata (L) Pierre</td>
<td>Karanj</td>
<td>Tree, Hill Slopes, P</td>
<td>20.341 N 74.258 E</td>
<td>Mar–May</td>
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<td>56 Rhynchosia miniata (L.) DC.</td>
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<td>57 Rhynchosia rothii Benth. ex Alttch.</td>
<td>Motha Ranghevanda</td>
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<td>58 Sesbania bispinosa (Jacq.) W.Wight</td>
<td>Ran Sevari, Hatla</td>
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<td>Nov-Dec</td>
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<td>Lahen Kaval</td>
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<td>Sep-Oct</td>
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</tr>
<tr>
<td>64 Tephrosia villosa (L.) Pers.</td>
<td>Unhali</td>
<td>Sub-Shrub, Hill Slopes, P</td>
<td>20.352 N 74.222 E</td>
<td>Jul-Aug</td>
<td>SDW-12</td>
</tr>
<tr>
<td>65 Teramnus mollis Benth.</td>
<td>Ran udd</td>
<td>Climber, Inside Bushes, C</td>
<td>20.391 N 74.222 E</td>
<td>Oct-Nov</td>
<td>SDW-391</td>
</tr>
<tr>
<td>66 Teramnus repens subsp. gracilis (Chow) Verdc.</td>
<td>Ran udd</td>
<td>Climber, Inside Bushes, C</td>
<td>20.361 N 74.210 E</td>
<td>Nov-Dec</td>
<td>SDW-1105</td>
</tr>
<tr>
<td>68 Vigna Khondalesii (Santapau) Sundarahal. &amp; Wadhwa</td>
<td>Bud mug</td>
<td>Shrub, Exposed Rock Surfaces, T</td>
<td>20.335 N 74.256 E</td>
<td>Sep-Oct</td>
<td>SDW-836</td>
</tr>
</tbody>
</table>
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Legumes from Satmala hills, Maharashtra

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Botanical name | Vernacular name | Habit, habitat, life form | GPS coordinates | Phenology | Exsiccata
---|---|---|---|---|---
Vigna mungo (L.) Hepper | Udid | Creeping Herb, Soil Covered Area, T | 20.360 N 74.210 E | Sep–Oct | SDW-184
Vigna radiata var. sublobata (Roxb.) Verdc. | Mug | Creeping Herb, Moist Soil Covered Area, T | 20.384 N 74.198 E | Oct–Nov | SDW-1112
Zornia gibbosa | Landgu | Herb, Hill Slopes, T | 20.349 N 74.228 E | Aug–Sep | SDW-126


Figure 2. Subfamily wise distribution of species as per LPWG 2017.

malabaricum (Roxb.) Benth, Prosopis cineraria (L.) Druce, Pongamia pinnata (L.) Pierre, Senegalia catechu (Lf) P.H.Hurter & Vachellia nilotica (L.) P.H.Hurter are often used for construction purposes. The seeds of few plants such as Dalbergia sissoo Roxb. ex DC., Cassia fistula L., Erythrina stricta Roxb., and Butea monosperma (Lam.) Kuntze collected by local people to grow saplings in their garden.

CONCLUSION

The family Fabaceae Lindl. is the second largest family after Poaceae due to its high adaptability on various microhabitats. Many species of Fabaceae are good source of ethno medicine, timber, and wild edible. Some herbaceous members belonging to the genus, Chamaecrista Moench, Alysicarpus Desv, Crotalaria L., Desmodium Desv, Indigofera L., Senna Mill., are dominant inside grasslands while some such as Pilostigma Hochst, Tamarindus Tourn. ex. L., Cassia L., Prosopis L., Vachellia Wight & Arn., Butea Roxb. ex Willd., Dichrostachys (A.Dc.) Wight & Arn., Dalbergia Lf, Senegalia Raf., Guilandina L., Vachellia Wight & Arn, Pongamia Adans. are dominant in dry deciduous forest cover the hill slopes. Few endemic species such as Vigna khandalensis (Santapau) Sundararagh. & Wadhwa, Alysicarpus pubescens Law, Crotalaria juncea L., and Cajanus sericeus (Benth. ex Baker) Maesen restricted to uppermost plateau only. Few legumes, Sesbania bispinosa (Jacq.) W. Wight & Smithia sensitiva Aiton are restricted to edges of seasonal streams only. According to the IUCN Red List of Threatened Species, 27 species were ‘Least Concern’ and one species is ‘Near Threatened’. It is observed that major threats to these species are over grazing & human interference. So there is urgent need to conserve these special habitats for sustainable utilization of legumes from study area.

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