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# Ethnomedicobotany: Exploration of Wild Biodiversity for Immune Boosting and Others in Communities of Dry Districts of Karnataka, India

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**ABSTRACT**

**Bidar, Raichur and Vijayapura are the three dry districts among others of eastern planes of Karnataka. The forest divisions are corresponding to the districts. They are comparatively backward districts with poverty abundant and with poor medical infrastructure to deal with epidemics like Covid-19 and likewise. The districts experience dry spells frequently but traversed with the major Krishna, Tungabhadra rivers and experience floods, makes population more vulnerable to diseases and epidemics. In spite of dry and rocky terrains, they are abundantly rich in ethnic floral biodiversity. Large numbers of highly traded medicinal plants have been reported. The districts are prone with the biotic pressure on wild herbals mainly of sheep and goats. About 381 species in Bidar; 273 Species in Raichur and 127 species in Vijayapura have been recorded. Many rare and threatened species as per the International Union for Conservation of Nature (IUCN) have also been reported from these divisions. Large numbers of taxa of medicinal properties including highly traded species are found in the districts. The medicinal efficacy of dry zone wild species is considered as very high. The use of herbal combinations for immunity boosting will reduce the pressure from medical infrastructure and increase quality of life. The forests of Bidar district are found having better wild herbal biodiversity, site quality and may be considered immune boosting centre. Ocimum sanctum, considered as one of the best immune boosters of high efficacy is widely found in all the forests of three divisions. The Ayush department of the State may take note of it. Based on the assessment certain areas have been recommended for gene pool conservation for medicinal plants. The percentages of herbs of medicinal value in the floral population are found high in these districts. The study has also laid stress on estimation of herbal medicinal resources for better management.**

**Keywords**: Ethnomedicobotany, medicinal plants, forest divisions, forest ranges, beats, assessment, transit lines, subplots, threatened species, commercially high traded species, natural regeneration, scrub forest, Biodiversity Board, Medicinal Plant Authority, National Medicinal Plant Board.

## INTRODUCTION

India, a megadiverse country with 2.4% of the world's land area, harbours 7 to 8% of the total species recorded so far contains over 45,000 plant species and 91,000 animal species. It is also amongst the few countries that have developed a biogeographic classification for conservation planning, and has mapped biodiversity rich areas in the country. Of the 34 globally acclaimed biodiversity hotspots, four are in India, represented by the Himalayas, the Western Ghats (part of Western Ghats and Srilanka), the North-eastern India (part of Indo-Burma), and the Nicobar Islands (part of Sundarland). Considering the outstanding universal values and high level of endemism in the Western Ghats, 39 heritage sites are recognized by the International Union for Conservation of Nature and Natural Resources (IUCN) within the Indian States of Kerala, Karnataka, Tamil Nadu and Maharashtra.

The tree cover of the Karnataka State is reported as increased in the last two surveys by the Forest Survey of India. But the increases in tree cover require the micro analysis. By and large, the rights and concessions do not have the same meaning today to the communities and ethnic medico Botany takes the centre stage in the harsh man-made conditions. With explosion of the human population, though forests are in no way able to meet the increasing traditional medical needs of course.

Studies in the domain of forest ecology and biodiversity, especially on population status, regeneration, medicinal uses and prevailing threat to the species require a holistic approach. Assessing/exploring the population trends of medicinal plants in the forests is also of special interest and development of the traditional use of medicines more specific for immunization against the serious threats like Covid-19 and others likewise makes the present study more relevant. Though there are medicinal plants used since ancient times, new explorations are bringing out the healing powers of several species, so far unnoticed to the modern world. The backwardness in this region of the State, the relevance of such study takes priority.

The present article is the part of a project on “Assessment of Population Status and Removal of Bio-resources in Forests with Special Emphasis on Medicinal Plants in Karnataka” under the National Medicinal Plant Board (NMPB) scheme and being implemented by the Karnataka Biodiversity Board in collaboration with Karnataka State Medicinal Plants Authority (KAMPA) and Karnataka Forest Department (KFD). The main objective is to explore population status i.e. distribution and density of traded medicinal plants and other species too.

It is a unique project which is first of its kind in the entire country to assess the population status of medicinal plant resources in the entire forest areas of the State. Considering the vast size of Karnataka, partly coming under the Western Ghats, line transect sampling method is adopted by surveying an average of 0.5% areas in each beat (the basic unit of forests). There are about 3166 beats (excluding wildlife beats-648) in the forests of the State. The outcome of the project would help in the conservation, planning, management, development of RET species, and sustainable use

of medicinal plants across the forest divisions of Karnataka. The management can also be planned beat wise. The project also focusses on Participatory Rural Appraisal in villages for identifying the contemporary medicinal plant uses and knowledge, an approach that recognizes the centrality of the indigenous communities.

Medicinal plants play an important role in supporting healthcare in India more so in country side. According to the World Health Organization (WHO), 80% of the rural population in developing countries utilizes locally available medicinal plants for their primary healthcare needs. About 7200 species of medicinal plants are in current use by local communities all over India. About 90% of the country's medicinal plant species are found in forest habitats. Only 10% of them are distributed among other landscapes such as open grasslands, agricultural pastures, road sides, bunds of water bodies etc. So, there is an urgent need to conserve and develop the wild populations of medicinal plant diversity in prioritized forest habitats of the country. The cultivation of medicinal plants is slowly picking up outside the forest.

India's rich medicinal plant heritage of 7200 species along with around 40,000 formulations spread among various health systems. If conserved and sustainably utilized for immunization and reduce pressure from costly medical infrastructure, and certainly it will have global relevance. For India's own health needs, conservation of her medicinal plants will contribute to self-reliance of millions on primary healthcare system. The demand for medicinal plants is growing. In 2006, the annual turnover of the herbal industry was rest with Rs. 2,000 million. According to some estimates, India supplies 12% of the world's requirements of medicinal plants. Today, 90% of the medicinal plants consumed domestically and exported globally are collected from the wild habitats. Only 70 out of around 900 species in the trade are obtained purely from cultivated sources.

Due to the increasing global demand for herbal remedies and more so in the present Covid-19 epidemic, the medicinal plants in the forests may face threat for their survival. If the uncontrolled harvesting of bio-resources from the wild habitats are not checked urgently, many of the valuable medicinal plants used for immunity boosting will be vanished from the wild along with their therapeutic knowledge, which is handed down through generations. The distribution pattern and quantity of the medicinal plants in the forests are not estimated in any State of the country broadly. In this back ground, the current article has been developed to make a base foundation for the ways of conserve the ethnic plant sources, sustainable immunity boosting use, development of natural herbal growth in the forest by estimating their population, regeneration, quantification and also identity with location, as 'Field Gene Banks' (FGB) for the conservation of genome for future generations.

## METHODOLOGY

The present study is the part of a project implemented by the Karnataka Biodiversity Board and funded by National Medicinal Plant Board, Delhi. Considering the important role of the multiple agencies involved in the project, perhaps the unique in Indian forestry sector, it has been decided by the Karnataka Biodiversity Board (KBB) and Karnataka Medicinal Plant Authority (KAMPA), to implement the project in all beats (3166) of all the Forest Divisions (FD). The Karnataka Forest Department has 39 forest divisions spread across the 13 circles. Each FD comprises of Sub divisions, ranges, sections, and many beats (basic unit) of the forest. So, for the smooth implementation of the project, the surveys have been planned at the beat level in all the ranges, for complete covering the

forests in appropriate seasons, in collaboration with the front-line staff of the forest department by hiring the taxonomists. Considering the practical difficulties due to the vast forest area, it has been decided to cover 0.5% sampling of the total forest area in each beat by the line transect method. The following steps were taken for conducting the transect surveys.

- Transect lines of 10-meter width in the proportionate of 0.5% of the area are drawn across the beats in such a manner that all types of vegetation's viz. natural forests, plantations, hill/slopes, riversides, marshy lands, ponds etc. are get covered proportionately. The transect lines are marked with GPS reading, drawn on top-sheets and then translate in the field.
- All individuals of each of the tree species in the whole transect line have been recorded/counted in the prescribed Proforma along with their four girth class measurements.
- For counting of herbs, shrubs, and climbers, rectangular sub plots of 5mtx5mt size have been demarcated along the transect line at an interval of every 200 meters alternately.
- If the subplot at the beginning of the transect line is fixed on the right side, it is laid at the left side after 200 meters. The marking of the subplots alternately to the sides has been followed for the entire transect line. The samples of subplots thus cover about 0.00625% of the beat forest area.
- All the herbs, shrubs, orchids and climbers in subplots with medicinal value/otherwise found in them have been counted, identified and recorded in the prescribed Proformas.
- GPS reading at the beginning, middle and at the end of the transect line and the GPS reading at the centre of each subplot (5mtx5mt) have been noted and recorded.
- Each transect survey team comprised of two students of Botany/Forestry/Ayurveda/trained botanist, a Forester, a Forest Guard, a Forest Watcher or such other staff, and a local Botanist/Ayurveda doctor/Plant Scientist. The students once got trained at later phase of the survey, the combination was changed to a student (trained) two staff (Forester and Forest Guard), a local man known to vernacular names and a watcher as helper in each team.
- All the data recorded were analysed in well-designed programme to get desired outcome.

**Development Of Biodiversity Data System**

The current surveys may not give desired results if a proper database program is not established. The databases have been designed in a manner wherein the medicinal plant species of Karnataka are linked with precise locations in the forests. The program will help to enter and process the data collected through the transect surveys for assessing the population of medicinal plants for various purposes. The system incorporates data of all the species surveyed such as botanical name, local name, family, numbers of individual/combined, girth class of trees, regeneration status, location details of beats, ranges, divisions and many other characters. Some of the advantages of the user-friendly data managing program are as under:

- Rapid and easy input or output of desired/required data and work as a multi-user system.
- Collected information on the plant species have been entered into various levels such as divisions, ranges, sections, and beats along with scientific names, vernacular names, families, uses, and number of individual species.
- The scientific name, local name, and family of the plants are preloaded as drop box for user friendly manner in adding the appropriate choices.

- Database facilitate to enter the GPS readings of each of the subplots in the transect lines and the transit line itself.
- The data can be merged and processed from the beat level to the State level (beats to section to range, division to circle, and to State).

## RESULTS AND DISCUSSION

### Profile Of The Study Area

#### *Bidar Division*

It is the northernmost forest division/district of Karnataka covers the entire Bidar district and administratively part of Kalaburagi forest circle. It is bordered by Kalaburagi district in south, Kamareddy and Sangareddy districts of Telangana in east, Latur and Osmanabad districts of Maharashtra in west, and Nanded district of Maharashtra in north. The division has 30400.815 ha of forest land under its control, comprising five ranges i.e Aurad, Basavakalyan, Bhalki, Bidar, and Humnabad. The division belongs to 'northern Maidan/plains region' with extensive areas of treeless/tree vegetation and scrubby hillocks. Altitude varies from 420 to 715 meters above mean sea level (MSL). The division is having comparatively ideal climatic conditions than to other divisions in the region.

Bidar division mainly consists of Southern Tropical Dry Deciduous type of forest. Scrub vegetation is also found in few areas characterized by many thorny shrubs and scattered trees.

Black soil derived from Deccan traps, is found in major parts of the division. It is deep black in colour and texture varies from loam to clay. High concentration of lime results in poor infiltration capacity of the soil in certain areas. Central portion of the division has lateritic soil. It is pale to bright red in colour and clay to clayey loam in nature with good infiltration capacity. Tributaries of the Krishna and Godavari rivers such as Manjra, Karanja, Chulki Nala, Mullamari, and Gandrinala are flowing through the division.

Generally, the area experiences semi-arid climate for major part of the year with moderate summer. Mild dust storms and heat waves are common in April and May. The hot season remains to stay from March to May; Southwest monsoon starts from mid-June and extends up to September and October. December and January is the part of cold season. Intermitted pre-monsoon rains are also reported in the division. Temperature varies from 12C in December and goes up to 42C in April-May.

The average annual precipitation is 847 mm with most of the rainfall received during the southwest monsoons. Occassionally the division experience ranges due to cyclones. Variation in annual rainfall is distinct and also experience to droughts. *Working plan of Bidar division: 2018-19 to 2027-28.*

#### *Raichur Division*

The Raichur forest division comprises the Raichur district located in north-eastern plains of Karnataka. Administratively it belongs to Kalaburagi forest circle. It is naturally bounded by the Krishna River in north and Tungabhadra River in south. Political/geographically, the division borders with Yadagiri district in north, Vijayapura and Bagalakote districts in northwest, Koppal district in west, Bellary district in south and Mahabubnagar district of Telangana. The Raichur

division comprised of 42603.07 ha forests under its administrative control, distributed in four ranges i.e Devadurga, Lingasuru, Manvi, and Raichur.

The Raichur division comprised of the Southern Tropical Dry Deciduous and Scrub forests type. Generally, the vegetation consists of many thorny herbs and shrubs with very few trees. It is one of the drier regions of the State. The area falls in to 'northern Maidan/plains region' with bare hillocks and large areas having treeless vegetation. The altitude varies from 358 to 508 meters above mean sea level (MSL). It slopes from north-west to south-east direction. The soil is black cotton /sandy soil, part of the Dharwad schist, which is cut by nalas and rivulets with denuded trees. The gneissic region is more or less broken and covered with a thin mantle of red loamy soil. Gneissic hills cover a small belt adjoining the confluence of the Krishna and Tungabhadra Rivers.

Generally, the area experiences dryness for the major part of the year with a hot summer. The hot season begins from mid-February and stay up to May; South-west monsoon begins from mid-June onwards and remains active up to September. October and November are the post monsoon period and December to mid-February is the mild cold season. Temperature varies from 11C in December to 42C in May. Being a rain shadow region, rainfall varies from 400 to 800 mm in the district. The average rain fall is 600 mm with 41 average rainy days, annually. Occurrence of heavy rainfalls over few days during June to September is a special feature of the area. *Working plan of Raichur division: 2018-19 to 2027-28.*

***Vijayapura Division***

The Vijayapura forest division is situated in northern Karnataka bordering the Maharashtra state. It lies between 1728' and 169' N. Latitudes and between 7520' and 7628'E. Longitudes. It is surrounded by Sholapur and Sangli districts of Maharastra in north-west, Bheema River in east, Kalaburagi and Raichur districts in south-east, Bagalkot district and Krishna River in south and Belagavi district in west. Administratively it falls under the Belagavi forest circle and comprises of 4 Ranges such as Vijayapura, Indi, Sindagi, and Muddebihal.

The Vijayapura forest division comprises only 0.17% (802 hectare) of forest of geographical area of the district/division. It primarily consists of Dry Deciduous and Thorny Scrub Forest types.

The Vijayapura Range primarily consists of plain lands with gentle slope while the Muddebihal range is partly hilly with many mild slopes. Elevation varies from 540 m adjacent to Krishna River side to 650 m in central part. The northern part forms the catchment of Bheema River while the southern part drains into the Almatti dam in the Krishna River.

Texture of soil varies from coarse granular murrum to fine clayey deposits. In the richest part, soil is formed of alluvial clay like detritus of rock passing to fine sand composed of silicate. In other parts, a calcareous formation overlying the trap or a shallow soil of murrum detritus is found. Soil is deep along the rivers, but shallow on the hilly region. Erosion is heavy in the undulating terrain all along the rivers traversing to the district.

It is the most arid division characterized by low rainfall and hot summer. Temperature varies from 11°C during winter (December-January) to 42°C during summer (March-May). Onset of southwest monsoon brings down the temperature considerably.

The rainfall is scanty and erratic in occurrence and mainly received through the south-west monsoon. The rainy days vary from 37 in Indi taluk to 41 days in B.Bagewadi taluk. Variation in rainfall is substantial.

Surveys in these three districts/divisions were taken up by the Karnataka Biodiversity Board along with Karnataka Medicinal Plant Authority during post rainy season of 2016 and 2017. Initial training was organized at Bidar Raichur and Vijayapura, headquarters and an orientation programme was provided to the DCF, ACF, RFO's, DyRFO's, FG's, FW's, Students, Nativaidyas and others regarding project and survey. To assess the population of medicinal plants and others, inventory with a sampling intensity of 0.5% and 0.00625% in transect lines and subplots respectively has been designed. The distribution of tree species in various girth classes all along the transit lines, herbs and shrubs and claimbers in subplots of all forests have been recorded in the proforma during the surveys. The present study imbibes to show how the issue of medicinal plant conservation fits into the Indian framework wherein the NMPB operates. It is primarily focussed on the wild medicinal plants. *Working plan of Vijayapura division: 2012-13 to 2021-22.*

Survey was conducted in 25 beats of the Bidar, 15 beats of Raichur and 3 beats of Vijayapura divisions as provided in **tables-1, 2 and 3.** It shows name of ranges, beats and forest area in hectares. A comparative statement for the divisions is also given in **table-4.**

**Table-1 Forest area covered in Bidar division**

| Sl.no | Name of range | Name of beat | Forest area in hectare |
|---|---|---|---|
| 1 | Aurad | Jambagi | 702.01 |
| | | Rajeshwara | 209.73 |
| | | Sangam | 403.71 |
| 2 | Basavakalyan | Basavakalyan | 425.61 |
| | | Niragudi | 505.61 |
| | | Rajeshwara | 625.19 |
| 3 | Bhalki | Dhanmura | 225 |
| | | Halbarga | 155 |
| | | Khanapur | 418 |
| | | Khatak chincholi | 93.9 |
| | | Malchapur | 38 |
| 4 | Bidar | Bagdal | 1800 |
| | | Chitta | 363.67 |
| | | Honnikeri | 1742.98 |
| | | Kamatana | 526.95 |
| | | Shahapur | 1400 |
| 5 | Humnabad | Basirapur | 2864.7 |
| | | Benchincholli | 201.81 |
| | | Bhonyar | 2661.01 |
| | | Changler | 2511.19 |
| | | Chimmanchod | 1914.52 |
| | | Chinkera | 409.11 |
| | | Karknalli | 3277.29 |
| | | Mangalgi | 4103.62 |
| | | Salebeeranalli | 2822.2 |
| **Total** | | | **30400.82** |

**Table-2 Forest area covered in Raichur division**

| Sl. No | Name of range | Name of beat | Forest area in hectare |
|---|---|---|---|
| 1 | Devadurga | Arakeri | 2290.38 |
| | | Bankaladoddi | 3723.39 |
| | | Devadurga | 15016.18 |
| | | Gabburur | 480 |
| | | Galag | 2220.35 |
| | | Jalahalli | 598 |
| 2 | Lingasuru | Anehosuru | 435.43 |
| | | Bayalagudda | 400 |
| | | Gurgunta | 5512.34 |
| 3 | Manvi | Kavital | 7942 |
| | | Sindanoor | 826 |
| | | Turvihal | 816 |
| 4 | Raichur | Chandrabanda | 197 |
| | | Maliyabada | 4292 |
| | | Yeregara | 1866 |
| **Total** | | | **46615.07** |

**Table-3 Forest area covered in Vijayapura division**

| Sl.no | Name of range | Name of beat | Forest area (hectare) |
|---|---|---|---|
| 1 | Vijayapura | Benal | 142.13 |
| 2 | Vijayapura | Mamdapur | 635 |
| 3 | Indi | Jhalki | 25 |
| **Total** | | | **802.13** |

**Table-4 Comparison of various categories in three forest divisions of dry zone**

| Sl.no | Category | Bidar division | Raichur division | Vijayapura division |
|---|---|---|---|---|
| 1 | Forest area in hectares | 30400 | 42603 | 802 |
| 2 | Ranges | 5 | 4 | 2 |
| 3 | Beats | 25 | 15 | 3 |
| 4 | Taxa assessed | 381 | 273 | 127 |
| 5 | Species | 374 | 271 | 127 |
| 6 | Tree species | 110 | 51 | 20 |
| 7 | Shrubs | 52 | 58 | 28 |
| 8 | Herbs | 219 | 164 | 79 |
| 9 | Common Species | 48 (13 trees+6 shrubs+29 herbs) | | |
| 10 | Traded medicinal plants | 112 | 104 | 52 |
| 11 | Highly traded med. plants | 58 | 40 | 17 |
| 12 | IUCN listed med. plants | 6 | 3 | 0 |

## Assessment Of Population Of Trees, Shrubs And Herbs

Based on the outcome of assessment for total species found in Bidar, Raichur and Vijayapura divisions, a comparative statement has been prepared and noticed that there is large variation in

the species of trees, shrubs and herbs found in these 3 districts/divisions. Not only the species but also the population of plants within the species is also found of large variation. It is to be seen here that though the climatic/edaphic conditions are almost the same but the variation in species/within is quite significant. There may be various reasons like the biotic pressure, soil structure etc but in-depth study is required to be conducted for such large variations in flora of three districts more so variation in beats. *Singh, 2017 and 2019.* There may be deviation of the range of 20-25% in numbers. The population information is self-explanatory and compiled in the **tables-5,6,7**:

**Table-5 Comparative population of Bidar, Raichur and Vijayapura divisions for tree species**

| Sl no | Species name | Population status of bidar | Population status of raichur | Population status of vijayapura |
|---|---|---|---|---|
| 1 | *Acacia auriculiformis* | 4358370 | 0 | 0 |
| 2 | *Acacia catechu* | 300878 | 8822 | 0 |
| 3 | *Acacia chundra* | 1716374 | 1335000 | 0 |
| 4 | *Acacia ferruginea* | 263 | 1971 | 0 |
| 5 | *Acacia horrida* | 0 | 684355 | 0 |
| 6 | *Acacia intsia* | 146659 | 0 | 0 |
| 7 | *Acacia leucophloea* | 0 | 143350 | 3969 |
| 8 | *Acacia nilotica ssp. indica* | 111668 | 0 | 0 |
| 9 | *Acacia nilotica* | 130955 | 264288 | 8745 |
| 10 | *Acacia sphaerocephala* | 0 | 0 | 4369 |
| 11 | *Aegle marmelos* | 10398 | 0 | 200 |
| 12 | *Agrostistachys indica* | 200 | 0 | 0 |
| 13 | *Ailanthus excelsa* | 66525 | 4200 | 397 |
| 14 | *Alangium salvifolium ssp. salvifolium* | 0 | 71935 | 0 |
| 15 | *Alangium salvifolium* | 778 | 35945 | 0 |
| 16 | *Albizia amara* | 1581444 | 10880480 | 3398 |
| 17 | *Albizia chinensis* | 7778 | 0 | 0 |
| 18 | *Albizia lebbeck* | 235330 | 0 | 595 |
| 19 | *Alanda cathartica var. nobilis* | 1992 | 0 | 0 |
| 20 | *Allophylus serratus* | 10000 | 0 | 0 |
| 21 | *Alstonia scholaris* | 61250 | 0 | 0 |
| 22 | *Anacardium occidentale* | 2665946 | 0 | 0 |
| 23 | *Annona squamosa* | 1646656 | 2719925 | 0 |
| 24 | *Anogeissus latifolia* | 2475906 | 2044 | 0 |
| 25 | *Anthocephalus chinensis* | 498 | 0 | 0 |
| 26 | *Archidendron monadelphum* | 6080 | 0 | 0 |
| 27 | *Artocarpus hirsutus* | 35000 | 0 | 0 |
| 28 | *Azadirachta indica* | 4887362 | 721561 | 28052 |
| 29 | *Baccaurea courtallensis* | 29050 | 0 | 0 |
| 30 | *Balanites roxburghii* | 0 | 43210 | 0 |
| 31 | *Bauhinia malabarica* | 8003 | 0 | 0 |
| 32 | *Bauhinia purpurea* | 17126 | 0 | 0 |
| 33 | *Bauhinia racemosa* | 143849 | 2297 | 0 |
| 34 | *Borassus flabellifer* | 0 | 20268 | 0 |
| 35 | *Boswellia serrata* | 248504 | 0 | 0 |
| 36 | *Bridelia montana .* | 605 | 0 | 0 |
| 37 | *Bridelia retusa* | 605 | 0 | 0 |
| 38 | *Buchanania lanzan* | 1759996 | 0 | 0 |
| 39 | *Butea monosperma* | 2096182 | 22943 | 0 |
| 40 | *Canthium dicoccum var. dicoccum* | 1992 | 0 | 0 |

| | | | | |
|---|---|---|---|---|
| 41 | *Careya arborea* | 8923 | 0 | 0 |
| 42 | *Cassia fistula* | 818623 | 1902385 | 1201 |
| 43 | *Cassia siamea* | 2721781 | 490339 | 5762 |
| 44 | *Cassine paniculata* | 10458 | 0 | 0 |
| 45 | *Casuarina equisetifolia* | 1167 | 0 | 0 |
| 46 | *Chloroxylon swietenia* | 7982474 | 12859771 | 0 |
| 47 | *Cinnamomum verum* | 1750 | 0 | 0 |
| 48 | *Cola acuminata* | 59430 | 0 | 0 |
| 49 | *Corymbia citriodora* | 13047822 | 0 | 0 |
| 50 | *Cyathocalyx zeylanicus* | 400 | 0 | 0 |
| 51 | *Dalbergia latifolia* | 7758 | 8881 | 0 |
| 52 | *Dalbergia paniculata* | 2063 | 0 | 0 |
| 53 | *Dalbergia sissoides* | 0 | 103993 | 0 |
| 54 | *Dalbergia sissoo* | 6800 | 38672 | 1400 |
| 55 | *Dillenia indica* | 5894 | 0 | 0 |
| 56 | *Diospyros melanoxylon* | 1073068 | 3595 | 0 |
| 57 | *Diospyros montana* | 97865 | 0 | 0 |
| 58 | *Diospyros paniculata* | 43445 | 0 | 0 |
| 59 | *Diospyros tomentosa* | 23511 | 0 | 0 |
| 60 | *Dolichandrone atrovirens* | 5976 | 7153 | 0 |
| 61 | *Dolichandrone falcata* | 103703 | 0 | 0 |
| 62 | *Ehretia laevis* | 419 | 0 | 0 |
| 63 | *Euphorbia tirucalli* | 0 | 375 | 0 |
| 64 | *Ficus benghalensis* | 11031 | 1314 | 0 |
| 65 | *Ficus drupacea var. pubescens* | 0 | 1840 | 0 |
| 66 | *Ficus religiosa* | 628 | 766 | 0 |
| 67 | *Ficus tsjahela* | 3666 | 954 | 0 |
| 68 | *Garcinia gummi-gutta* | 2000 | 0 | 0 |
| 69 | *Gardenia latifolia* | 0 | 6131 | 0 |
| 70 | *Gardenia resinifera* | 95709 | 0 | 0 |
| 71 | *Garuga pinnata* | 6600 | 0 | 0 |
| 72 | *Gliricidia maculata* | 7563624 | 0 | 0 |
| 73 | *Gliricidia sepium* | 6384 | 0 | 0 |
| 74 | *Glochidion littorale* | 403 | 0 | 0 |
| 75 | *Gmelina arborea* | 77742 | 0 | 0 |
| 76 | *Gmelina indica* | 1743 | 0 | 0 |
| 77 | *Grewia tiliifolia var. tilifolia* | 3486 | 0 | 0 |
| 78 | *Gyrocarpus americanus* | 996 | 400 | 0 |
| 79 | *Haldina cordifolia* | 17113 | 0 | 0 |
| 80 | *Hardwickia binata* | 2332620 | 262317 | 8408 |
| 81 | *Hibiscus tiliaceus* | 1743 | 0 | 0 |
| 82 | *Holoptelea integrifolia* | 152179 | 622884 | 2390 |
| 83 | *Ixora arborea* | 134205 | 1957 | 0 |
| 84 | *Lagerstroemia parviflora* | 13189 | 0 | 0 |
| 85 | *Lannea coromandelica* | 17139 | 0 | 0 |
| 86 | *Lawsonia inermis* | 3735 | 0 | 0 |
| 87 | *Leucaena latisiliqua* | 6480 | 0 | 0 |
| 88 | *Leucaena leucocephala* | 16530 | 4056 | 0 |
| 89 | *Madhuca longifolia var. latifolia* | 7555 | 0 | 0 |
| 90 | *Madhuca longifolia var. longifolia* | 11703 | 430 | 0 |
| 91 | *Madhuca longifolia* | 10431 | 0 | 0 |
| 92 | *Mallotus philippensis* | 103590 | 0 | 0 |

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|---|---|---|---|---|
| 93 | *Maytenus emarginata* | 256050 | 1990 | 0 |
| 94 | *Morinda citrifolia* | 108299 | 6661 | 0 |
| 95 | *Morinda pubescens var. pubescens* | 237473 | 0 | 600 |
| 96 | *Morinda tomentosa* | 15005 | 23647 | 0 |
| 97 | *Neoarckia cadamba* | 263 | 0 | 0 |
| 98 | *Oroxylum indicum* | 403 | 0 | 0 |
| 99 | *Peltophorum pterocarpum* | 2535 | 2629 | 0 |
| 100 | *Pentapanax leschenaultii* | 4052 | 0 | 0 |
| 101 | *Phoenix sylvestris* | 0 | 954413 | 0 |
| 102 | *Phyllanthus emblica* | 433671 | 0 | 2000 |
| 103 | *Pongamia pinnata Pierre* | 5552306 | 594199 | 997 |
| 104 | *Premna tomentosa .* | 0 | 1290 | 0 |
| 105 | *Prosopis cineraria Druce* | 2099 | 0 | 0 |
| 106 | *Pterocarpus marsupium* | 21971 | 0 | 0 |
| 107 | *Pterocarpus santalinus* | 2333 | 0 | 0 |
| 108 | *Rhizophora mucronata* | 7000 | 0 | 0 |
| 109 | *Santalum album* | 240111 | 15542 | 0 |
| 110 | *Semecarpus anacardiumf.* | 102541 | 0 | 0 |
| 111 | *semecarpus travancorica* | 3200 | 0 | 0 |
| 112 | *Senna surattensis* | 22138 | 0 | 0 |
| 113 | *Simarouba amara* | 137425 | 1514 | 0 |
| 114 | *Soymida febrifuga* | 20619 | 0 | 0 |
| 115 | *Sterculia urens* | 46479 | 0 | 0 |
| 116 | *Strychnos potatorum* | 0 | 7284 | 0 |
| 117 | *Symplocos villosa* | 35000 | 0 | 0 |
| 118 | *Syzygium cumini* | 107608 | 0 | 0 |
| 119 | *Tamarindus indica* | 215054 | 0 | 1600 |
| 120 | *Tectona grandis* | 1154636 | 0 | 0 |
| 121 | *Terminalia arjuna* | 72317 | 0 | 0 |
| 122 | *Terminalia bellirica* | 347152 | 0 | 0 |
| 123 | *Terminalia chebula* | 606 | 0 | 0 |
| 124 | *Terminalia pallida* | 3111 | 0 | 0 |
| 125 | *Terminalia tomentosa* | 1274312 | 0 | 0 |
| 126 | *Thespesia populnea* | 4667 | 0 | 0 |
| 127 | *Vernonia arborea* | 12832 | 0 | 0 |
| 128 | *Vitex negundo var. negundo* | 303200 | 0 | 0 |
| 129 | *Vitex negundo* | 0 | 0 | 200 |
| 130 | *Wrightia tinctoria var. tinctoria* | 407800 | 0 | 0 |
| 131 | *Wrightia tinctoria* | 179835 | 1776998 | 0 |
| 132 | *Xeromphis spinosa* | 21917 | 0 | 0 |
| 133 | *Ximenia americana* | 16415 | 0 | 0 |
| 134 | *Zanthoxylum rhetsa* | 2397 | 0 | 0 |
| 135 | *Ziziphus horrida* | 0 | 5950 | 399 |
| 136 | *Ziziphus jujuba* | 565444 | 146229 | 0 |
| 137 | *Ziziphus mauritiana* | 1750 | 1502 | 0 |
| 138 | *Ziziphus xylopyrus* | 107338 | 8294 | 0 |

**Table-6 Comparative population of Bidar, Raichur and Vijayapura divisions for shrub species**

| Sl.no | Species name | Population status of bidar | Population status of raichur | Population status of vijayapura |
|---|---|---|---|---|
| 1 | *Abelmoschus ficulneus* | 466667 | 0 | 0 |
| 2 | *Abrus precatorius* | 1390559 | 504078 | 0 |
| 3 | *Abutilon indicum* | 0 | 136408 | 104588 |
| 4 | *Acacia caesia* | 2072345 | 0 | 0 |
| 5 | *Acacia hohenackeri* | 1200452 | 0 | 0 |
| 6 | *Acacia sinuata* | 3360000 | 0 | 0 |
| 7 | *Acalypha fruticosa* | 0 | 15129090 | 0 |
| 8 | *Aerva lanata* | 504000 | 74012 | 0 |
| 9 | *Agave americana* | 46200 | 418504 | 189294 |
| 10 | *Anisomeles malabarica* | 0 | 1092162 | 0 |
| 11 | *Aristolochia bracteolata* | 0 | 602414 | 0 |
| 12 | *Aristolochia indica* | 0 | 7061508 | 0 |
| 13 | *Asparagus racemosus var. racemosus* | 1880107 | 1282803 | 0 |
| 14 | *Atylosia albicans* | 9333333 | 244734 | 0 |
| 15 | *Atylosia scarabaeoides* | 223642191 | 63067 | 0 |
| 16 | *Balanites roxburghii* | 0 | 0 | 721405 |
| 17 | *Barleria buxifolia* | 987689 | 148023 | 11370 |
| 18 | *Barleria cristata* | 4412974 | 0 | 0 |
| 19 | *Barleria longiflora* | 0 | 300292 | 0 |
| 20 | *Barleria prionitis subsp. prionitoides* | 0 | 83287 | 0 |
| 21 | *Barleria prionitis* | 58099 | 3952944 | 0 |
| 22 | *Breynia retusa* | 658459 | 0 | 0 |
| 23 | *Cadaba fruticosa* | 0 | 569934 | 26312 |
| 24 | *Cajanus cajan* | 288000 | 0 | 0 |
| 25 | *Calotropis gigantea* | 112000 | 308535 | 0 |
| 26 | *Calotropis procera* | 0 | 0 | 26312 |
| 27 | *Canavalia ensiformis* | 7395794 | 0 | 0 |
| 28 | *Canthium angustifolium* | 4935693 | 0 | 0 |
| 29 | *Canthium coromandelicum* | 140080927 | 6414069 | 34111 |
| 30 | *Canthium parviflorum* | 10148278 | 22499502 | 0 |
| 31 | *Canthium rheedei* | 560000 | 0 | 0 |
| 32 | *Capparis decidua* | 0 | 0 | 104588 |
| 33 | *Capparis divaricata* | 0 | 752914 | 0 |
| 34 | *Capparis sepiaria* | 0 | 0 | 29882 |
| 35 | *Capparis zeylanica* | 0 | 223239 | 14941 |
| 36 | *Carissa carandas* | 4184613 | 1120433 | 11370 |
| 37 | *Carissa congesta* | 167784 | 0 | 0 |
| 38 | *Carissa hirsuta* | 680976 | 0 | 0 |
| 39 | *Carissa paucinerva* | 0 | 801759 | 0 |
| 40 | *Carissa spinarum* | 0 | 68099336 | 0 |
| 41 | *Cassia alata* | 92666 | 471934 | 0 |
| 42 | *Cassia auriculata* | 0 | 0 | 414502 |
| 43 | *Cassia auriculata syn Senna auriculata* | 12717845 | 69760897 | 0 |

| | | | | |
|---|---|---|---|---|
| 44 | *Cassia floribunda* | 0 | 95354 | 0 |
| 45 | *Cassia montana* | 34289709 | 0 | 0 |
| 46 | *Cassia occidentalis* | 0 | 333146 | 0 |
| 47 | *Cassia sericea* | 9105116 | 234849 | 4915647 |
| 48 | *Catunaregam rugulosa* | 4447248 | 6530934 | 0 |
| 49 | *Catunaregam spinosa* | 3837359 | 2675656 | 147815 |
| 50 | *Celastrus paniculatus* | 519476 | 0 | 0 |
| 51 | *Cissampelos pareira var. hirsuta* | 361020 | 0 | 0 |
| 52 | *Cissus pallida* | 3860007 | 37051652 | 0 |
| 53 | *Cissus quadrangularis* | 0 | 111018 | 0 |
| 54 | *Clerodendrum serratum* | 294667 | 0 | 0 |
| 55 | *Coccinia grandis* | 0 | 31533 | 0 |
| 56 | *Cocculus hirsutus* | 0 | 10509033 | 81135 |
| 57 | *Corchorus tridens* | 0 | 812120 | 0 |
| 58 | *Crotalaria berteroana* | 252000 | 0 | 0 |
| 59 | *Crotalaria hirsuta* | 1930897 | 0 | 34111 |
| 60 | *Crotalaria hirta* | 6560303 | 0 | 0 |
| 61 | *Crotalaria paniculata* | 56208 | 0 | 0 |
| 62 | *Crotalaria prostrata* | 49280816 | 0 | 0 |
| 63 | *Croton bonplandianus* | 0 | 1085901 | 0 |
| 64 | *Cryptolepis buchananii* | 775107 | 0 | 0 |
| 65 | *Cryptolepis grandiflora* | 0 | 2020273 | 0 |
| 66 | *Cryptostegia grandiflora* | 0 | 2809064 | 242813 |
| 67 | *Cucumis sativus* | 0 | 76406 | 0 |
| 68 | *Desmodium laxiflorum* | 38187165 | 0 | 0 |
| 69 | *Desmodium velutinum* | 1369407 | 0 | 0 |
| 70 | *Dichrostachys cinerea* | 0 | 78800 | 74706 |
| 71 | *Dicoma tomentosa* | 50080 | 38229208 | 756930 |
| 72 | *Dioscorea tomentosa* | 0 | 119193 | 0 |
| 73 | *Diospyros chloroxylon* | 49892279 | 0 | 0 |
| 74 | *Dodonaea viscosa* | 213411081 | 8741961 | 0 |
| 75 | *Endostemon viscosus* | 0 | 844709 | 0 |
| 76 | *Euphorbia caducifolia* | 0 | 22299 | 11370 |
| 77 | *Euphorbia neriifolia* | 187500 | 0 | 0 |
| 78 | *Flacourtia indica* | 1120000 | 223575 | 0 |
| 79 | *Flueggea leucopyrus* | 0 | 636913 | 71793 |
| 80 | *Gmelina asiatica* | 2702499 | 0 | 0 |
| 81 | *Grewia flavescens* | 0 | 1597009 | 0 |
| 82 | *Grewia hirsuta* | 0 | 1839538 | 0 |
| 83 | *Grewia laevigata* | 62528075 | 0 | 0 |
| 84 | *Gymnema sylvestre* | 0 | 237165 | 0 |
| 85 | *Gymnosporia montana* | 39287 | 0 | 0 |
| 86 | *Gymnosporia senegalensis* | 78574 | 0 | 0 |
| 87 | *Helicteres isora* | 0 | 382394 | 0 |
| 88 | *Hemidesmus indicus* | 0 | 956876 | 0 |

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|---|---|---|---|---|
| 89 | *Hibiscus micranthus* | 0 | 6456420 | 22741 |
| 90 | *Hyptis suaveolens* | 150203326 | 189200 | 0 |
| 91 | *Ichnocarpus frutescens* | 0 | 134814 | 0 |
| 92 | *Indigofera cassioides* | 97140 | 0 | 0 |
| 93 | *Indigofera cordifolia* | 97694736 | 68451030 | 1030941 |
| 94 | *Indigofera glabra* | 0 | 1277500 | 0 |
| 95 | *Indigofera trifoliata var. multicaulis* | 3193212 | 0 | 0 |
| 96 | *Indigofera trifoliata var. trifoliata* | 2480880 | 0 | 0 |
| 97 | *Ipomoea aquatica* | 0 | 964292 | 0 |
| 98 | *Ipomoea carnea subsp. carnea* | 0 | 0 | 11370 |
| 99 | *Ipomoea carnea* | 0 | 1278468 | 0 |
| 100 | *Jasminum auriculatum* | 0 | 36528 | 0 |
| 101 | *Jasminum brevilobum* | 96832 | 0 | 0 |
| 102 | *Jasminum cuspidatum* | 0 | 135018 | 0 |
| 103 | *Jasminum humile* | 3920000 | 0 | 0 |
| 104 | *Jasminum malabaricum* | 0 | 255555 | 0 |
| 105 | *Jatropha glandulifera* | 0 | 0 | 74706 |
| 106 | *Jatropha gossypifolia* | 78574 | 1165499 | 0 |
| 107 | *Justicia adhatoda* | 17029300 | 0 | 0 |
| 108 | *Kirganelia reticulata* | 0 | 830620 | 0 |
| 109 | *Lantana camara var. aculeata* | 163516890 | 205707 | 0 |
| 110 | *Lantana indica* | 560000 | 0 | 0 |
| 111 | *Leea indica* | 653333 | 0 | 0 |
| 112 | *Lepidagathis barberi* | 0 | 33449 | 0 |
| 113 | *Lepidagathis cristata* | 12144532 | 19136048 | 0 |
| 114 | *Lepidagathis cuspidata* | 78000 | 0 | 0 |
| 115 | *Maerua oblongifolia* | 0 | 0 | 11370 |
| 116 | *Maytenus senegalensis* | 134318981 | 0 | 0 |
| 117 | *Merremia tridentata ssp. hastata* | 0 | 55748 | 0 |
| 118 | *Mesua oblongifolia* | 0 | 270924 | 0 |
| 119 | *Mimosa hamata* | 4802817 | 0 | 11370 |
| 120 | *Morinda coreia* | 11708444 | 0 | 0 |
| 121 | *Nyctanthes arbor-tristis* | 2029944 | 0 | 0 |
| 122 | *Ocimum gratissimum* | 104766 | 0 | 0 |
| 123 | *Olax scandens* | 6478904 | 0 | 0 |
| 124 | *Opuntia dillenii* | 0 | 11150 | 0 |
| 125 | *Opuntia stricta var. dillenii* | 0 | 1980372 | 0 |
| 126 | *Orthosiphon pallidus* | 3447683 | 0 | 0 |
| 127 | *Orthosiphon thymiflorus* | 0 | 14769 | 0 |
| 128 | *Pachygone ovata* | 387329 | 0 | 0 |
| 129 | *Passiflora foetida* | 0 | 78800 | 22741 |
| 130 | *Pavonia odorata* | 9035218 | 16129856 | 44824 |
| 131 | *Pavonia zeylanica* | 40256909 | 233935 | 0 |
| 132 | *Pentatropis capensis* | 0 | 0 | 41253 |
| 133 | *Phyllanthus reticulatus* | 0 | 11150 | 0 |

| | | | | |
|---|---|---|---|---|
| 134 | *Plectranthus bishopianus* | 805533 | 0 | 0 |
| 135 | *Polygala chinensis* | 161107 | 5287912 | 89647 |
| 136 | *Polygonum chinense* | 0 | 284055 | 0 |
| 137 | *Premna villosa* | 271130 | 0 | 0 |
| 138 | *Prosopis juliflora* | 17954126 | 19261961 | 0 |
| 139 | *Pseudarthria viscida* | 5543124 | 0 | 0 |
| 140 | *Pterolobium hexapetalum* | 3437552 | 29605 | 0 |
| 141 | *Pupalia lappacea var. lappacea* | 5465707 | 0 | 0 |
| 142 | *Pupalia lappacea* | 182294 | 0 | 0 |
| 143 | *Randia aculeata* | 316038 | 0 | 0 |
| 144 | *Reinwardtia indica* | 154932 | 0 | 0 |
| 145 | *Rhus mysorensis* | 0 | 211205 | 0 |
| 146 | *Rhynchosia minima var. minima* | 0 | 159966 | 0 |
| 147 | *Rhynchosia suaveolens* | 256983 | 0 | 0 |
| 148 | *Rhynchosia viscosa* | 0 | 22299 | 0 |
| 149 | *Rivea hypocrateriformis* | 0 | 466346 | 0 |
| 150 | *Ruellia patula* | 0 | 0 | 358588 |
| 151 | *Scoparia dulcis* | 138000 | 0 | 0 |
| 152 | *Securinega leucopyrus* | 368594 | 4150037 | 0 |
| 153 | *Securinega virosa* | 88429 | 0 | 0 |
| 154 | *Senna alexandrina* | 2423720 | 0 | 0 |
| 155 | *Senna italica* | 0 | 0 | 34111 |
| 156 | *Senna obtusifolia* | 0 | 84411 | 0 |
| 157 | *Sida acuta* | 5183984 | 0 | 0 |
| 158 | *Sida cordata* | 0 | 0 | 29882 |
| 159 | *Solanum pubescens* | 1120000 | 0 | 0 |
| 160 | *Stylosanthes fruticosa* | 1784825 | 2932966 | 0 |
| 161 | *Tephrosia candida* | 0 | 197985 | 0 |
| 162 | *Tephrosia purpurea* | 1431347 | 21829957 | 36074 |
| 163 | *Tephrosia tinctoria* | 0 | 4228963 | 0 |
| 164 | *Tinospora cordifolia* | 0 | 194208 | 0 |
| 165 | *Tinospora cordifolia* | 0 | 0 | 11370 |
| 166 | *Tragia cannabina* | 0 | 82600 | 0 |
| 167 | *Triumfetta pilosa* | 1400000 | 0 | 0 |
| 168 | *Triumfetta rhomboidea* | 0 | 11674840 | 0 |
| 169 | *Tylophora asthmatica* | 0 | 1387954 | 0 |
| 170 | *Vitex negundo* | 2462772 | 11150 | 0 |
| 171 | *Waltheria indica* | 0 | 11331789 | 0 |
| 172 | *Ziziphus glaberrima* | 252129 | 0 | 0 |
| 173 | *Ziziphus oenoplia* | 0 | 419228 | 0 |
| 174 | *Ziziphus rugosa* | 18591787 | 339429 | 0 |

**Table-7 Comparative population of Bidar, Raichur and Vijayapura division for herb species**

| sl.no | species name | population status of Bidar | population status of Raichur | population status of Vijayapura |
|---|---|---|---|---|
| 1 | *Acalypha ciliata* | 15200 | 0 | 0 |
| 2 | *Acalypha indica* | 0 | 111018 | 0 |
| 3 | *Acalypha lanceolata* | 0 | 63067 | 0 |
| 4 | *Acanthospermum australe* | 1400000 | 0 | 0 |
| 5 | *Acanthospermum hispidum* | 513599 | 354538 | 0 |
| 6 | *Achyranthes aspera var. aspera* | 798810 | 389518 | 0 |
| 7 | *Achyranthes aspera* | 65592076 | 1212414 | 115959 |
| 8 | *Aclisia secundiflora* | 3244064 | 0 | 0 |
| 9 | *Actiniopteris radiata* | 0 | 1781712 | 0 |
| 10 | *Ageratum conyzoides* | 896000 | 0 | 0 |
| 11 | *Allium cepa* | 120652 | 0 | 0 |
| 12 | *Allmania nodiflora var. dichotoma* | 0 | 739899 | 0 |
| 13 | *Allmania nodiflora var. procumbens* | 0 | 3738922 | 0 |
| 14 | *Aloe vera* | 0 | 950667 | 0 |
| 15 | *Alternanthera sessilis* | 188236 | 342184 | 0 |
| 16 | *Alternanthera tenella* | 0 | 0 | 255725 |
| 17 | *Alysicarpus belgaumensis* | 0 | 69524 | 0 |
| 18 | *Alysicarpus bupleurifolius var.* | 0 | 52437 | 0 |
| 19 | *Alysicarpus bupleurifolius* | 951792 | 35896427 | 0 |
| 20 | *Alysicarpus glumaceus* | 2280348 | 279935 | 0 |
| 21 | *Alysicarpus longifolius* | 0 | 325099 | 0 |
| 22 | *Alysicarpus monilifer* | 4557333 | 1075223 | 288111 |
| 23 | *Alysicarpus ovalifolius* | 0 | 0 | 104588 |
| 24 | *Alysicarpus procumbens* | 964460 | 0 | 0 |
| 25 | *Alysicarpus pubescens* | 1593948 | 0 | 0 |
| 26 | *Alysicarpus racemosus* | 6917406 | 0 | 0 |
| 27 | *Alysicarpus rugosus var. pilifer* | 322213 | 0 | 0 |
| 28 | *Alysicarpus rugosus var. rugosus* | 3744920 | 0 | 0 |
| 29 | *Alysicarpus rugosus* | 7845837 | 0 | 0 |
| 30 | *Alysicarpus vaginalis* | 276000 | 0 | 16667 |
| 31 | *Amischophacelus axillaris* | 72000 | 0 | 0 |
| 32 | *Ammannia baccifera* | 138000 | 0 | 0 |
| 33 | *Andrographis echioides* | 1526979 | 23079366 | 399561 |
| 34 | *Andrographis paniculata* | 188377012 | 0 | 0 |
| 35 | *Anisochilus carnosus* | 531652 | 0 | 0 |
| 36 | *Anisomeles heyneana* | 0 | 126616 | 0 |
| 37 | *Aristida adscensionis* | 101873 | 0 | 0 |
| 38 | *Aristida funiculata* | 101873 | 0 | 0 |
| 39 | *Asclepias curassavica* | 560000 | 0 | 0 |
| 40 | *Asparagus racemosus* | 55733 | 1462640 | 0 |
| 41 | *Atylosia rugosa* | 2684706 | 0 | 0 |
| 42 | *Atylosia scarabaeoides* | 0 | 0 | 44824 |
| 43 | *Barleria repens Nees* | 840000 | 0 | 0 |

| | | | | |
|---|---|---|---|---|
| 44 | *Biophytum helenae Buscal.* | 6229869 | 0 | 0 |
| 45 | *Biophytum sensitivum var.* | 43630321 | 0 | 0 |
| 46 | *Biophytum sensitivum var. sensitivum* | 80483062 | 1452677 | 0 |
| 47 | *Blainvillea acmella* | 7833682 | 0 | 0 |
| 48 | *Blepharis asperrima* | 789017 | 0 | 0 |
| 49 | *Blepharis integrifolia* | 0 | 5752180 | 68222 |
| 50 | *Blepharis maderaspatensis* | 2608666 | 365830 | 0 |
| 51 | *Blepharis repens* | 35946911 | 0 | 22741 |
| 52 | *Blumea aurita* | 2251220 | 0 | 0 |
| 53 | *Boerhavia diffusa* | 0 | 45705448 | 268941 |
| 54 | *Borreria articularis* | 55656718 | 0 | 0 |
| 55 | *Borreria pusilla* | 228044859 | 0 | 0 |
| 56 | *Borreria stricta* | 0 | 424764 | 0 |
| 57 | *Brachiaria eruciformis* | 65478 | 0 | 0 |
| 58 | *Breweria latifolia Benth.* | 1373796 | 0 | 0 |
| 59 | *Byttneria herbacea* | 0 | 760947 | 0 |
| 60 | *Caesulia axillaris* | 3670900 | 0 | 0 |
| 61 | *Caralluma adscendens var.* | 0 | 337644 | 11370 |
| 62 | *Caralluma adscendens* | 0 | 7981591 | 0 |
| 63 | *Caralluma indica* | 0 | 151596 | 0 |
| 64 | *Caralluma umbellata* | 0 | 471934 | 0 |
| 65 | *Cassia absus* | 13132249 | 0 | 0 |
| 66 | *Cassia italica* | 560000 | 0 | 0 |
| 67 | *Cassia mimosoides* | 4700082 | 40858177 | 45482 |
| 68 | *Cassia obtusifolia syn Senna obtusifolia* | 0 | 126616 | 0 |
| 69 | *Cassia pumila* | 94725042 | 0 | 0 |
| 70 | *Cassia senna* | 2450500 | 0 | 0 |
| 71 | *Cassia tora* | 510223534 | 4034090 | 0 |
| 72 | *Cassytha filiformis* | 0 | 134547 | 0 |
| 73 | *Catharanthus pusillus* | 0 | 29798 | 0 |
| 74 | *Celosia argentea var. argentea* | 1024553 | 0 | 0 |
| 75 | *Celosia argentea* | 1502823 | 0 | 303052 |
| 76 | *Ceropegia bulbosa* | 0 | 0 | 164353 |
| 77 | *Ceropegia juncea* | 0 | 0 | 11370 |
| 78 | *Chamaecrista pumila* | 6119796 | 0 | 0 |
| 79 | *Chlorophytum breviscapum* | 161631 | 0 | 0 |
| 80 | *Chlorophytum laxum* | 0 | 0 | 22741 |
| 81 | *Chrysopogon fulvus* | 414607 | 0 | 0 |
| 82 | *Cleome aspera* | 0 | 3465747 | 0 |
| 83 | *Cleome felinaf.* | 0 | 1406570 | 104588 |
| 84 | *Cleome simplicifolia* | 564000 | 0 | 0 |
| 85 | *Cleome viscosa* | 0 | 12220893 | 0 |
| 86 | *Coccinia grandis* | 0 | 0 | 11370 |
| 87 | *Coldenia procumbens* | 0 | 92000 | 0 |

| | | | | |
|---|---|---|---|---|
| 88 | *Commelina attenuata* | 1135160 | 76346 | 0 |
| 89 | *Commelina benghalensis* | 0 | 219166 | 0 |
| 90 | *Commelina erecta* | 0 | 884793 | 0 |
| 91 | *Commelina forskalaei* | 0 | 0 | 29882 |
| 92 | *Commelina hirsuta* | 0 | 629099 | 0 |
| 93 | *Commelina paleata* | 0 | 0 | 6667 |
| 94 | *Corchorus aestuans* | 748660 | 63067 | 0 |
| 95 | *Corchorus capsularis* | 204120 | 0 | 0 |
| 96 | *Corchorus olitorius* | 933333 | 0 | 0 |
| 97 | *Corchorus trilocularis* | 0 | 0 | 247517 |
| 98 | *Crotalaria biflora* | 112416 | 0 | 0 |
| 99 | *Crotalaria filipes Benth.* | 2199035 | 0 | 0 |
| 100 | *Crotalaria hebecarpa* | 0 | 0 | 1132549 |
| 101 | *Crotalaria heyneana* | 2364455 | 0 | 0 |
| 102 | *Crotalaria nana* | 2800000 | 0 | 0 |
| 103 | *Crotalaria orixensis* | 825267 | 0 | 0 |
| 104 | *Crotalaria pallida* | 2945607 | 0 | 0 |
| 105 | *Crotalaria parviflora* | 116199 | 0 | 0 |
| 106 | *Crotalaria pusilla* | 2033247 | 59077 | 0 |
| 107 | *Cucumis callosus* | 0 | 0 | 44824 |
| 108 | *Curculigo orchioides* | 724980 | 0 | 0 |
| 109 | *Cyamopsis tetragonoloba* | 0 | 84000 | 0 |
| 110 | *Cyanotis arcotensis* | 450000 | 0 | 0 |
| 111 | *Cyanotis cristata* | 0 | 0 | 22741 |
| 112 | *Cyanotis fasciculata* | 1724048 | 0 | 0 |
| 113 | *Cyanotis tuberosa* | 0 | 51800634 | 0 |
| 114 | *Cynodon dactylon* | 107900 | 0 | 0 |
| 115 | *Dactyloctenium aegyptium* | 0 | 292221 | 0 |
| 116 | *Dendrobium nanum* | 1008517 | 0 | 0 |
| 117 | *Desmodium gangeticum* | 11814647 | 0 | 0 |
| 118 | *Desmodium triflorum* | 14463648 | 454018 | 0 |
| 119 | *Digera muricata* | 0 | 0 | 119529 |
| 120 | *Dipteracanthus patulus* | 116199 | 303457 | 0 |
| 121 | *Dipteracanthus prostratus* | 3141580 | 0 | 0 |
| 122 | *Dregea volubilis* | 0 | 0 | 11370 |
| 123 | *Drimia indica* | 0 | 18351967 | 0 |
| 124 | *Dysophylla cruciata* | 4706414 | 0 | 0 |
| 125 | *Ecbolium ligustrinum* | 3475730 | 0 | 0 |
| 126 | *Eclipta alba Hassk.* | 1866667 | 0 | 0 |
| 127 | *Eclipta prostrata L.* | 298822 | 0 | 0 |
| 128 | *Eleiotis monophylla* | 80553 | 0 | 0 |
| 129 | *Elephantopus scaber* | 0 | 6376457 | 0 |
| 130 | *Elytraria acaulis* | 0 | 2205081 | 0 |
| 131 | *Emilia scabra* | 760500 | 0 | 0 |
| 132 | *Enicostemma hyssopifolium* | 2083160 | 5137701 | 0 |

| | | | | |
|---|---|---|---|---|
| 133 | *Eria reticosa* | 112000 | 0 | 0 |
| 134 | *Euphorbia articulata* | 402767 | 0 | 0 |
| 135 | *Euphorbia concanensis* | 0 | 22299 | 0 |
| 136 | *Euphorbia cordifolia* | 0 | 215032 | 0 |
| 137 | *Euphorbia cristata* | 0 | 868281 | 0 |
| 138 | *Euphorbia elegans* | 0 | 0 | 11370 |
| 139 | *Euphorbia hirta* | 171099444 | 26045683 | 44824 |
| 140 | *Euphorbia prostrata* | 0 | 666105 | 0 |
| 141 | *Euphorbia splendens* | 0 | 66897 | 0 |
| 142 | *Euphorbia thymifolia* | 0 | 273841 | 185961 |
| 143 | *Evolvulus alsinoides* | 72332462 | 81497049 | 674359 |
| 144 | *Flaveria trinervia* | 12100 | 0 | 0 |
| 145 | *Glossocardia bosvallea* | 43014962 | 23204285 | 102334 |
| 146 | *Glossogyne bidens* | 0 | 22456881 | 0 |
| 147 | *Gomphrena celosioides* | 0 | 126616 | 0 |
| 148 | *Gomphrena globosa* | 471512 | 0 | 0 |
| 149 | *Goniocaulon glabrum* | 186667 | 0 | 0 |
| 150 | *Gynura nitida* | 62600 | 0 | 0 |
| 151 | *Habenaria suaveolens* | 2912455 | 0 | 0 |
| 152 | *Hedyotis brachypoda* | 180000 | 0 | 0 |
| 153 | *Hedyotis cyanantha* | 96664 | 0 | 0 |
| 154 | *Heliotropium scabrum* | 9333333 | 0 | 0 |
| 155 | *Heliotropium zeylanicum* | 0 | 1149254 | 0 |
| 156 | *Heteropogon contortus* | 15200 | 0 | 0 |
| 157 | *Hibiscus lobatus* | 96832 | 0 | 0 |
| 158 | *Hibiscus talbotii* | 2304607 | 0 | 0 |
| 159 | *Hybanthus enneaspermus* | 36896735 | 14289379 | 11370 |
| 160 | *Hygrophila auriculata* | 6428156 | 0 | 0 |
| 161 | *Impatiens fruticosa* | 1400000 | 0 | 0 |
| 162 | *Impatiens latifolia* | 5600000 | 0 | 0 |
| 163 | *Indigofera hirsuta* | 1587500 | 0 | 0 |
| 164 | *Indigofera linifolia var. campbelli* | 3485960 | 0 | 0 |
| 165 | *Indigofera linifolia var. linifolia* | 5507097 | 0 | 0 |
| 166 | *Indigofera linifolia* | 90700072 | 0 | 962782 |
| 167 | *Indigofera linnaei* | 12122070 | 62023147 | 68222 |
| 168 | *Indigofera mysorensis* | 0 | 80705 | 0 |
| 169 | *Indigofera spicata* | 224000 | 0 | 0 |
| 170 | *Indigofera tinctoria* | 805533 | 12861474 | 0 |
| 171 | *Indoneesiella echioides* | 147810 | 0 | 0 |
| 172 | *Ipomoea pes-tigridis* | 464795 | 0 | 0 |
| 173 | *Justicia diffusa* | 0 | 1095000 | 0 |
| 174 | *Justicia glauca* | 12278326 | 65364000 | 0 |
| 175 | *Justicia neesii* | 12100 | 0 | 0 |
| 176 | *Justicia procumbens* | 11464534 | 41409167 | 1383790 |
| 177 | *Justicia prostrata* | 756388 | 73055 | 0 |

| | | | | |
|---|---|---|---|---|
| 178 | *Justicia quinqueangularis* | 1846187 | 0 | 0 |
| 179 | *Justicia simplex* | 38803397 | 0 | 0 |
| 180 | *Lagenandra ovata* | 216000 | 0 | 0 |
| 181 | *Launaea procumbens* | 0 | 0 | 83098 |
| 182 | *Lavandula bipinnata* | 2963899 | 0 | 418353 |
| 183 | *Ledebouria socialis* | 0 | 1312964 | 0 |
| 184 | *Lepidagathis cristata* | 0 | 0 | 1507505 |
| 185 | *Lepidagathis prostrata* | 389676 | 0 | 0 |
| 186 | *Lepidagathis trinervis* | 2103023 | 0 | 0 |
| 187 | *Leucas angustissima* | 332025 | 0 | 0 |
| 188 | *Leucas aspera* | 2669989 | 4670445 | 0 |
| 189 | *Leucas biflora* | 0 | 9107279 | 238778 |
| 190 | *Leucas cephalotes* | 231571675 | 0 | 0 |
| 191 | *Leucas diffusa Benth.* | 0 | 59077 | 29882 |
| 192 | *Leucas lanata Benth.* | 0 | 372162 | 0 |
| 193 | *Leucas longifolia Benth.* | 0 | 0 | 224118 |
| 194 | *Melhania incana* | 0 | 0 | 149412 |
| 195 | *Melochia corchorifolia* | 0 | 127243 | 0 |
| 196 | *Merremia aegyptia* | 0 | 365000 | 0 |
| 197 | *Merremia emarginata* | 0 | 0 | 612588 |
| 198 | *Merremia gangetica* | 9774931 | 0 | 0 |
| 199 | *Merremia tridentata* | 6201862 | 4940445 | 136445 |
| 200 | *Mimosa pudica* | 27648930 | 84000 | 0 |
| 201 | *Mollugo nudicaulis* | 0 | 49632445 | 0 |
| 202 | *Mollugo pentaphylla* | 327392 | 9329020 | 0 |
| 203 | *Murdannia gigantea* | 734500 | 0 | 0 |
| 204 | *Nymphaea nouchali* | 144000 | 0 | 0 |
| 205 | *Ocimum americanum* | 16520333 | 678308 | 0 |
| 206 | *Ocimum basilicum* | 315252 | 0 | 0 |
| 207 | *Ocimum sanctum* | 0 | 0 | 29882 |
| 208 | *Ocimum sanctum syn Ocimum* | 11708444 | 5566201 | 0 |
| 209 | *Oldenlandia auricularia* | 16600 | 0 | 0 |
| 210 | *Oldenlandia corymbosa* | 250800 | 6016075 | 23333 |
| 211 | *Oldenlandia diffusa* | 161107 | 0 | 0 |
| 212 | *Oldenlandia herbacea* | 165600 | 58061468 | 0 |
| 213 | *Oldenlandia nagporensis* | 0 | 44598 | 0 |
| 214 | *Oldenlandia umbellata* | 0 | 0 | 68222 |
| 215 | *Oxalis corniculata* | 0 | 189200 | 0 |
| 216 | *Pancratium triflorum* | 0 | 73502 | 0 |
| 217 | *Panicum repens* | 12688045 | 0 | 0 |
| 218 | *Parthenium hysterophorus* | 718724 | 0 | 0 |
| 219 | *Paspalum vaginatum* | 8400000 | 0 | 0 |
| 220 | *Pedicularis zeylanica* | 1263946 | 99594 | 0 |
| 221 | *Pennisetum hohenackeri* | 252129 | 0 | 0 |
| 222 | *Pentanema indicum* | 22698019 | 0 | 0 |

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|---|---|---|---|---|
| 223 | *Phyla nodiflora* | 77466 | 0 | 0 |
| 224 | *Phyllanthus amarus* | 42999158 | 68061 | 0 |
| 225 | *Phyllanthus fraternus* | 552000 | 0 | 0 |
| 226 | *Phyllanthus maderaspatensis* | 132764692 | 6818785 | 482346 |
| 227 | *Phyllanthus niruri* | 11703049 | 6403984 | 0 |
| 228 | *Phyllanthus rheedii* | 0 | 76346 | 0 |
| 229 | *Phyllanthus simplex* | 141640432 | 0 | 0 |
| 230 | *Phyllanthus urinaria* | 774658 | 0 | 0 |
| 231 | *Phyllanthus virgatus* | 48118354 | 13604004 | 56852 |
| 232 | *Pilea wightii* | 1120000 | 0 | 0 |
| 233 | *Polygala arvensis* | 6528762 | 1865207 | 0 |
| 234 | *Polygala erioptera* | 744713 | 0 | 104588 |
| 235 | *Portulaca grandiflora* | 0 | 73502 | 0 |
| 236 | *Portulaca oleracea* | 746667 | 126133 | 0 |
| 237 | *Portulaca pilosa* | 0 | 331910 | 0 |
| 238 | *Pulicaria angustifolia* | 323004104 | 0 | 0 |
| 239 | *Pulicaria wightiana* | 17916635 | 11788569 | 60778 |
| 240 | *Pupalia lappacea var. orbiculata* | 0 | 31533 | 0 |
| 241 | *Rhynchosia hirta* | 0 | 78299 | 0 |
| 242 | *Rhynchosia minima* | 0 | 238188 | 89647 |
| 243 | *Rotala rosea* | 1120000 | 0 | 0 |
| 244 | *ia indica* | 6256 | 0 | 0 |
| 245 | *Rubia cordifolia* | 0 | 180279 | 0 |
| 246 | *Rungia pectinata* | 0 | 0 | 2256118 |
| 247 | *Rungia repens* | 22368210 | 0 | 0 |
| 248 | *Sacciolepis myosuroides* | 4666667 | 0 | 0 |
| 249 | *Sarcostemma brunonianum* | 0 | 328749 | 0 |
| 250 | *Scilla hyacinthina* | 0 | 13915349 | 0 |
| 251 | *Senecio candicans* | 373333 | 0 | 0 |
| 252 | *Senecio intermedius* | 0 | 1603518 | 0 |
| 253 | *Senecio tenuifolius* | 0 | 4313695 | 0 |
| 254 | *Senna uniflora* | 0 | 6758678 | 0 |
| 255 | *Sida alnifolia* | 871490 | 0 | 0 |
| 256 | *Sida cordata* | 217185412 | 711686 | 0 |
| 257 | *Sida cordifolia* | 4509956 | 2705719 | 0 |
| 258 | *Sida mysorensis* | 51733562 | 0 | 0 |
| 259 | *Sida ovata* | 0 | 0 | 456035 |
| 260 | *Sida rhombifolia ssp. rhombifolia* | 1018402 | 68061 | 0 |
| 261 | *Sida spinosa* | 83967733 | 534506 | 0 |
| 262 | *Sigesbeckia orientalis* | 15200 | 0 | 0 |
| 263 | *Solanum indicum* | 0 | 110133 | 0 |
| 264 | *Solanum virginianum* | 0 | 73502 | 74706 |
| 265 | *Sopubia delphiniifolia* | 3437000 | 0 | 0 |
| 266 | *Spermacoce articularis* | 0 | 0 | 147815 |
| 267 | *Spermacoce hispida* | 0 | 11562216 | 147815 |

| | | | | |
|---|---|---|---|---|
| 268 | *Spermacoce ocymoides* | 0 | 59535065 | 0 |
| 269 | *Spermacoce pusilla./ Borreria* | 2323973 | 148364 | 0 |
| 270 | *Spermacoce pusilla* | 51181183 | 0 | 227408 |
| 271 | *Spilanthes paniculata* | 144996 | 0 | 0 |
| 272 | *Stemodia viscosa* | 3809248 | 0 | 0 |
| 273 | *Striga asiatica* | 16600 | 0 | 0 |
| 274 | *Striga densiflora* | 372000 | 0 | 276157 |
| 275 | *Stylosanthes guianensis* | 0 | 1000450 | 0 |
| 276 | *Stylosanthes hamata* | 0 | 0 | 16667 |
| 277 | *Swertia corymbosa* | 672700 | 0 | 0 |
| 278 | *Swertia densifolia* | 334400 | 0 | 0 |
| 279 | *Tagetes patula* | 0 | 110133 | 0 |
| 280 | *Tephrosia calophylla* | 0 | 31083410 | 0 |
| 281 | *Tephrosia pumila* | 38802249 | 350294 | 59765 |
| 282 | *Tephrosia strigosa* | 26958760 | 0 | 216038 |
| 283 | *Tephrosia villosa* | 56208 | 471934 | 0 |
| 284 | *Tragia bicolor* | 0 | 0 | 74706 |
| 285 | *Tragia plukenetii* | 0 | 0 | 119529 |
| 286 | *Tragus roxburghii* | 0 | 742970 | 0 |
| 287 | *Tribulus terrestris* | 0 | 11216633 | 343647 |
| 288 | *Trichodesma amplexicaule* | 0 | 88814 | 0 |
| 289 | *Trichodesma indicum* | 7331301 | 0 | 0 |
| 290 | *Trichodesma indicum var. indicum* | 2474821 | 0 | 13333 |
| 291 | *Trichodesma zeylanicum* | 330107 | 0 | 29882 |
| 292 | *Tricholepis radicans* | 6136092 | 0 | 0 |
| 293 | *Trichuriella monsoniae* | 0 | 310933 | 0 |
| 294 | *Tridax procumbens* | 0 | 84879547 | 1015740 |
| 295 | *Triumfetta annua* | 38733 | 0 | 0 |
| 296 | *Triumfetta rotundifolia* | 0 | 0 | 29882 |
| 297 | *Tylophora indica var. glabra* | 0 | 92000 | 0 |
| 298 | *Tylophora indica* | 0 | 7661446 | 0 |
| 299 | *Umbilicus rupestris* | 6089832 | 0 | 0 |
| 300 | *Vernonia cinerea. syn* | 112745555 | 746830 | 167632 |
| 301 | *Vicoa indica  syn Pentanema* | 15382042 | 74115 | 0 |
| 302 | *Vigna mungo* | 161107 | 0 | 0 |
| 303 | *Waltheria indica* | 0 | 0 | 11370 |
| 304 | *Wattakaka volubilis* | 0 | 734486 | 0 |
| 305 | *Xanthium indicum* | 22800 | 365277 | 0 |
| 306 | *Xanthium strumarium* | 7510867 | 39400 | 11370 |
| 307 | *Zingiber officinale* | 1354661 | 0 | 0 |
| 308 | *Zornia diphylla.* | 26391560 | 0 | 0 |
| 309 | *Zornia gibbosa* | 27835901 | 90919978 | 34111 |

## Comparative Habitat Of Trees, Shrubs And Herbs In The Three Dry Divisions

it is stated here that among the three divisions Bidar get the higher rainfall and having the good soil may be the reason for more tree species. Likewise, the more herbal species in Vijayapura may be due to the more open space having less tree crown density **table-8.**

**Table-8 Habitat of trees, shrubs and herbs in the three dry divisions**

| Sl.no | Name of the division | Tree species | Shrub species | Herb species |
|---|---|---|---|---|
| 1 | Bidar | 110 (28.87%) | 52 (13.65%) | 219 (57.48%) |
| 2 | Raichur | 51 (19%) | 58 (21%) | 164 (60%) |
| 3 | Vijayapura | 20 (16%) | 28 (22%) | 79 (62%) |

## Biodiversity Variation Among Beats In Respect To Species Of Three Divisions

The total species of trees, shrubs and herbs have been tabulated and found that there is large variation among the habitat in the beats within the division and among the divisions. In case of Bidar division the highest numbers of species are found in Karkanalli beat while the least number of species are found in Bagdal beat. Likewise in Raichur division the highest numbers of species are found in Kavital beat and the least number of species are found in Yeregara beat. The numbers of beats in Vijayapura division are only three due to less forest area.

In this division the highest numbers of species are found in Mamdapur beat while the least number of species are found in Jhalki beat **table-9**. There is further scope of comparative study regarding biodiversity by assessing the name of species in the beats. Due to paucity of the size of this article it has not been taken here.

**Table-9 Biodiversity variations among the beats of three divisions**

| Sl.no | Name of the range | Name of beat | Tree | Shrub | Herb | Total |
|---|---|---|---|---|---|---|
| 1 | Bidar | Jambagi | 10 | 12 | 53 | 75 |
| | | Rajeshwara | 7 | 9 | 17 | 33 |
| | | Sangam | 10 | 15 | 40 | 65 |
| | | Basavakalyan | 15 | 20 | 32 | 67 |
| | | Niragudi | 7 | 8 | 12 | 27 |
| | | Rajeshwara | 20 | 15 | 19 | 54 |
| | | Dhanmura | 23 | 12 | 23 | 58 |
| | | Halbarga | 19 | 12 | 22 | 53 |
| | | Khanapur | 17 | 17 | 20 | 54 |
| | | Khatak chincholi | 13 | 6 | 18 | 37 |
| | | Malchapur | 3 | 5 | 13 | 21 |
| | | Bagdal | 11 | 4 | 5 | 20 |
| | | Chitta | 17 | 4 | 10 | 31 |
| | | Honnikeri | 48 | 31 | 47 | 126 |
| | | Kamatana | 30 | 10 | 26 | 66 |
| | | Shahapur | 42 | 27 | 59 | 128 |
| | | Basirapur | 15 | 6 | 14 | 35 |
| | | Benchincholli | 15 | 11 | 12 | 38 |
| | | Bhonyar | 26 | 17 | 22 | 65 |
| | | Changler | 37 | 15 | 40 | 92 |
| | | Chimmanchod | 8 | 8 | 10 | 26 |
| | | Chinkera | 14 | 14 | 13 | 41 |
| | | Karknalli | 44 | 38 | 74 | 156 |
| | | Mangalgi | 17 | 9 | 14 | 40 |
| | | Salebeeranalli | 12 | 9 | 18 | 39 |
| 2 | Raichur | Arakeri | 21 | 40 | 53 | 114 |
| | | Bankaladoddi | 10 | 53 | 63 | 126 |
| | | Devadurga | 20 | 50 | 65 | 135 |
| | | Gabburur | 10 | 21 | 37 | 68 |
| | | Galag | 19 | 41 | 41 | 101 |
| | | Jalahalli | 10 | 18 | 23 | 51 |
| | | Anehosuru | 6 | 8 | 9 | 23 |
| | | Bayalagudda | 6 | 13 | 24 | 43 |
| | | Gurgunta | 19 | 35 | 55 | 109 |
| | | Kavital | 22 | 51 | 73 | 146 |
| | | Sindanoor | 13 | 18 | 31 | 62 |
| | | Turvihal | 5 | 15 | 27 | 47 |
| | | Chandrabanda | 11 | 20 | 21 | 52 |
| | | Maliyabada | 23 | 39 | 54 | 116 |
| | | Yeregara | 12 | 14 | 13 | 39 |
| 3 | Vijayapura | Benal | 11 | 23 | 39 | 73 |
| | | Jhalki | 7 | 4 | 17 | 28 |
| | | Mamdapur | 11 | 22 | 43 | 76 |

**Regeneration Of Tree Species**

The regeneration pattern of the tree species in the divisions was assessed through counting the saplings of less than 10 cm girth. The data generated also indicates the dominance of various species across the transect lines. The number of poles of each species belonged three divisions are provided in the **table-10**.

Regeneration status in Bidar division**:** A glimpse on the regeneration of 110 tree species, based on the new recruits have resulted that in 14 species regeneration potential is found satisfactory. Some of the species are *Gliricidia sepium* , *Corymbia citriodora* ,*Chloroxylon swietenia* , *Pongamia pinnata* ,*Azadirachta indica* , *Cassia siamea* , *Diospyros melanoxylon* , *Acacia chundra* , *Butea monosperma* , and *Anacardium occidentale* are the dominant species among tree species in the Bidar division.

There is no regeneration observed in 9 tree species and that should be the most concern of the department. The species which is having overall less than 50,000 poles in the division should be the concern of the department for exsitu planting. Further, while doing so it should be taken into consideration that the planting should be done in the beats where that species is found. Likewise the regeneration status in Raichur and Vijayapura divisions is also done and stated in the table-12.

Regeneration status in Raichur division**:** A glimpse on the regeneration data on 40 tree species shows that 5 species have been identified with good regeneration potential i.e *Chloroxylon swietenia*, *Albizia amara, Annona squamosa, Cassia fistula, Wrightia tinctoria.*

The regeneration surveys reveal that some species like *Gyrocarpus americanus, Premna tomentosa, Acacia ferruginea, Ficus drupacea var. pubescens, Ailanthus excelsa, Simarouba amara, Ixora arborea, and Strychnos potatorum* have very poor regenaration.

Regeneration status in Vijayapura division: A glimpse of the regeneration data on tree species shows very poor regeneration. The forest area is very less in comperition to the other two divisions. That 4 species have 2,000 young plants each. Of them, only one species, *Azadirachta indica* has been projected with a regeneration potential of 5,000 plants. *Hardwickia binata* (4604), *Acacia nilotica* (4179), *and Cassia siamea* (2587) are the other species with 2000 young plants each. Species such as *Aegle marmelos, Morinda pubescens, Pongamia pinnata, Vitex negundo, and Ziziphus horrida* have been estimated with 1000 young plants each in the area.

**Table-10 Regeneration status of tree species in Bidar, Raichur and Vijayapura divisions**

| sl. no | Bidar | | Raichur | | Vijayapura | |
|---|---|---|---|---|---|---|
| | **Species** | **projected saplings** | **Species** | **projected saplings** | **Species** | **projected saplings** |
| 1. | *Gliricidia sepium* | *5485449* | *Chloroxylon swietenia* | *9552473* | *Azadirachta indica* | *5399* |
| 2. | *Corymbia citriodora* | *3957428* | *Albizia amara* | *6421289* | *Hardwickia binata* | *4604* |
| 3. | *Chloroxylon swietenia* | *3627476* | *Annona squamosa* | *1863175* | *Acacia nilotica* | *4179* |
| 4. | *Pongamia pinnata* | *3376894* | *Cassia fistula* | *1480940* | *Cassia siamea* | *2587* |
| 5. | *Azadirachta indica* | *1717945* | *Wrightia tinctoria* | *1239600* | *Phyllanthus emblica* | *1600* |
| 6. | *Cassia siamea* | *1021755* | *Pongamia pinnata* | *535734* | *Holoptelea integrifolia* | *1596* |
| 7. | *Diospyros melanoxylon* | *985560* | *Holoptelea integrifolia* | *502923* | *Albizia amara* | *1401* |
| 8. | *Acacia chundra* | *834860* | *Azadirachta indica* | *480803* | *Tamarindus indica* | *1400* |
| 9. | *Butea monosperma* | *775485* | *Cassia siamea* | *475354* | *Dalbergia sissoo* | *1200* |
| 10. | *Anacardium occidentale* | *751912* | *Acacia chundra* | *294726* | *Acacia leucophloea* | *1191* |
| 11. | *Annona squamosa* | *746513* | *Acacia nilotica* | *209517* | *Pongamia pinnata* | *601* |
| 12. | *Anogeissus latifolia* | *696552* | *Ziziphus mauritiana* | *117919* | *Morinda pubescens* | *400* |
| 13. | *Hardwickia binata* | *662769* | *Hardwickia binata* | *110088* | *Ziziphus horrida* | *399* |
| 14. | *Albizia amara* | *640781* | *Alangium salvifolium* | *65205* | *Vitex negundo* | *200* |
| 15. | *Tectona grandis* | *468895* | *Acacia leucophloea* | *47195* | *Aegle marmelos* | *200* |
| 16. | *Ziziphus mauritiana* | *412847* | *Balanites roxburghii* | *43210* | | |
| 17. | *Buchanania lanzan* | *404231* | *Dalbergia sissoides* | *36117* | | |
| 18. | *Cassia fistula* | *400590* | *Dalbergia sissoo* | *28341* | | |
| 19. | *Terminalia alata* | *376972* | *Morinda tomentosa* | *23647* | | |
| 20. | *Wrightia tinctoria* | *270531* | *Borassus flabellifer* | *20268* | | |
| 21. | *Santalum album* | *192715* | *Butea monosperma* | *14596* | | |
| 22. | *Phyllanthus emblica* | *161873* | *Phoenix sylvestris* | *13679* | | |
| 23. | *Vitex negundo* | *130289* | *Santalum album* | *6661* | | |
| 24. | *Acacia nilotica* | *107007* | *Ziziphus horrida* | *5950* | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 25. | *Terminalia bellirica* | *103651* | *Ziziphus xylopyrus* | *5652* | | |
| 26. | *Mallotus philippensis* | *101500* | *Acacia catechu* | *5481* | | |
| 27. | *Acacia catechu* | *95905* | *Dalbergia latifolia* | *4441* | | |
| 28. | *Ixora arborea* | *95007* | *Leucaena leucocephala* | *4056* | | |
| 29. | *Ziziphus xylopyrus* | *93883* | *Peltophorum pterocarpum* | *2629* | | |
| 30. | *Holoptelea integrifolia* | *89088* | *Bauhinia racemosa* | *2297* | | |
| 31. | *Tamarindus indica* | *87049* | *Diospyros melanoxylon* | *2270* | | |
| 32. | *Albizia lebbeck* | *86656* | *Morinda citrifolia* | *2220* | | |
| 33. | *Ailanthus excelsa* | *66525* | *Strychnos potatorum* | *1907* | | |
| 34. | *Diospyros montana* | *66266* | *Ixora arborea* | *1527* | | |
| 35. | *Alstonia scholaris* | *61250* | *Simarouba amara* | *1514* | | |
| 36. | *Boswellia serrata* | *58570* | *Ailanthus excelsa* | *1431* | | |
| 37. | *Sterculia urens* | *46479* | *Ficus drupacea var. pubescens* | *920* | | |
| 38. | *Diospyros paniculata* | *43445* | *Acacia ferruginea* | *657* | | |
| 39. | *Morinda citrifolia* | *42810* | *Premna tomentosa* | *430* | | |
| 40. | *Gardenia resinifera* | *42653* | *Gyrocarpus americanus* | *200* | | |
| 41. | *Morinda pubescens* | *41006* | | | | |
| 42. | *Semecarpus anacardium* | *38324* | | | | |
| 43. | *Gmelina arborea* | *38285* | | | | |
| 44. | *Artocarpus hirsutus* | *35000* | | | | |
| 45. | *Symplocos villosa* | *35000* | | | | |
| 46. | *Syzygium cumini* | *30284* | | | | |
| 47. | *Simarouba amara* | *29398* | | | | |
| 48. | *Baccaurea courtallensis* | *29050* | | | | |
| 49. | *Bauhinia racemosa* | *24312* | | | | |
| 50. | *Dolichandrone falcata* | *22286* | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 51. | *Xeromphis spinosa* | *18117* | | | | |
| 52. | *Cola acuminata* | *17559* | | | | |
| 53. | *Haldina cordifolia* | *17113* | | | | |
| 54. | *Ximenia americana* | *16415* | | | | |
| 55. | *Leucaena leucocephala* | *16333* | | | | |
| 56. | *Pterocarpus marsupium* | *14416* | | | | |
| 57. | *Bauhinia purpurea* | *14290* | | | | |
| 58. | *Terminalia arjuna* | *13941* | | | | |
| 59. | *Madhuca longifolia* | *13570* | | | | |
| 60. | *Vernonia arborea* | *12832* | | | | |
| 61. | *Cassine paniculata* | *10458* | | | | |
| 62. | *Diospyros tomentosa* | *9610* | | | | |
| 63. | *Lagerstroemia parviflora* | *9050* | | | | |
| 64. | *Careya arborea* | *8923* | | | | |
| 65. | *Albizia chinensis* | *7778* | | | | |
| 66. | *Rhizophora mucronata* | *7000* | | | | |
| 67. | *Archidendron monadelphum* | *6080* | | | | |
| 68. | *Dolichandrone atrovirens* | *5976* | | | | |
| 69. | *Dillenia indica* | *5894* | | | | |
| 70. | *Thespesia populnea* | *4667* | | | | |
| 71. | *Pentapanax leschenaultii* | *4052* | | | | |
| 72. | *Morinda tomentosa* | *3801* | | | | |
| 73. | *Terminalia pallida* | *3111* | | | | |
| 74. | *Bauhinia malabarica* | *3001* | | | | |
| 75. | *Leucaena latisiliqua* | *2832* | | | | |
| 76. | *Dalbergia latifolia* | *2634* | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 77. | *Dalbergia sissoo* | *2600* | | | | |
| 78. | *Grewia tiliifolia* | *2490* | | | | |
| 79. | *Pterocarpus santalinus* | *2333* | | | | |
| 80. | *Prosopis cineraria* | *2099* | | | | |
| 81. | *Garcinia gummi-gutta* | *2000* | | | | |
| 82. | *Garuga pinnata* | *2000* | | | | |
| 83. | *Canthium dicoccum* | *1992* | | | | |
| 84. | *Hibiscus tiliaceus* | *1743* | | | | |
| 85. | *Madhuca longifolia* | *1039* | | | | |
| 86. | *Semecarpus travancorica* | *1000* | | | | |
| 87. | *Gyrocarpus americanus* | *996* | | | | |
| 88. | *Alangium salvifolium* | *778* | | | | |
| 89. | *Terminalia chebula* | *606* | | | | |
| 90. | *Dalbergia paniculata* | *563* | | | | |
| 91. | *Soymida febrifuga* | *563* | | | | |
| 92. | *Anthocephalus chinensis* | *498* | | | | |
| 93. | *Ficus tsjahela* | *498* | | | | |
| 94. | *Glochidion littorale* | *403* | | | | |
| 95. | *Cyathocalyx zeylanicus* | *400* | | | | |
| 96. | *Ficus religiosa* | *281* | | | | |
| 97. | *Aegle marmelos* | *263* | | | | |
| 98. | *Neolamarckia cadamba* | *263* | | | | |
| 99. | *Bridelia retusa* | *202* | | | | |
| 100. | *Bridelia montana* | *202* | | | | |
| 101. | *Peltophorum pterocarpum* | *202* | | | | |

Based on the number of mature tree species and its regeneration, some species are identified which requires immediate attention for *ex-situ* cultivation. The details are given the **table-11**. Likewise, the shrubs and herbs are also identified and listed in **tables-12&13.**

**Table-11 Tree species of conservation concern in Bidar, Raichur and Vijayapura divisions:**

| Sl. no. | Bidar | Raichur | Vijayapura |
|---|---|---|---|
| 1. | *Acacia ferruginea* | *Acacia ferruginea* | *Aegle marmelos* |
| 2. | *Alangium salvifolium* | *Ailanthus excelsa* | *Ailanthus excelsa* |
| 3. | *Anthocephalus chinensis* | *Anogeissus latifolia* | *Vitex negundo* |
| 4. | *Bridelia montana* | *Bauhinia racemosa* | *Ziziphus horrida* |
| 5. | *Bridelia retusa* | *Diospyros melanoxylon* | |
| 6. | *Canthium dicoccum* | *Ficus benghalensis* | |
| 7. | *Cinnamomum verum* | *Ficus drupacea var. pubescens* | |
| 8. | *Cyathocalyx zeylanicus* | *Ficus religiosa* | |
| 9. | *Dalbergia paniculata* | *Ficus tsjahela* | |
| 10. | *Dillenia indica* | *Gyrocarpus americanus* | |
| 11. | *Dolichandrone atrovirens* | *Ixora arborea* | |
| 12. | *Ehretia laevis* | *Leucaena leucocephala* | |
| 13. | *Ficus religiosa* | *Madhuca longifolia* | |
| 14. | *Ficus tsjahela* | *Peltophorum pterocarpum* | |
| 15. | *Garcinia gummi-gutta* | *Premna tomentosa* | |
| 16. | *Glochidion littorale* | *Simarouba amara* | |
| 17. | *Grewia tiliifolia* | | |
| 18. | *Gyrocarpus americanus* | | |
| 19. | *Hibiscus tiliaceus* | | |
| 20. | *Neolamarckia cadamba* | | |
| 21. | *Oroxylum indicum* | | |
| 22. | *Peltophorum pterocarpum* | | |
| 23. | *Pentapanax leschenaultii* | | |
| 24. | *Prosopis cineraria* | | |
| 25. | *Pterocarpus santalinus* | | |
| 26. | *Semecarpus travancorica* | | |
| 27. | *Terminalia chebula* | | |
| 28. | *Terminalia pallida* | | |
| 29. | *Thespesia populnea* | | |
| 30. | *Zanthoxylum rhetsa* | | |

**Table-12, Shrub species of conservation concern in Bidar, Raichur and Vijayapura divisions:**

| Sl. no. | Bidar | Raichur | Vijayapura |
|---|---|---|---|
| 1. | *Agrostistachys indica* | *Cassia floribunda* | NIL |
| 2. | *Allamanda cathartica* | *Coccinia grandis* | |
| 3. | *Allophylus serratus* | *Dichrostachys cinerea* | |
| 4. | *Cassia surattensis* | *Euphorbia caducifolia* | |
| 5. | *Gymnosporia montana* | *Euphorbia splendens* | |
| 6. | *Lawsonia inermis* | *Euphorbia tirucalli* | |
| 7. | | *Jasminum auriculatum* | |
| 8. | | *Maytenus emarginata* | |
| 9. | | *Passiflora foetida* | |
| 10. | | *Phyllanthus reticulatus* | |
| 11. | | *Pterolobium hexapetalum* | |
| 12. | | *Tragia cannabina* | |
| 13. | | *Tylophora indica var. glabra* | |

**Table-13, Herbs of conservation concern in Bidar, Raichur and Vijayapura divisions:**

| Sl. no | Bidar | Raichur | Vijayapura |
|---|---|---|---|
| 1. | *Acalypha ciliata* | *Abutilon indicum* | *Alysicarpus vaginalis* |
| 2. | *Amischophacelus axillaris* | *Acalypha indica* | *Barleria buxifolia* |
| 3. | *Ammannia baccifera* | *Acalypha lanceolata* | *Commelina paleata* |
| 4. | *Aristida adscensionis* | *Aerva lanata.* | *Euphorbia elegans* |
| 5. | *Aristida funiculata* | *Alysicarpus belgaumensis* | *Hybanthus enneaspermus* |
| 6. | *Barleria prionitis* | *Alysicarpus glumaceus.* | *Stylosanthes hamata* |
| 7. | *Brachiaria eruciformis* | *Anisomeles heyneana* | *Trichodesma indicum* |
| 8. | *Crotalaria biflora* | *Atylosia albicans.* | *Waltheria indica* |
| 9. | *Crotalaria paniculata* | *Atylosia scarabaeoides.* | *Xanthium strumarium* |
| 10. | *Crotalaria parviflora* | *Barleria buxifolia* | |
| 11. | *Cynodon dactylon* | *Barleria longiflora* | |
| 12. | *Dicoma tomentosa* | *Caralluma indica* | |
| 13. | *Dipteracanthus patulus* | *Cassia obtusifolia* | |
| 14. | *Eleiotis monophylla* | *Catharanthus pusillus* | |
| 15. | *Eria reticosa* | *Coldenia procumbens.* | |
| 16. | *Flaveria trinervia* | *Commelina attenuata* | |
| 17. | *Gynura nitida* | *Commelina benghalensis* | |
| 18. | *Hedyotis cyanantha* | *Corchorus aestuans* | |
| 19. | *Heteropogon contortus* | *Crotalaria pusilla* | |
| 20. | *Hibiscus lobatus* | *Cucumis sativus* | |
| 21. | *Indigofera cassioides* | *Cyamopsis tetragonoloba* | |
| 22. | *Jatropha gossypifolia* | *Dactyloctenium aegyptium* | |
| 23. | *Justicia neesii* | *Dipteracanthus patulus* | |

| | | | |
|---|---|---|---|
| 24. | *Lepidagathis cuspidata* | *Euphorbia concanensis* | |
| 25. | *Nymphaea nouchali* | *Euphorbia cordifolia* | |
| 26. | *Ocimum gratissimum* | *Euphorbia thymifolia* | |
| 27. | *Oldenlandia auricularia* | *Gomphrena celosioides* | |
| 28. | *Phyla nodiflora* | *Hyptis suaveolens* | |
| 29. | *Rothia indica* | *Indigofera mysorensis* | |
| 30. | *Scoparia dulcis* | *Justicia prostrata* | |
| 31. | *Sigesbeckia orientalis* | *Lepidagathis barberi* | |
| 32. | *Spilanthes paniculata* | *Leucas diffusa* | |
| 33. | *Striga asiatica* | *Melochia corchorifolia* | |
| 34. | *Tephrosia villosa .* | *Merremia tridentata* | |
| 35. | *Triumfetta annua* | *Mimosa pudica* | |
| 36. | | *Oldenlandia nagporensis* | |
| 37. | | *Orthosiphon thymiflorus* | |
| 38. | | *Oxalis corniculata* | |
| 39. | | *Pancratium triflorum* | |
| 40. | | *Pavonia zeylanica* | |
| 41. | | *Pedicularis zeylanica* | |
| 42. | | *Phyllanthus amarus* | |
| 43. | | *Phyllanthus rheedii* | |
| 44. | | *Polygonum chinense* | |
| 45. | | *Portulaca grandiflora* | |
| 46. | | *Portulaca oleracea* | |
| 47. | | *Pupalia lappacea* | |
| 48. | | *Rhynchosia hirta* | |
| 49. | | *Rhynchosia viscosa* | |
| 50. | | *Rubia cordifolia* | |
| 51. | | *Sida rhombifolia* | |
| 52. | | *Solanum anguivi* | |
| 53. | | *Solanum virginianum* | |
| 54. | | *Spermacoce pusilla* | |
| 55. | | *Tagetes patula* | |
| 56. | | *Tephrosia candida* | |
| 57. | | *Trichodesma amplexicaule.* | |
| 58. | | *Trichuriella monsoniae* | |
| 59. | | *Vicoa indica* | |

The forest beats with remarkable presence of highly traded medicinal plants shall have to be conserved as Field Gene Banks for the conservation to maintain inter generation equity and considering their increasing demand in India. The KAMPA, KBB, and KFD should join hands and do needful. No such assertive areas have been found in the Vijayapura division, **table-14.**

**Table-14, Proposed field gene banks in the two divisions**

| sl. no. | name of division | name of range | name of beat | number of tree species | number of herb species | number of shrub species | total species |
|---|---|---|---|---|---|---|---|
| 1 | Bidar | Humnabad | Karknalli | 44 | 38 | 74 | 156 |
| 2 | | Bidar | Shahapur | 42 | 27 | 59 | 128 |
| 3 | | Bidar | Honnikeri | 48 | 31 | 47 | 126 |
| 4 | | Humnabad | Changler | 37 | 15 | 40 | 92 |
| 5 | | Aurad | Jambagi | 10 | 12 | 53 | 75 |
| 1 | Raichur | Manvi | Kavital | 22 | 51 | 73 | 146 |
| 2 | | Devadurga | Devadurga | 20 | 50 | 65 | 135 |
| 3 | | Devadurga | Bankaladoddi | 10 | 53 | 63 | 126 |
| 4 | | Raichur | Maliyabada | 23 | 39 | 54 | 116 |
| 5 | | Devadurga | Arakeri | 21 | 40 | 53 | 114 |

Though the areas in these three divisions are not continuous but the part gene pool is found across these divisions. The species found in common among these three divisions are listed herein **table-15**.

**Table-15, Common species found in three divisions**

| Sl.no | Trees | Shrubs | Herbs |
|---|---|---|---|
| 1. | *Acacia nilotica* | *Canthium coromandelicum* | *Achyranthes aspera* |
| 2. | *Agave americana* | *Carissa carandas* | *Alysicarpus monilifer* |
| 3. | *Ailanthus excelsa* | *Cassia auriculata* | *Atylosia scarabaeoides* |
| 4. | *Albizia amara* | *Catunaregam spinosa* | *Barleria buxifolia* |
| 5. | *Azadirachta indica* | *Cryptostegia grandiflora* | *Cassia mimosoides* |
| 6. | *Cassia fistula* | *Securinega leucopyrus* | *Cassia sericea* |
| 7. | *Cassia siamea* | | *Dicoma tomentosa* |
| 8. | *Dalbergia sissoo* | | *Euphorbia hirta* |
| 9. | *Hardwickia binata* | | *Evolvulus alsinoides* |
| 10. | *Holoptelea integrifolia* | | *Glossocardia bosvallea* |
| 11. | *Morinda coreia Buch* | | *Hybanthus enneaspermus* |
| 12. | *Pongamia pinnata* | | *Indigofera cordifolia* |
| 13. | *Vitex negundo* | | *Indigofera linnaei* |
| 14. | | | *Justicia procumbens* |
| 15. | | | *Lepidagathis cristata* |
| 16. | | | *Merremia tridentata* |
| 17. | | | *Ocimum sanctum* |
| 18. | | | *Oldenlandia corymbosa* |
| 19. | | | *Pavonia odorata* |
| 20. | | | *Phyllanthus maderaspatensis* |
| 21. | | | *Phyllanthus virgatus* |
| 22. | | | *Polygala chinensis* |
| 23. | | | *Pulicaria wightiana* |
| 24. | | | *Sida cordata* |
| 25. | | | *Tephrosia pumila* |
| 26. | | | *Tephrosia purpurea* |
| 27. | | | *Vernonia cinerea* |
| 28. | | | *Xanthium strumarium* |
| 29. | | | *Zornia gibbosa* |

## Dominant Plant Species In The Divisions

Taking into consideration the projected numbers of the species in all the 43 beats of these three divisions has helped in to identify the dominant species among the trees, shrubs and the herbs.

In regard to Bidar division *Cassia tora* of the Caesalpiniacae family is projected as dominant herbaceous species, *Lantana camara* of the Verbenaceae family in shrub species and *Prosopis juliflora* of Mimosidae are the dominant species in herbs, shrubs and trees respectively. The results indicate that division is infested with Prosopis and Lantana plants.

In Raichur division, *Zornia gibbosa* of Fabaceae, *Cassia auriculata* of Caesalpiniaceae and *Prosopis juliflora* of Mimosidae is the dominant herb, shrub and tree species respectively. The forests of the Raichur are also found infested with the *Prosopis juliflora* species. This dominance of this species hinders the development of other many natural species which were found in past.

In Vijayapura division, *Balanites roxburghii* of Balanitaceae; Zygophyllaceae *Merremia emarginata* of Convolvulaceae; *Cassia sericea* of *Caesalpiniaceae* are the dominant tree shrub and herb species respectively. The details are given in the table-16.

**Table-16, Comparative statement of dominant species in three divisions**

| sl. no | name of the division | name of the dominant species | | | respective number of the plants of the dominant species | | |
|---|---|---|---|---|---|---|---|
| | | tree | shrub | herb | tree | shrub | herb |
| 1 | Bidar | *Prosopis juliflora* | *Lantana camara* | *Cassia tora* | 17954126 | 163516890 | 510223534 |
| 2 | Raichur | *Prosopis juliflora* | *Cassia auriculata* | *Zornia gibbosa* | 19261961 | 69760897 | 90919978 |
| 3 | Vijayapura | *Balanitis roxburghii* | *Merremia emarginata* | *Cassia sericea* | 721405 | 612588 | 4915647 |

## Rarest Plant Species Of The Three Divisions

Based on the present survey across all the beats and taking in to consideration the least numbers of plants in a species, the rare species have been identified in the divisions. The details are given in the **table-17**.

**Table-17, statement of rarest species in three divisions**

| Sl. No | Name of the division | Name of the rarest species | | | Respective number of the plants of the rarest species | | |
|---|---|---|---|---|---|---|---|
| | | Tree | Shrub | Herb | Tree | Shrub | Herb |
| 1 | Bidar | *Neolamarckia cadamba* | *Agrostistachys indica* | *Rotia indica* | 263 | 200 | 6256 |
| 2 | Raichur | *Gyrocarpus americanus* | *Euphorbia tirucalli* | *Orthosiphon thymiflorus* | 400 | 375 | 14769 |
| 3 | Vijayapura | *Aegle marmelos* | *Acacia horrida* | *Commelina paleata* | 200 | 4369 | 6667 |

## Assessment Of Threatened Medicinal Plant Species

By analysis of the species population, about six species are reported in the divisions which have been Red listed by the International Union for Conservation of Nature (IUCN). As could be seen from the table, the *Chloroxylon swietenia* and *Santalum album* are found abundantly. However, *Dalbergia*

*latifolia, Pterocarpus santalinus and Terminalia pallida* are facing threat. Department may report this to the IUCN **Table-18**.

**Table-18, Status of threatened medicinal plant species as per IUCN**

| Sl.no. | Botanical name | Family | Projected individuals | Threat status |
|---|---|---|---|---|
| 1. | *Chloroxylon swietenia* | Rutaceae | 79,82,474 | Vulnerable |
| 2. | *Dalbergia latifolia* | Fabaceae | 7,758 | Vulnerable |
| 3. | *Diospyros paniculata* | Ebenaceae | 43,445 | Vulnerable |
| 4. | *Pterocarpus santalinus* | Fabaceae | 2,333 | Endangered |
| 5. | *Santalum album* | Santalaceae | 2,40,111 | Vulnerable |
| 6. | *Terminalia pallida* | Combretaceae | 3,111 | Vulnerable |

## Ethnic medicinal Importance of the Assessed Plants

Bidar, Raichur and Vijayapura are three dry districts among others of eastern planes of Karnataka They are comparatively backward districts with poverty abundant and with poor medical infrastructure to deal with epidemics like Covid-19 and likewise. Large population of these districts make use of herbals with their traditional knowledge and guidance of "Nativaidyas".The Lambani tribes are traditional users for human and cattle. The districts experience dry spells frequently but traversed with the major Krishna, Tungabhadra rivers and experience floods, makes population more vulnerable to diseases and epidemics.

In spite of dry and rocky terrains, there are abundantly rich in ethnic floral biodiversity. Large numbers of taxa of medicinal properties including highly traded species are found in the districts. The medicinal efficacy of dry zone wild species is considered as very high.

The use of herbal combinations for immunity boosting will reduce the pressure from medical infrastructure and increase quality of life. The forests of Bidar district are found having better wild herbal biodiversity, site quality and may be considered immune boosting centre. The Ayush department of the State may take note of it. Based on the assessment certain areas have been recommended for gene pool conservation for medicinal plants. The percentages of herbs of medicinal value in the floral population are found high in these districts. The study has thrown the approximate estimation of herbal medicinal resources and can be make use for better management.

Large numbers of highly traded medicinal plants have been reported. Many plants documented during the surveys are known to be traditionally collected, traded, and used as medicines for centuries, in both oral and codified health systems in India. An effort is made for identifying the plants of Bidar FD with trade potential. It has resulted in 112 species included in the trade list of the National Medicinal Plant Board (NMPB), as shown in **Table-19**.

**Table-19,Traded Medicinal Plants Found in Bidar**

| Sl. No | Botanical name | Sl. No | Botanical name |
|---|---|---|---|
| 1 | Abrus precatorius L. | 2 | Acacia caesia (L.) Willd. |
| 3 | Acacia catechu (Roxb.) Willd. | 4 | Acacia chundra (Rottler) Willd. |
| 5 | Acacia nilotica (L.) Delile | 6 | Achyranthes aspera L. |
| 7 | Aegle marmelos (L.) Correa | 8 | Aerva lanata (L.) Juss. ex Schult. |
| 9 | Ageratum conyzoides L. | 10 | Ailanthus excelsa Roxb. |
| 11 | Alangium salvifolium (L.f) Wang | 12 | Albizia amara (Roxb.) Boivin |
| 13 | Albizia lebbeck (L.) Benth. | 14 | Alstonia scholaris (L.) R.Br. |
| 15 | Alternanthera sessilis (L.) R.Br. | 16 | Andrographis paniculata (Burm.f.) Wall. |
| 17 | Anogeissus latifolia (Roxb. ex DC.) Wall. ex Guill.& Perr. | 18 | Asparagus racemosus Willd. |
| 19 | Atylosia scarabaeoides (L.) Benth. | 20 | Azadirachta indica A.Juss. |
| 21 | Barleria cristata L. | 22 | Barleria prionitis L. |
| 23 | Bauhinia malabarica Roxb. | 24 | Bauhinia racemosa Lam. |
| 25 | Biophytum sensitivum (L.) DC. | 26 | Boswellia serrata Roxb. ex Coleb. |
| 27 | Buchanania lanzan Spr. | 28 | Butea monosperma (Lam.) Taub. |
| 29 | Calotropis gigantea (L.) R.Br. | 30 | Careya arborea Roxb. |
| 31 | Carissa carandas L. | 32 | Cassia absus L. |
| 33 | Cassia alata L. | 34 | Cassia auriculata L. |
| 35 | Cassia fistula L. | 36 | Cassia senna L. |
| 37 | Cassia siamea Lam. | 38 | Cassia tora L. |
| 39 | Catunaregam spinosa (Thunb.) Tirveng | 40 | Celastrus paniculatus Willd. |
| 41 | Cinnamomum verum J.S.Presl | 42 | Cryptolepis buchananii Roemer & Schultes |
| 43 | Curculigo orchioides Gaertner | 44 | Cynodon dactylon C. Fischer |
| 45 | Dalbergia latifolia Roxb. | 46 | Dalbergia sissoo Roxb. |
| 47 | Desmodium gangeticum (L.) DC. | 48 | Desmodium triflorum (L.) DC. |
| 49 | Diospyros melanoxylon Roxb. | 50 | Dodonaea viscosa N. Jacq. |
| 51 | Eclipta prostrata (L.) L. | 52 | Enicostemma hyssopifolium (Willd.) Verd. |
| 53 | Euphorbia hirta L. | 54 | Euphorbia neriifolia L. |
| 55 | Evolvulus alsinoides (L.) L. | 56 | Ficus benghalensis L. |
| 57 | Ficus religiosa L. | 58 | Flacourtia indica (Burm.f.) Merr. |
| 59 | Gardenia resinifera Roth | 60 | Garuga pinnata Roxb. |
| 61 | Glossocardia bosvallea (L.f.) DC. | 62 | Gmelina arborea Roxb. |
| 63 | Holoptelea integrifolia Planch. | 64 | Hybanthus enneaspermus (L.) F.V.Muell. |
| 65 | Indigofera tinctoria L. | 66 | Ipomoea pes-tigridis L. |
| 67 | Justicia adhatoda L | 68 | Lannea coromandelica (Houtt.) Merr. |
| 69 | Lawsonia inermis L. | 70 | Leucas aspera (Willd.) Link |
| 71 | Madhuca longifolia var. latifolia | 72 | Merremia tridentata (L.) Hall.f. |
| 73 | Mimosa pudica L. | 74 | Mollugo pentaphylla L. |
| 75 | Morinda citrifolia Trin. | 76 | Morinda coreia Buch.-Ham |

| | | | |
|---|---|---|---|
| 77 | Nyctanthes arbor-tristis L. | 78 | Ocimum americanum L. |
| 79 | Ocimum basilicum L. | 80 | Ocimum gratissimum L. |
| 81 | Ocimum sanctum L. | 82 | Oldenlandia corymbosa L. |
| 83 | Oroxylum indicum L. | 84 | Pavonia odorata Willd. |
| 85 | Pavonia zeylanica (L.) Cav. | 86 | Phyllanthus amarus Schum. & Thonn. |
| 87 | Phyllanthus debilis Klein ex Willd. | 88 | Phyllanthus emblica L. |
| 89 | Phyllanthus maderaspatensis L. | 90 | Phyllanthus virgatus G. Forster |
| 91 | Pongamia pinnata (L.) Pierre | 92 | Portulaca oleracea L. |
| 93 | Prosopis cineraria (L.) Druce | 94 | Pseudarthria viscida (L.) Wight. & Arn. |
| 95 | Pterocarpus marsupium Roxb. | 96 | Pterocarpus santalinus L.f. |
| 97 | Santalum album L. | 98 | Semecarpus anacardium L.f. |
| 99 | Sida acuta N. Burman | 100 | Sida cordifolia L. |
| 101 | Sida rhombifolia L. | 102 | Soymida febrifuga (Roxb.) A.Juss. |
| 103 | Sterculia urens Roxb. | 104 | Syzygium cumini (L.) Skeels |
| 105 | Tamarindus indica L. | 106 | Tephrosia purpurea (L.) Pers. |
| 107 | Vernonia cinerea (L.) Less. | 108 | Vitex negundo L. |
| 109 | Wrightia tinctoria R.Br. | 110 | Zanthoxylum rhetsa (Roxb.) DC. |
| 111 | Ziziphus mauritiana Lam. | 112 | Ziziphus xylopyrus (Retz.) Willd. |

## Species with High Trade Potential

Desk research on the above 112 species of Bidar division, documented during the surveys resulted in the identification of 58 highly traded species of the country, as per a national study organized by the NMPB. Raw materials arising out of the species, each, are traded with a volume of more than 100 Metric Tonnes, annually which includes species, trade name, parts traded and corresponding uses in traditional/otherwise manners by the local communities/trading are provided in **Tables-20,21and 22** for the divisions. The plants are also traded officially or smuggling to various drug industries

**Table-20: Highly Traded Medicinal Plants Found in Bidar**

| Sl.no | Botanical name | Trade name | Parts traded/used | Uses |
|---|---|---|---|---|
| 1. | Abrus precatorius | Chirmati, Gunja | Seed, Roots, Leaves | Seed -Alopecia, hair fall, skin diseases, cough, fever |
| 2. | Acacia catechu | Katha | Stem bark, Heartwood, Gum | Skin diseases, diabetes, cough, throat infection |
| 3. | Acacia nilotica | Babul | Stem bark, Gum, Fruit | Venereal diseases, nausea, burns and wounds, stomach-ache and diarrhoea. |
| 4. | Achyranthes aspera | Apamarga | Whole plant | Tumour, piles, fistula, stomach pain, wart, worms, skin disease |
| 5. | Aegle marmelos | Bael, Vilvam | Bark, Leaf, Fruit | Diarrhoea, dysentery, good for heart, diabetes, hypertension |
| 6. | Aerva lanata | Cheroola | Whole plant | Renal calculi, gall bladder stone, urinary tract infection |
| 7. | Albizia amara | Krishna sirish | Leaf | Anti-dote for poisonous bites, skin diseases, piles. Gonorrhoea, diarrhoea |

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| 8. | Alstonia scholaris | Saptaparna | Stem bark | Viral fever, malaria, skin disease, troubles in digestion, tumours, ulcers, asthma |
| 9. | Andrographis paniculata. | Kalmegh | Whole plant | All kinds of fever, liver disorder, skin diseases, |
| 10. | Anogeissus latifolia | Dhawada | Gum | Diarrhoea, bleeding piles, wound healing, swelling |
| 11. | Asparagus racemosus | Satavar | Tuberous root | Gynaecological disorders, induce lactation, to increase sperm count, backache, rejuvenator |
| 12. | Azadirachta indica | Neem, Nimba | Bark, Leaf, Flower, Fruit | Fever, skin diseases, wound healing, diabetes, liver disorder |
| 13. | Boswellia serrata | Guggul, Dupa | Gum-resin | Knee pain, cervical and lumbar spondylosis, asthma, inflammatory bowel disease |
| 14. | Buchanania lanzan | Chironji | Seed | Diarrhoea, skin disease, cough, asthma, Rejuvenator |
| 15. | Butea monosperma. | Palasa, Palash | Root, Bark, Gum, Flower, Seed | Renal calculi, Gall bladder stone, tumour, skin diseases |
| 16. | Careya arborea | Kumbhipoo | Stem bark, Fruit Flower, Leaves | Leaves-filaria, colic, loose motions and ulcers. Bark-antipyretic, abortifacient, antipruritic and in smallpox, urinary discharges and rheumatic pain. |
| 17. | Cassia absus | Chaksoo | Root, Seed | Good for eyes, diuretic, cathartic, liver and kidney diseases, reduce swelling and is effective in eye ailments. |
| 18. | Cassia fistula | Amalthas, Sonari | Bark, Flower, Fruit, Seed | Skin diseases, Constipation, Piles, fistula, fissure, jaundice, syphilis, diarrhoea |
| 19. | Cassia senna | Sonamukhi | Leaf, Fruit | Chronic constipation, Irritable bowel syndrome, haemorrhoids |
| 20. | Cassia tora | Chakoda, Pawad | Seed, Root | Leprosy, ringworm, itching and psoriasis, snakebites. Leaves balm for arthritis. |
| 21. | Celastrus paniculatus | Jyothismathi | Fruit, Seed | Oil-memory enhancer, nervine tonic, hair fall, |
| 22. | Curculigo orchioides | Kaali musali | Root | Aphrodisiac, Rejuvenator, |
| 23. | Cynodon dactylon | Karuka | Whole plant | Urinary tract infection, hyper lipidaemia, bleeding piles, uterine bleeding, |
| 24. | Desmodium gangeticum. | Saalaparni | Whole plant | Cough, diarrhoea, worm infestation, fever, |
| 25. | Eclipta prostrata | Bhringaraj | Whole plant | Hair tonic, greying of hairs, liver disorder, cough, asthma, skin disease |
| 26. | Ficus benghalensis | Vada, Peraal | Stem bark | Uterine disorder, skin diseases, wound healing, |
| 27. | Ficus religiosa | Asvattha | Stem bark, Leaf | Uterine disorder, skin diseases, wound healing, |
| 28. | Gardenia resinifera | Dikamali | Gum | Appetizer, astringent to bowels, relieves pain of bronchitis, vomiting and constipation |
| 29. | Gmelina arborea | Gamphari | Root | Fever, Anti-dote for poison, joint pain, uterine disorder, Urine infection, |

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|---|---|---|---|---|
| 30. | Holoptelea integrifolia | Cirabilva, Thapasi | Fruit, Stem bark | Inflammation, gastritis, dyspepsia, colic, intestinal worms, vomiting, wound healing, leprosy, diabetes, haemorrhoids, dysmenorrhea, and rheumatism |
| 31. | Indigofera tinctoria | Nili, Avuri | Whole plant | Greying of hairs, hair tonic, epilepsy, nervous disorders, asthma, bronchitis, fever, stomach pain, liver diseases, kidney and spleen diseases, skin conditions, wounds sores, haemorrhoids, gonorrhoea, syphilis, snake bites, |
| 32. | Justicia adhatoda | Adusa, Vasa | Leaf | Asthma, cough, cold, fever, skin disease, liver disorder |
| 33. | Lannea coromandelica | Jingini | Stem bark | Leaf paste is applied -sprains and elephantiasis. Boiled leaves are applied-swellings and body pains. The juice of bark and leaves is applied-ulcers and swellings. |
| 34. | Lawsonia inermis | Henna, Mehndi | Leaf | Greying of hairs, hair tonic, skin diseases, improve haemoglobin, reduce burning sensation- palm, foot, head, eyes |
| 35. | Madhuca longifolia | Mahua phul | Flower, oil | Oil Emollient, Skin Disease, Rheumatism, Headache, laxative, Piles, Haemorrhoids, Emetics, Anti Earth worm. enzyma, Wound Healing, Anti Burns, Bone Fractur |
| 36. | Merremia tridentata | Prasarani | Whole plant | Astringent, aphrodisiac, laxative and bitter properties. Aerial parts-haemorrhoids, swellings, rheumatic affections and urinary infections |
| 37. | Morinda coreia | Manjanathi | Root | Bark is tonic, astringent, febrifuge and antiseptic. Skin lesions, ulcers, wounds and urinary diseases |
| 38. | Ocimum americanum | Ban Tulasi | Whole plant, Leaf, Flower, Seed | Leaves: useful in helminthiasis, anorexia, dyspepsia, flatulence, dysentery, leprosy, pruritus, parasitic, vomiting, poisonous affections, haemoptysis, strangury, migraine, malaria and fever. Seeds: useful in hyperdipsia, malaria, migraine and emaciation |
| 39. | Ocimum basilicum | Kaali Tulasi | Whole plant, Seed | Cough cold fever, improve immunity, headaches, diarrhoea, constipation, warts, worms, and kidney malfunctions. **Immunity.** |
| 40. | Ocimum sanctum | Krishna Tulasi | Whole plant, Seed | Cough cold fever, improve immunity bronchitis, malaria, diarrhoea, dysentery, skin disease, arthritis, eye diseases, insect bites , **immune boosting** |
| 41. | Oldenlandia corymbosa | Parppada | Whole plant | Remove toxins, blood circulation, promote diuresis and relieve stranguries. It is also active against appendicitis, hepatitis, pneumonia, cholecystitis, urinary infection, cellulites and snake bite. Fever, |
| 42. | Oroxylum indicum | Syonaka | Root, Stem bark | Astringent to bowels, cooling, aphrodisiac, tonic, increases appetite, biliousness, fevers, bronchitis, intestinal worms, vomiting, dysentery, leukoderma, asthma, inflammation, |
| 43. | Phyllanthus amarus | Bhumiamla, Nelanelli | Whole plant | Jaundice, skin diseases, stomach, genitourinary system, liver, kidney and spleen. Stomachic, diuretic, febrifuge and antiseptic. Gonorrhoea, menorrhagia and other genital affection |

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|---|---|---|---|---|
| 44. | Phyllanthus emblica | Amla | Fruit | Rejuvenator, good for eyes, hair tonic, diabetes, hyper lipidaemia, jaundice, diarrhoea, |
| 45. | Pongamia pinnata | Karanji, Honge | Leaf, Root, Fruit, Stem bark, Seed | Tumours, piles, skin diseases, and ulcers, gonorrhoea, cleaning gums, teeth, and ulcers, and is used in vaginal and skin diseases |
| 46. | Pseudarthria viscida | Moovila | Leaf, Root | Asthma, nervous dysfunction |
| 47. | Pterocarpus marsupium | Asana | Heart wood, Resin | Diabetes, Skin disease, bleeding gums, toothache, |
| 48. | Pterocarpus santalinus | Raktachandana | Heart wood | Antipyretic, anti-inflammatory, anthelmintic, tonic, haemorrhage, dysentery, aphrodisiac, anti-hyperglycaemic and diaphoretic |
| 49. | Santalum album | Chandan | Heartwood, Root | Common colds, bronchitis, skin disorders, heart ailments, general weakness, fever, infection of the urinary tract, inflammation of the mouth and pharynx, liver and gallbladder complaints and other maladies |
| 50. | Semecarpus anacardium | Bilawa | Root, Fruit | Good for male and female reproductive systems, good for heart, improve sperm count, sexual power, good for cardiac debility. |
| 51. | Sida rhombifolia | Bala, Maha bala | Root, Whole plant, Fruit | Leaves-relieve swelling, the fruits-relieve headache, the mucilage is used as an emollient, and the root is used to treat rheumatism. |
| 52. | Soymida febrifuga | Rohan | Fruit | Anti-aging, leucorrhoea and dysmenorrhoea, rheumatism swellings, arthritis, peptic ulcers, diarrhoea, dysentery, fever and as enemata |
| 53. | Sterculia urens | Karaya | Gum | Bulk-forming laxative to relieve constipation, increase sexual desire, |
| 54. | Tephrosia purpurea | Sarpankha, Kolinji | Leaf, Root, Fruit | Anthelmintic, alexiteric, restorative, and antipyretic. Prosy, ulcers, asthma, and tumours, as well as diseases of the liver, spleen, heart, and blood |
| 55. | Vitex negundo | Neergundi | Leaf, Root, Fruit | Anti-inflammatory, expectorant, tranquilizer, antispasmodic, anti-convulsant, rejuvenates, anti-arthritic, anthelminthic, anti-fungal and antipyretic |
| 56. | Wrightia tinctoria | Kutaja | Leaf, Bark, Seed | Diarrhoea and Blood Pressure. It is good for Urinary Problems, Rheumatoid Arthritis, Psoriasis and Osteoarthritis. The bark of the plant is used for treating diarrhoea, Piles and Skin diseases like Ringworm, Leprosy |
| 57. | Ziziphus mauritiana | Ber | Fruit | Improve muscular strength and weight, for prevents liver and bladder diseases and stress ulcers, used as sedative, reduce constipation. |
| 58. | Ziziphus xylopyrus | Ghonta | Fruit | Urinary disorders, obesity, snake bite, insomnia and digestive disorders. Leaf paste topical application relives headache. |

**Table-21: Highly Traded Medicinal Plants Found in Vijayapura divisions**

| Sl. No | Botanical name | Trade name | Parts traded | Uses |
|---|---|---|---|---|
| 1. | Acacia nilotica | Babul | Bark, Gum, Fruit | Venereal diseases, nausea, burns and wounds, stomach-ache and diarrhoea. |
| 2. | Aegle marmelos | Bilva, Bael | Bark, Fruit, Leaf, | Diarrhoea, dysentery, good for heart, diabetes, hypertension |
| 3. | Albizia amara | Krishna sirish | Leaf | Anti-dote for poisonous bites, skin diseases, piles. Gonorrhoea, diarrhoea |
| 4. | Azadirachta indica . | Neem, Nimba | Bark, Flower, Fruit, Leaf, Seed | Fever, skin diseases, wound healing, diabetes, liver disorder |
| 5. | Cassia fistula | Amalthas, Sonari | Bark, Flower, Fruit, Seed | Skin diseases, Constipation, Piles, fistula, fissure, jaundice, syphilis, diarrhoea |
| 6. | Holoptelea integrifolia | Cirabilva, Thapasi | Fruit, Stem bark | Inflammation, gastritis, dyspepsia, colic, intestinal worms, vomiting, wound healing, leprosy, diabetes, haemorrhoids, dysmenorrhea and rheumatism. |
| 7. | Merremia tridentata | Prasarini | Whole plant | Astringent, aphrodisiac, laxative and bitter properties. Aerial parts-haemorrhoids, swellings, rheumatic affections and urinary infections |
| 8. | Morinda pubescens. | Manjanaathi | Root | Ulcer, glandular swellings, digestive disorders especially in children, in venereal diseases, rheumatic disease, dysentery, Antioxidant, cytotoxic activities, anticancer activity, anti- plasmodial activity. |
| 9. | Ocimum sanctum L. | Tulasi | Leaf, Seed, Whole plant | Cough cold fever, improve immunity bronchitis, malaria, diarrhoea, dysentery, skin disease, arthritis, eye diseases, insect bites , **immune boosting** |
| 10 | Oldenlandia corymbosa | Pitpapra | Whole plant | Remove toxins, blood circulation, promote diuresis and relieve stranguries. It is also active against appendicitis, hepatitis, pneumonia, cholecystitis, urinary infection, cellulites and snake bite. Fever |
| 11 | Phyllanthus emblica | Amla, Amalaki | Fruit | Rejuvenator, good for eyes, hair tonic, diabetes, hyper lipidaemia, jaundice, diarrhoea, |
| 12 | Pongamia pinnata | Karanji, Honge | Leaf, Root, Fruit, Stem bark, Seed | Tumours, piles, skin diseases, and ulcers, gonorrhoea, cleaning gums, teeth, and ulcers, and is used in vaginal and skin diseases |
| 13 | Solanum virginianum | Kantakari | Fruit, Root, Whole plant | Cough, chest pain, against vomiting, hair fall, leprosy, itching scabies, skin diseases and cardiac diseases associated with oedema. Roots decoction is used as fabrige, effective diuretic and expectorant |
| 14 | Tephrosia purpurea | Sarpankha | Whole plant | Anthelmintic, alexiteric, restorative, and antipyretic. Prosy, ulcers, asthma, and tumours, as well as diseases of the liver, spleen, heart, and blood |
| 15 | Tinospora cordifolia | Amritha balli | Stem | Diabetes, high cholesterol, allergic rhinitis (hay fever), stomach pain, gout, cancers, rheumatoid arthritis (RA), hepatitis, peptic ulcer disease (PUD), fever, gonorrhoea, syphilis and boost immune system. |
| 16 | Tribulus terrestris | Gokhru | Fruit | Enhance libido, urinary tract infection, reduce swelling. General health supplement, increase testosterone levels, renal calculi |
| 17 | Vitex negundo . | Neergundi | Leaf, Root, Fruit | Anti-inflammatory, expectorant, tranquilizer, antispasmodic, anti-convulsant, rejuvenate, anti-arthritic, anthelminthic, anti-fungal and antipyretic |

**Table-22: Highly Traded Medicinal Plants Found in Raichur division**

| Sl.no | Botanical name | Trade name | Parts traded | Uses |
|---|---|---|---|---|
| 1. | Abrus precatorius L. | Chirmati, Gunja | Root, Seed | Seed -Alopecia, Hair fall, Skin diseases, Root/leaves – Cough, Fever |
| 2. | Acacia catechu (L.f.) Willd | Katha | Stem bark, Heartwood, Gum | Skin diseases, diabetes, cough, throat infection |
| 3. | Acacia nilotica (L.) Delile | Babul | Stem bark, Gum, Fruit | Venereal diseases, nausea, burns and wounds, stomach-ache and diarrhoea. |
| 4. | Achyranthes aspera L. | Apamarga | Whole plant | Tumour, piles, fistula, stomach pain, wart, worms, skin disease |
| 5. | Aerva lanata (L.) Juss. Ex Schult. | Cheroola | Whole plant | Renal calculi, gall bladder stone, urinary tract infection |
| 6. | Albizia amara (Roxb.) Boivin | Krishna sirish | Leaf | Anti-dote for poisonous bites, skin diseases, piles. Gonorrhoea, diarrhoea |
| 7. | Aloe vera (L.) Burm.f. | Kumari | Leaf | Heals burns. Improves digestion, promotes oral health, clears acne, and relieves anal fissures. Uterine disorders. |
| 8. | Anogeissus latifolia (Roxb. Ex DC.) Wall. Ex Guill.& Perr. | Dhawada | Gum | Diarrhoea, bleeding piles, wound healing, swelling |
| 9. | Asparagus racemosus Willd. | Satavar | Tuberous root | Gynaecological disorders, induce lactation, to increase sperm count, backache, rejuvenator |
| 10. | Azadirachta indica A.Juss. | Neem, Nimba | Bark, Leaf, Flower, Fruit | Fever, skin diseases, wound healing, diabetes, liver disorder |
| 11. | Boerhavia diffusa L. | Rakta punarnnava | Root, Whole plant | Anti-diabetic, diuretic properties. Relives pain, anti-inflammation, and treating indigestion. |
| 12. | Butea monosperma (Lam.) Taub. | Palasa, Palash | Root, Bark, Gum, Flower, Seed | Renal calculi, Gall bladder stone, Tumor, skin diseases |
| 13. | Cassia fistula L. | Amalthas, Sonari | Bark, Flower, Fruit, Seed | Skin diseases, Constipation, Piles, fistula, fissure, jaundice, syphilis, diarrhoea |
| 14. | Cassia tora L. | Chakoda, Pawad | Seed, Root | Leprosy, ringworm, itching and psoriasis, snakebites. Leaves balm for arthritis. |
| 15. | Ficus benghalensis L. | Vada, Peraal | Stem bark | Uterine disorder, skin diseases, wound healing, |
| 16. | Ficus religiosa L. | Asvattha | Stem bark, Leaf | Uterine disorder, skin diseases, wound healing |
| 17. | Gymnema sylvestre (Retz.) R.Br. Ex Sm. | Madhunasini | Leaf | Reduce sugar level, reduce cholesterol-protect heart, improves digestion, helps in weight management. |
| 18. | Helicteres isora L. | Marodphali | Fruit | Treat snake bite, diarrhoea/dysentery and constipation of new born baby. Improves digestion, abdominal colic, intestinal parasite, |
| 19. | Hemidesmus indicus (L.) R.Br. Ex Schult | Ananthamul, Sweta sariwa | Root | Fever, bronchitis, peptic ulcer, skin diseases, liver diseases, piles, leukorrhea, syphilis, purities, urinary infection |
| 20. | Holoptelea integrifolia Planch. | Cirabilva, Thapasi | Fruit, Stem bark | Inflammation, gastritis, dyspepsia, colic, intestinal worms, vomiting, wound healing, leprosy, diabetes, haemorrhoids, dysmenorrhea, and rheumatism |

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| 21. | Merremia tridentata (L.) Hall.f. | Prasarani | Whole plant | Astringent, aphrodisiac, laxative and bitter properties. Aerial parts-haemorrhoids, swellings, rheumatic affections and urinary infections |
| 22. | Mesua ferrea L. | Nagakesar | Flower | Leprosy, itching, erysipelas, scabies, wounds and excessive sweating. Dried flowers are used in dysentery, uterine bleeding, bleeding piles. Oil from the seeds of this tree used in treating sores and rheumatism. |
| 23. | Morinda coreia Buch.-Ham | Manjanathi | Root | Bark is tonic, astringent, febrifuge and antiseptic. Skin lesions, ulcers, wounds and urinary diseases |
| 24. | Ocimum americanum L. | Ban Tulasi | Whole plant, Leaf, Flower, Seed | Leaves: useful in helminthiasis, anorexia, dyspepsia, flatulence, dysentery, leprosy, pruritus, parasitic, vomiting, poisonous affections, haemoptysis, strangury, migraine, malaria and fever. Seeds: useful in hyperdipsia, malaria, migraine and emaciation, **Immunity.** |
| 25. | Ocimum sanctum L. | Krishnatulasi | Whole plant, Seed | Cough cold fever, improve immunity bronchitis, malaria, diarrhoea, dysentery, skin disease, arthritis, eye diseases, insect bites, **immune boosting** |
| 26. | Oldenlandia corymbosa L. | Parppada | Whole plant | Remove toxins, blood circulation, promote diuresis and relieve stranguries. It is also active against appendicitis, hepatitis, pneumonia, cholecystitis, urinary infection, cellulites and snake bite. Fever, |
| 27. | Phyllanthus amarus Schum. & Thonn. | Bhumiamla, Nelanelli | Whole plant | Jaundice, skin diseases, stomach, genitourinary system, liver, kidney and spleen. Stomachic, diuretic, febrifuge and antiseptic. Gonorrhoea, menorrhagia and other genital affection |
| 28. | Pongamia pinnata (L.) Pierre | Karanji, Honge | Leaf, Root, Fruit, Stem bark, Seed | Tumors, piles, skin diseases, and ulcers, gonorrhoea, cleaning gums, teeth, and ulcers, and is used in vaginal and skin diseases |
| 29. | Santalum album L. | Chandan | Heartwood, Root | Common colds, bronchitis, skin disorders, heart ailments, general weakness, fever, infection of the urinary tract, inflammation of the mouth and pharynx, liver and gallbladder complaints and other maladies |
| 30. | Sida rhombifolia L. | Bala, Maha bala | Root, Whole plant, Fruit | Leaves-relieve swelling, the fruits-relieve headache, the mucilage is used as an emollient, and the root is used to treat rheumatism. |
| 31. | Solanum anguivi Lam. | Brhati | Fruit, Root | Fruit-vegetable, reduce blood pressure<br>Root- Cough, asthma toothache, |
| 32. | Solanum virginianum L | Kantakari | Root, Whole plant, Fruit | Cough, chest pain, vomiting, hair fall, leprosy, itching scabies, skin diseases and cardiac edema, Roots decoction – fever, as diuretic and expectorant |
| 33. | Strychnos potatorum L. F. | Nirmali | Fruit, Seed | Gonorrhoea, leukorrhea gastropathy, bronchitis, chronic diarrhoea, dysentery, renal and vesicle calculi, diabetes, conjunctivitis, scleritis, ulcers and other eye disease. Neurological disorder |
| 34. | Tephrosia purpurea (L.) Pers. | Sarpankha, Kolinji | Leaf, Root, Fruit | Anthelmintic, alexiteric, restorative, and antipyretic. Prosy, ulcers, asthma, and tumours, as well as diseases of the liver, spleen, heart, and blood |

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|---|---|---|---|---|
| 35. | Tinospora cordifolia (Willd.) Miers | Amruthu balli, Guduchi | Stem | Diabetes, high cholesterol, allergic rhinitis (hay fever), stomach pain, gout, cancers, rheumatoid arthritis (RA), hepatitis, peptic ulcer disease (PUD), fever, gonorrhoea, syphilis and boost immune system. |
| 36. | Tribulus terrestris L. | Gokhru | Fruit, Root | Enhance libido, urinary tract infection, reduce swelling. General health supplement, increase testosterone levels, renal calculi |
| 37. | Vitex negundo L. | Neergundi | Leaf, Root, Fruit | Anti-inflammatory, expectorant, tranquilizer, antispasmodic, anti-convulsant, rejuvenates, anti-arthritic, anthelminthic, anti-fungal and antipyretic |
| 38. | Wrightia tinctoria R.Br. | Kutaja | Leaf, Bark, Seed | Bloody diarrhoea, bleeding piles and Skin diseases |
| 39. | Ziziphus mauritiana Lam. | Ber | Fruit | Improve muscular strength and weight, for prevents liver and bladder diseases and stress ulcers, used as sedative, reduce constipation. |
| 40. | Ziziphus xylopyrus (Retz.) Willd. | Ghonta | Fruit | Urinary disorders, obesity, snake bite, insomnia and digestive disorders. Leaf paste topical application relives headache. |

## Rough Quantification/Assessment Of Some High Medicinal Value Species In The Divisions

### *Bidar Division*

The exploration had resulted in the estimation on current stock and prediction of population of many highly traded medicinal species in the forests of north-eastern Karnataka. Around 20 lakhs of plants belonged to two tree species, accepted as sources of 'katha' of Indian herbal sector had been estimated through the surveys. Of them, *Acacia chundra* has the maximum of 17,16,374 individuals. The other 'katha' source, *Acacia catechu* has 3,00,878 individual plants.

18,83,77,012 plants of *Andrographis paniculata* (Burm.f.) Nees, source of 'kalmegh' have been reported during the surveys. Annually 2000 to 5000 Metric Tonnes (MT) of the species is being traded in India. 'Satavar' is a highly traded raw drug as per a country level study organized by the NMPB during 2006-2007 periods. 19,35,840 plants belong to its authentic source, *Asparagus racemosa,* have been reported from the FD. It is estimated that 3000 to 5000 MT of its tubers are traded across Indian markets annually.

2000 to 5000 MT of raw materials of 'neem' source (*Azadirachta indica* of Meliaceae) are being traded annually in the country. 48,87,362 plants of 'neem' have been recorded during the surveys. *Buchanania lanzan,* a tree species of Anacardiaceae family, is the source of 'chironji' which is traded in the range of 5000 to 10000 MT per year. The assessment shows that 17,59,996 plants of the species are existing in the forest. Due to its high trade value, the Division has to be proud of this species.

51,02,23,534 plants belong to 'chakoda' (*Cassia tora*) are also recorded from the Bidar FD. The annual volume of trade of 'chakoda' ranges from 5000 to 10000 MT. 'Kaali musali' is one of the highly traded herbal drugs with an estimated volume of 300-500 MT annually. Its source plant species, *Curculigo orchioides* of the Hypoxidaceae, has a projected number of 724980 herbs in the Bidar FD. 95709 individuals belong to *Gardenia resinifera* correlated with a highly traded 'dikamali' of Indian markets are enumerated from here.

'Tulsi' (*Ocimum sanctum*) is worshipped as sacred since time immemorial by the Hindus and used as a popular remedy for cold and fever. The present surveys had resulted in the projection of 1,17,08,444 plants from the locality. The assessment has significance due to the demand in the herbal sector which requires 2000 to 5000 MT of the species, sourced mainly from cultivation.

37,85,52,343 plants belong to six species correlated to 'bhumi amalaki' are identified from the Bidar Division. Its annual turnover ranges between 2000 and 5000 MT. Of them, *Phyllanthus virgatus* has projected to be dominant with 189758786 herbs followed by *P.maderaspatensis* with 132764692 plants. *Phyllanthus amarus* has been estimated with 42999158 herbs while *P.debilis* has 11703049 plants. Two sources of 'bhumi amalaki' have been estimated with 10 lakhs of individual plants each. Of them, *P.urinaria* has 774658 individual herbs while *P.fraternus* has 552000 plants which is the least 'bhumi amalaki' source in the forest locality.

The authentic source of 'asana' (*Pterocarpus marsupium* of Fabaceae) has been estimated with 21,971 plants while the related 'rakta chandan' (*Pterocarpus santalinus*) has been projected with, 2333 plants. The latter is an IUCN listed threatened medicinal species. So, protection of it should be given priority by the Bidar Division.

*Sida rhombifolia* is the authentic source of 'mahabala' as per the API which is traded in the range of 5000-10000 MT among the herbal sector in the country. The assessment has resulted in the locating of 18,89,892 individual plants belongs to two subspecies. Of them, *Sida rhombifolia* ssp. *rhombifolia* is dominant with 1018402 plants while the other, *Sida rhombifolia* ssp. *alnifolia*, has 871490 plants, in Bidar Division. *Terminalia arjuna* of the Combretaceae family is the authentic source of 'arjun' in the Ayurveda, Sidha, Unani, and folk systems of medicine, in the country. The species has an estimated number of 72,317 plants, in the forest Division.

5,87,635 individual plants belonged to *Wrightia tinctoria* of Apocynaceae, accepted source of 'Indrajau'or 'kutaja' have been projected during the surveys. Around 5,67,194 plants belong to 'ber' (*Ziziphus mauritiana* of Rhamnaceae) have also been projected from the locality.

***Vijaypura Division***

The surveys had resulted in the estimation on current stock and prediction of future population of many highly traded species in the Division situated in the northern border of Karnataka. 8745 plants belong to the 'Babul' source, *Acacia nilotica,* are estimated to be growing in the area.

'Nimba' is a highly traded herbal according to a study of the NMPB during 2006-2007 periods. 28,052 individuals belong to its authentic source, *Azadirachta indica,* are projected to be growing in the FD. It is estimated that 3000 to 5000 Metric Tonnes (MT) of raw materials of them are being annually traded through Indian markets.

136,445 plants belong to *Merremia tridentata,* the authentic source of 'Prasarini' have been estimated from the Division. Annual turnover of its root was estimated between 100 and 200 MT and found to be increasing, in the last decade.

Indian herbal sector requires a volume of 2000 to 5000 MT of *Ocimum sanctum* annually. 29,882 plants belong to the species have been estimated from this Division. *Solanum virginianum* is the

authentic source of 'Kantakari' according to the API. The species got projected with 1,13,352 herbs, during the surveys. Its annual volume of trade ranges between 1000 and 2000 MT, in the country.

11,370 plants belong to the authentic source of 'guduci', *Tinospora cordifolia,* got estimated during the surveys. 3,43,647 plants of *Tribulus terrestris,* the authentic source of 'gokhru', an ingredient of 'Dasamula' drug are being projected from the Vijayapura Division.

**Raichur Division**

The surveys had resulted in the estimation on current stock and prediction of population of many highly traded medicinal species in the forests of north-eastern Karnataka. Around 13.44 lakhs of plants belonged to two tree species, accepted as sources of 'katha' of Indian herbal sector had been estimated through the surveys. Of them, *Acacia chundra* has the maximum of 13,35,000 individuals. The other 'katha' source, *Acacia catechu* has 8,822 individual plants.

'Satavar' is a highly traded raw drug as per a country level study organized by the NMPB during 2006-2007 periods. 27,45,443 plants belong to its authentic source, *Asparagus racemosus,* have been projected from the FD. It is estimated that 3000 to 5000 MT of its tubers are being traded across Indian markets annually.

2000 to 5000 MT of raw materials of 'neem' source (*Azadirachta indica* of Meliaceae) are being traded annually in the country. 7,21,561 plants of 'neem' have been projected during the surveys. 40,34,090 plants belong to 'chakoda' (*Cassia tora*) are also projected from the Raichur FD. The annual volume of trade of 'chakoda' ranges from 5000 to 10000 MT.

Accepted source of 'madhunasini' (*Gymnema sylvestre* of Asclepiadaceae) has been estimated with 2,37,165 climbers while the source of 'marodphali' (*Helicteres isora* of Sterculiaceae) has been projected with 3,82,394 plants, in the Division. An estimated 300 to 500 MT of 'marodphali' fruits are being traded annually in the country.

'Sariwa' (*Hemidesmus indicus*) is popularly used for making cool drinks in summer. It is taken as an ingredient in many formulations of the TSM in India. Annual turn over of 'sariwa' was estimated between 600 and 1000 MT in the last decade. The current assessment reveals that 9,56,876 individual climbers are existing in the forest which is a cause of pride of the Division.

'Tulsi' (*Ocimum sanctum*) is worshipped as sacred since time immemorial by the Hindus and used as a popular remedy for cold, fever and Immunity. The present surveys had resulted in the projection of 55,66,201 plants from the locality. The assessment has significance due to the demand in the herbal sector which requires 2000 to 5000 MT of the species, sourced mainly from cultivation. 2,69,71,180 plants belong to five species correlated to 'bhumi amalaki' are identified from the Raichur Division. Its annual turnover ranges between 2000 and 5000 MT. Of them, *Phyllanthus virgatus* has projected to be dominant with 1,36,04,004 herbs followed by *P.maderaspatensis* with 68,18,785 plants and *P.debilis* with 64,03,984 plants. Two sources of 'bhumi amalaki' have been estimated with 1 lakh individual plants each. Of them, *P.rheedii* has 76,346 herbs while *P.amarus* has 68,061 plants which is the least in the forest locality.

*Sida rhombifolia* is the authentic source of 'mahabala' as per the API which is traded in the range of 5000-10000 MT among the herbal sector in the country. The assessment has resulted in the locating of 68,061 individual plants.

1,94,208 climbers belong to *Tinospora cordifolia,* authentic source of 'guduci' have been identified while 17,76,998 individual plants belonged to *Wrightia tinctoria*, accepted source of 'Indrajau'or 'kutaja' have been projected during the surveys. Around 1.5 lakh of plants belong to 'ber' (*Ziziphus mauritiana* of Rhamnaceae) have also been projected from this forest.

In the survey, it is noted that the *Acacia chundra* and *Acacia catechu* used for 'katha' is found abundantly in the divisions. *Andrographis paniculata* which is a source of 'kalmegh' and *Asparagus racemosus* (Satavar) are also found in plenty. Furthre, the trees of *Azadirachta indica* of Meliaceae and *Buchanania lanzan* (chironji) of Anacardiaceae are widely found in the districts. The other highly traded species found in the divisions are *Cassia tora* (chakoda), *Curculigo orchioides* (Kaali musali) of *Hypoxidaceae*, *Gardenia resinifera* (dikamali), *Ocimum sanctum* (Tulsi), all the six species of bhumi amalaki i.e *Phyllanthus virgatus, Phyllanthus maderaspatensis, Phyllanthus amarus*, *Phyllanthus debilis, Phyllanthus urinaria* and *Phyllanthus fraternus; Pterocarpus marsupium* (asana) of Fabaceae*, Pterocarpus santalinus* (rakta chandan);

*Sida rhombifolia* (mahabala), *Terminalia arjuna* (arjun) of Combretaceae; *Wrightia tinctoria* (indrajau or kutaja) of Apocynaceae, *Ziziphus mauritiana* (ber) of *Rhamnaceae; Gymnema sylvestre* (madhunasini) of Asclepiadaceae, *Helicteres isora* (marodphali) of Sterculiaceae, *Hemidesmus indicus* (Sariwa), *Tinospora cordifolia* (guduci); *Merremia tridentate* (Prasarini), *Solanum virginianum* (Kantakari), *Tribulus terrestris* (gokhru) an ingredient of 'Dasamula' drug are found in traded quantity. *Paramayya Mathad 2009, Vijay Danapur etal 2018, Sidanand Vitthal Kambhar 2014.*

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