

## Database Design for Agro Biodiversity Resources of Andhra Pradesh and Telangana

M. Balakrishnan<sup>1</sup>, S.K. Soam<sup>2</sup> and P.D. Sreekanth<sup>3</sup>

**Abstract:** The main aim of the study is to develop a knowledge management portal for the agricultural biodiversity of Andhra Pradesh and Telangana. These states are the central region of the Indian subcontinent has some representatives of the biological wealth of India. Its varied topography from the hilly ranges of the Eastern Ghats, the Nallamalais to the shores of Bay of Bengal, support varied vegetation types enriched by a variety of flora and fauna. AP and Telangana is a virtual bio reserve, which is unique both in terms of biodiversity and abundance. A constant refrain heard in Andhra Pradesh is that the state is the Annapurna, the Rice Bowl of the South. What is never said is that apart from the crop species called rice, Andhra Pradesh and Telangana are home to at least eight species of millets, 12 species of pulses, six species of oilseeds each one of them sporting dozens of varieties. Besides these, the states grows dozens of species of spices, and hundreds of species of vegetables. In this study the Primary and secondary data collected from Farmers, Department of Agriculture, AP, ANGRAU, NBPGR Reports, NBA Reports, ICAR Institute report, AICRP Reports and other published data. It contains description and basic set of information related to agro biodiversity resources related information like such as plant species, common name, scientific name, habitat, distributions, flowering time, seed traits, and economic importance of crops in Andhra Pradesh and Telangana periodicals and governmental websites. The Portal was developed using Drupal and MYSQL, which provides information resources on Agro biodiversity of AP and TS like Cereal crops, fruits, vegetables, spices, medicinal plants etc. It is concluded that, the Portal is user friendly and browser compatible to Mobiles, tablets, iPad etc. and also it provides all the information about Agro Biodiversity of the AP and TS states which will be resource base for the end user viz. researcher, academician and policymakers.

**Keywords:** Agro Biodiversity, My-SQL, Drupal, Cereals, Minor Millets.

### INTRODUCTION

Agricultural biodiversity can provide sustainable solutions to hunger, poverty and environmental degradation for smallholder farmers communities around all the states of India, and can also help them cope with the effects of climate change (Soam, S.K and M. Balakrishnan 2015). For small farmers to benefit from this vital resource and to thrive under changing and unpredictable conditions, so we need to collect, organize and provide access to information on the diversity of crops that exists on farms, in the wild and in gene banks. Currently,

much of this valuable information is dispersed and continually evolving in farmers' fields or local forests. Approaches to harness such dispersed information must be dynamic, mobile, location specific, and must leverage the best of advanced Computer methodology and tools. Rapid evolution in informatics provides exciting new opportunities for cost-effective interventions to collect organize and provide access to information on the diversity of crops, varieties.

The knowledge gathered over several generations by farmers, no less than then

<sup>1</sup> Senior Scientist, ICM Division, ICAR-NAARM, Hyderabad-500030. E-mail: balakrishnan@naarm.ernet.in

<sup>2</sup> Head, ICM Division, ICAR-NAARM, Hyderabad-500030. E-mail: soam@naarm.ernet.in

<sup>3</sup> Senior Scientist, ICM Division, ICAR-NAARM Hyderabad-500030. E-mail: sreekanth@naarm.ernet.in

information gathered over decades by researchers in agricultural biodiversity, is essential to improving conservation management and use in the future. This research topic processes and makes the information. The documentation of agricultural biodiversity Informatics research is used to improve the availability of agricultural biodiversity resources through the creation of innovative decision support system and networks. The role of communities in supplying their own indigenous knowledge and in being given access to the Indigenous knowledge of other communities will also be central to this research topic. Documenting traditional knowledge in databases and registries of various kinds provides the potential to protect claims. This research will facilitate decision-making by individual, government and multilateral stakeholders relating to the conservation and sharing of valuable genetic resources and allow smallholder farmers to access agricultural and forest biodiversity to enhance livelihoods and agricultural sustainability.

Traditional Agricultural crop diversity plays an important role for the sustenance of human life. These diverse crop groups and varieties play key role of the main components of sustainable development. Besides the known 500 tribal communities, 227 ethnic groups and 5000 forest villages, vast crop wealth is also being maintained by numerous unknown local communities in a traditional way in the India. These local varieties have become the integral part of socio-economy and cultural values of the local communities. Growing a large number of crops and their varieties by an individual farmer is considered a symbol of respect in that region. Traditional practices was propagated based on the intimate knowledge was prevalent in ancient India followed by the varieties choice (Sarawgi and Rastigi, 2000). In many parts of the country, varieties are being chosen for needs and not for the yields alone. They were chosen for their ability to withstand drought, flood, resistance to pests, resistance to diseases, toleration to salinity, time of maturity; size, colour, aroma, taste, keeping qualities of the grain, nutritional values etc (Patil *et al.*, 2009). A number of crops have been introduced in this region by early settlers. The introduction of new crops has created a huge diversity in crop plants, maintained through a variety of crop

compositions, supported by enormous variations in the edaphic, topographic and climatic conditions. Farming communities in the interior localities are completely dependent on local farmer named cultivars, which are also suitable for their environmental, socio-economic and ethnic requirements (Mehta *et. al.*, 2008). Many traditional agro-ecosystems are located in centers of crop diversity, thus containing populations of variable and adapted land races as well as wild and weedy relatives of crops. Clawson (1985), describes several systems in which tropical farmers grow multiple varieties of each crop, providing both intra-specific and inter-specific diversity, thus enhancing the harvest security. Farmers maintain a large number of crops and their varieties without mixture. Farmer's varieties include crop population, which farmers have identified and named as units (Lando and Mark, 1994). The changing food habitats in rural areas forced them to concentrate low on local traditional landraces. The age of old varieties of crop plants and their technologies are not in use since long time.

Andhra Pradesh and Telangana states are one of the agro-climatically important states in the country with nearly 128 local communities engaging in the traditional cultivation practices. Based on monsoons and availability of water from man-made sources, farmers of Andhra Pradesh grow and maintain more number of crops including the plantations crops and maintain in three cropping seasons (kharif, rabi and summer). A steady shift from traditional agro-ecosystem to modern agro-ecosystem because of edaphic, topographic and climatic factors coupled with the tremendous selection pressure over centuries old cultivation system resulted into immense variations in traditional varieties suited to a particular area (Arora and Nayar, 1984). Andhra Pradesh and Telangana states are the traditional farmers or indigenous people have played an important role on preserving genetic variability. Traditional ecosystems, such as home gardens, are essentially in situ reservoirs of genetic diversity. A considerable proportion of the remaining natural habitats and biodiversity reserves are in indigenous lands. The traditional crops such as minor millets, coarse cereal grains are occupy less area of cultivation; productivity is also less compare

to other crops. However, all the published information is in scattered form and accessing this information is difficult due to its present form in hard copy. Huge collection of information on agro biodiversity has already been generated by several research workers in AP. The collection of all these scattered information and compilation in the form of database would be beneficial for the researchers, policy makers and students in future. Hence, in order to achieve the above said, a study on development of database on agro biodiversity of Andhra Pradesh and Telangana. A database contains description and basic set of information related to Agricultural crop diversity resources related information like such as phylum, class, tribe, order, common name, scientific name, habitat, distributions, telugu name, seed traits, and economic importance cultivable crops in AP and Telangana and collection of data on crops grown, source of irrigation, yield particulars, input use, cropping pattern, incidence of pests and diseases, employment pattern, constraints faced, etc.

## **MATERIALS AND METHODS**

The extensive survey and development of portal was conducted during April 2015 March 2016 in AP and Telangana. The Primary and Secondary data collected from Farmers, Department of Agriculture, AP, ANGRAU, NBPGR Reports, NBA Reports, ICAR Institute report, AICRP Reports and other published data. The information collected was cross checked and authenticated with the primary and secondary data in this survey of all the description and basic set of information like such as phylum, class, tribe, order, common name, scientific name, habitat, distributions, telugu name, seed traits, and economic importance cultivable crops in AP and Telangana related to Agricultural crop diversity resources. The Portal was developed using Drupal and MYSQL

## **RESULT AND DISCUSSION**

The Portal development was aimed at developing the website-AKMP-Agro Biodiversity Knowledge Management Portal. The portal will prove to be a databank of agricultural Biodiversity resources of AP and Telangana States and will contain

information like such as phylum, class, tribe, order, common name, scientific name, habitat, distributions, telugu name, seed traits, and economic importance cultivable crops in AP and Telangana and collection of data on crops grown, source of irrigation, yield particulars, input use, cropping pattern, incidence of pests and diseases, employment pattern, constraints faced, etc., The AKMP is rich in information. The AKMP will provide the administrator user to create users with permissions to access and upload the data of their respective area of work. The data flow diagram of the AKMP is shown in (figure 1)

The Portal is targeted to a wide range of user which includes department of State Biodiversity Board and Line Departments of AP and TS states Services, policy makers, Scientists, researchers and public.

The Portal is designed in Drupal and My-SQL at the backend and the interface is created using PHP in HTML format. The webpage interface is interactive and is designed keeping general public in mind for easy access of their desired data. The database is very rich and up-to-date with information from latest state wise statistical census and other data from line departments, IIMR, IIRR, ANGRAU and other State Biodiversity Board. The details of the information contains in the portal is shown in the following figure (1-5).

The database page provides general information, agricultural biodiversity resource information and research and publication. To access and upload the information in the database, one needs to login to the portal. The username and password will be provided by the administrator on request for access and upload their data. Once the data uploaded to the portal it will be go to the administrator for the approval after approval the information will be displayed and it will added to the databases and it can be access by any one. In AP the cultivated crop plant species caused in growth of 140 species belonging to 132 genera and 46 families. Species belonging to crop groups namely vegetables, fruits and commercial crops dominated the collection. Species richness was predominant in cultivated crops like Cereals 4 species, Millets 9 species, Pulses 10 species, Oil seeds 7 species,

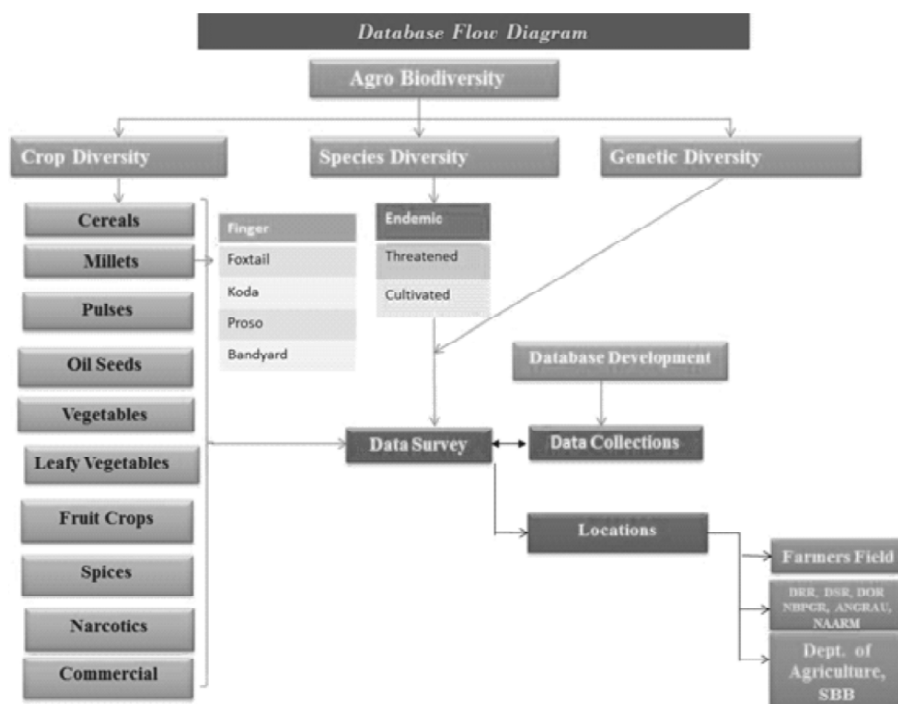


Figure 1: Data flow diagram of AKMP



Figure 2: Home page for the AKMP

Narcotics 2 species, Spices 12 species, vegetable crops 31 species, Fruit crops 25 species, commercial crops 23 species and Leafy vegetables 12 species. Angiosperms. Of the 2601 angiosperms, 531 are tree taxa representing, 245 shrubs and 290 climbers. Of

these dicotyledons comprise 1972 species and monocots 674 species have been included in this database. So far the database contains more than 3500 records and the details such as endemic species, threatened species, cultivated crop species and

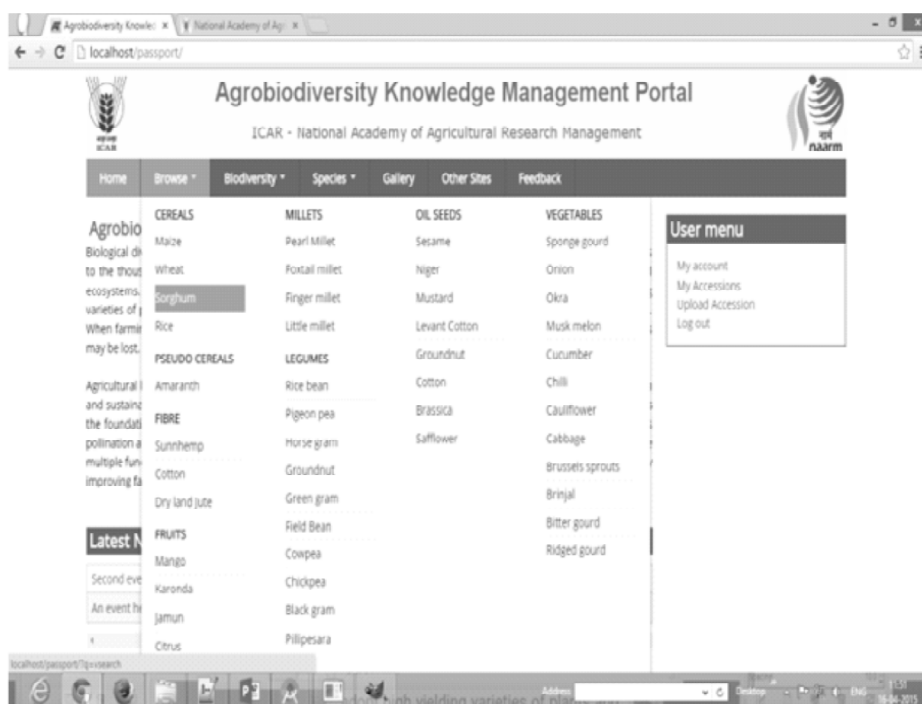


Figure 3: Mega Menu used for the AKMP

| Botanical Name             | Crop group | Family        | Telugu Name      | Common name   | Coastal Andhra                      | Telangana                           | Rayalaseema                         |
|----------------------------|------------|---------------|------------------|---------------|-------------------------------------|-------------------------------------|-------------------------------------|
| Trichosanthis anguina L.   | Vegetables | Cucurbitaceae | Potakaya         | Snake gourd   | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Borassus flabellifer Linn. | Fruits     | Arecaceae     | Taali, Taadi     | Palmyra palm  | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Carica papaya L.           | Fruits     | Caricaceae    | Boppayi, Pappayi | Papaya        | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Cucumis melo L.            | FRUITS     | Cucurbitaceae | Karbuja          | Musk melon    | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Citrus vulgaris            | Fruits     | Cucurbitaceae | Puchakaya        | Water melon   | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Citrus lemon (L.) Burm. f. | Fruits     | Rutaceae      | Nimma            | Lemon         | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Citrus maxima Merr.        | Fruits     | Rutaceae      | Pampara panasa   | Pomelo        | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Citrus medica L.           | Fruits     | Rutaceae      | Madeephalam      | Citron        | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Citrus aurantium L.        | Fruits     | Rutaceae      | Dabbkaya.        | Bitter orange | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |

Figure 4: Cultivated crop species of AP and Telangana states

passport information for sorghum and minor millets. It is needless to state that agricultural biodiversity resources play an essential role in agricultural economy of our nation. Agricultural products have a vital place in the list of essential

commodities in the day to day life of a common man (balakrishnan *et. al.*, 2009). We need to tap this potential resource to our benefit. This Portal can contribute and document all information of endemic and crop biodiversity resources present in the three

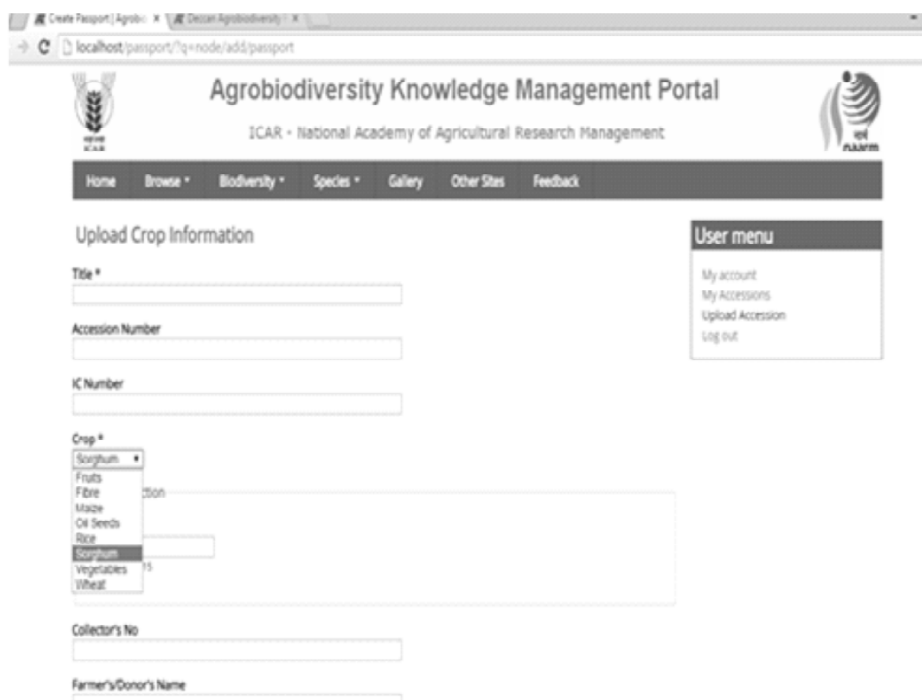


Figure 5: Data Entry sheet for upload the Crop information through online Photo Gallery



Figure 6: Photo gallery of the Agrobiodiversity resources

agrobiodiversity regions of Andhra Pradesh and Telangana and help prosperity. Database for Agrobiodiversity resources of AP and Telangana has been developed with an aim of providing technical information to the researchers. This portal would facilitate effective utilization of agro biodiversity.

Most of the world population depends on genetic, species, ecosystem and agriculture biodiversity. It is concluded that this Portal can contribute and document all information of endemic and crop biodiversity resources of Andhra Pradesh and Telangana and help prosperity. Database for Agrobiodiversity resources of AP and Telangana

has been developed with an aim of providing technical information to the researchers. This database provides a common platform for the entire information and user-friendly database. This portal would be updated on a regular basis, so that it could provide status about the agrobiodiversity resources, which could be useful to scientists, research scholars, researcher, academician and policymakers.

### References

- Arora RK and ER Nayar (1984), *Wild Relatives of Crop Plants in India*. Sci. Monograph. No.7. National Bureau of Plant Genetic Resources, New Delhi, p 90.
- Balakrishnan, M., S. Jeyakumar, R.C Srivastava, T. Sujatha and Mayank Pokhriyal (2009), Database design for animal genetic resources of Andaman and Nicobar Islands, *Indian Journal of Animal Sciences*, 79(6): 100-105.
- Clawson DL (1985), Harvest security and intra-specific diversity in traditional tropical agriculture. *Econ. Bot.* 39: 56-67.
- Lando RP and Mark (1994), Rainfed low land rice in Cambodia: A base line study; IRRI Research Paper series 152, Manda, The Philippines.
- Mehta PS, KS Negi and AK Sharma (2008), Traditional rice landraces of district Bageshwar, Uttarakhand and their conservation. *Indian J. Plant Genet. Resour.* 21(1): 55-59.
- Patil PV, PB Kamble and DK Kulkarni (2009), Role of traditional crops and varieties to mitigate emerging climate change on agriculture - A case study from Bhor region, Maharashtra. *Indian J. Plant Genet. Resour.* 22(1):76-79.
- Sarawgi AK and NK Rastogi (2000), Genetic diversity in traditional aromatic rice accessions from Madhya Pradesh. *Indian J. Plant Genet. Resour.* 13(2): 138-146.
- Soam, S.K and M. Balakrishnan (2015), Agro biodiversity and Sustainable rural Development Book (Eds.S.K.Soam and M.Balakrishnan) Published by New India Publisher New Delhi, (ISBN 978-93-833-05-89-6): 1-300.