

## MANAGING OF PLANT GENETIC RESOURCES IN RAJASTHAN

R. V. MAHESHWARI AND D. K. YADAVA, Agricultural Research Station, (Rajasthan Agricultural University), Sriganganagar 335 001 (Rajasthan)

Rajasthan being very diverse in relation to agroclimatic conditions has been divided in nine agroclimatic zones and has a very rich diversity in mothbean, pearl millet, clusterbean, cowpea, sorghum, greengram, blackgram, sesame, brassicas etc. A great diversity has also been observed in chickpea, groundnut, cotton, tumba, cumin, coriander, fennel, fenugreek, chillies, medicinal plants and horticultural crops like ber, pomegranate, citrus, ker, salvadora, karonda, *Prosopis* etc.

**Key words:** Plant genetic resources, management, diversity

Some efforts have been made for the collection of germplasm by Rajasthan Agricultural University and the NBPGR but still major areas remains unexplored for various important crops. Explorations need to be conducted for exploiting the biological diversity in Rajasthan for pulses, oilseeds, spices, medicinal plants in particular and fibre crops, wheat, barley, sorghum, maize and agri-horticultural crops in general. Special efforts are required to collect, identify and analyse chemically, number of wild medicinal plants which are being used in interiors by the *Adivasi* in southern part of Rajasthan and local habitat of Great Indian Thar Desert.

A germplasm repository is being established with the World Bank aid under Agricultural Development Project at University headquarters Bikaner. After establishment, the germplasm of various crops being maintained in various agro-climatic zones will be shifted to this unit. The facilities for long and short term conservation will consequently be developed and the value added genotypes of various crops will be registered at the NBPGR.

Rajasthan is situated in the North-western part of India located between 23°30' N and 30° 12' N latitude and 69° 30' E and 78° 17' E longitude. It is the second largest state in India with a geographical area of 3.42 lac km<sup>2</sup> and represents 10.4 per cent area of the country. The state has a great variability in relation to soils i.e. poor sand dunes to rich clay and loamy soils, rainfall 100 mm to 1000 mm per annum, temperature 0° to 49° C and topography gangetic plains to Aravali hill ranges. On the basis of soil types, rainfall distribution and other climatic components the state has been divided into nine agro-climatic zones viz. Arid Western Plain Zone, Irrigated North Western Plain Zone, Transitional Plain of Inland Drainage, Transitional Plain of Luni Basin, Semi Arid Eastern Plain Zone, Flood Prone Eastern Zone, Humid Southern Plain Zone, Humid South Eastern Plain Zone and Sub Humid Southern and Aravali Hills Zone. Rajasthan represents the three agroclimatic zones of the national level i.e. Agro-ecological Zone (2), Hot arid agro-ecological Zone (4) and Agro-ecological Zone (5) out of 20 agro-ecological zones (Sharma, 1998) divided on the basis of microclimate has

a very rich diversity in mothbean, pearl millet, clusterbean, cowpea, sorghum, greengram, blackgram, sesame, brassicas etc. A great diversity has also been observed in chickpea, groundnut, cotton, tumba, cumin, coriander, fennel, fenugreek, isabgol, chillies, medicinal plants and horticultural crops like ber, pomegranate, citrus, ker, salvadora, karonda, *Prosopis* etc. As no special efforts have been made to collect the variability from these crops hence in the present changing global trends it becomes imperative to complete this task for claiming our sovereign rights on the value added germplasm. Keeping the above points in view a case study on the plant genetic resources in Rajasthan has been carried out with the following objectives : (i) Current status of plant genetic resources in various agro-climatic zones of Rajasthan and (ii) Future plans for identification, collection, evaluation, conservation, documentation and registration of germplasm.

The genetic diversity for different crops has been reviewed in various agroclimatic zones of Rajasthan. The major crops being grown in various agro-climatic zones are being presented zonewise in Table 1

Table 1. Zonewise crops being grown in Rajasthan

No.	Zone	Major crops
1.	Arid Western Plain Zone - 1 a ARS, Mandore (Jodhpur)	Pearlmillet, mungbean, sesame, mothbean, clusterbean, chickpea, rapeseed & mustard, wheat, cumin, chilli, <i>Psyllium</i> , datepalm, tumba, ker, castor
2.	Irrigated North western Plain Zone - I b ARS, Sriganganagar	Cotton, chickpea, rapeseed & mustard, wheat, sugarbeet, clusterbean, mungbean, mothbean, groundnut, paddy, sugarcane, sesame, citrus, temperate fruits (peach, plum etc.), mango, grape
3.	Transitional Plain of inland Drainage - II a ARS, Fatehpur (Sikkar)	Chickpea, mustard, fenugreek, fennel, mungbean, mothbean, cowpea, clusterbean, sesame, groundnut, chilli, ber, pomegranate, cumin

4.	Transitional Plain of Luni Basin - II b ARS, Jalore	Cumin, <i>Psyllium</i> , sesame, chilli, fennel, tomato, mustard, pearl millet, cotton, mungbean, wheat, chickpea, clusterbean, henna, ker, piloo
5.	Semi-arid Eastern Plain Zone - III a ARS, Durgapura (Jaipur)	Wheat, barley, groundnut, chickpea, taramira, pearl millet, clusterbean, mothbean, mungbean, cotton, maize, fenugreek, fennel, onion, brinjal, ber, pomegranate, desi rose.
6.	Flood Prone Eastern Plain zone - III b ARS, Navgaon (Alwar)	Rapeseed & mustard, pearl millet, pigeonpea, barley, clusterbean, wheat, chickpea, fieldpea, fodder sorghum, ber guava, mango, lemon, papaya
7.	Sub-humid Southern Plain and Aravali Hills Zone-IV a ARS, Udaipur	Maize, sorghum, medicinal and aeromatic plants, wheat, barley, mustard, sugarcane, blackgram, cotton, bunch groundnut, soybean, garlic, safflower, niger, ginger, sesame, pigeonpea, castor, guava, aonla
8.	Humid Southern Plain Zone - IV b ARS, Bansawara	Paddy, maize, urdbean, mango, minor millets, chickpea, wheat, barley, pigeonpea, soybean, mustard, castor, cotton, sowa, aijwain, garlic, sapota, papaya, lemon, guava
9.	Humid South Eastern Plain Zone - V ARS, Kota	Soybean, paddy, durum wheat, sorghum, linseed, lentil, blackgram, chickpea, mustard, sugarcane, sunflower, coriander, potato, orange

Arora (1991) has reported a rich diversity in mothbean, pearl millet, clusterbean, cowpea, sorghum, mungbean, blackgram, sesame, brassicas, cucurbits, forage legumes and grasses. A huge diversity is also present in the field crops like cotton, groundnut; economic crops like cumin, isabgol, coriander, *Cucumis*, tumba, fennel, fenugreek, chillies, and horticultural crops like ber, pomegranate, citrus, *Salvadora*, Karonda, *Prosopis* spp. in Rajasthan which is also evident from the Table 1. The table also confirms wide diversity in relation to climatic conditions and diverse crops being grown in various zones. The germplasm of major field crops is being maintained

at different locations in the state is being listed in table 2 zone wise.

**Table 2. Germplasm lines of various crops maintained in various agro-climatic zones in Rajasthan**

	Crop	Zone
1.	Cotton	Ib
2.	Rapeseed mustard	III b, II b
3.	Groundnut	III a
4.	Wheat	III a
5.	Mothbean	I a
6.	Clusterbean	III a
7.	Chickpea	I b, III a
8.	Mungbean	III a
9.	Urdbean	IV b
10.	Barley	III a
11.	Rice	V
12.	Pearlmillet	III a
13.	Maize	IV a
14.	Sorghum	IV a

In addition to the above, there are a large number of life support species of which various parts are being used by the local habitat of the Great Indian Thar Desert and the *advasis* are being listed as under :

Type	Name of species	Plant part being used
Grasses	<i>Cenchrus</i> spp., <i>Penicum</i> spp., <i>Brachiaria</i> spp., <i>Lasiurus</i> spp., <i>Elusine</i> spp. and <i>Dactyloctenium</i>	Seeds are used by mixing with flour
Shrubs	<i>Haloxylon salicornicum</i> , Kumut ( <i>Acacia senegal</i> ), Matira ( <i>Citrullus lanatus</i> )	Seeds are being used
Leguminous weeds	<i>Indigofera</i> spp., <i>Vigna trilobata</i>	-do-
Trees	Bordi ( <i>Zizyphus nummularia</i> ), Ker ( <i>Capparis decidua</i> ), Dansri ( <i>Rhus mysorensis</i> ), Gangeran ( <i>Grewia tenax</i> ) Gangeti ( <i>Grewia villosa</i> ) Gunda ( <i>Cordia myxa</i> ), Sainjna ( <i>Moringa oleifera</i> ), Kachra ( <i>Cucumis</i> spp.), Khejri ( <i>Prosopis cineraria</i> )	

	Guar patha ( <i>Aloe vera</i> ), Khejri ( <i>Prosopis cineraria</i> )	Stem bark and leaf pulp
Rotts and tubers	Safed mushli ( <i>Chlorophytum</i> ), Dhak ( <i>Butea monosperma</i> ), Khadula ( <i>Ceropegia tuberosa</i> ), Semul ( <i>Bombax malabaricum</i> )	Roots and tubers

These life support species need to be chemically analysed and their medicinal and nutritional values will be established and recognised and registered to avoid further complications regarding the ownership at the global level in future. A large number of germplasm lines of various crops are being maintained in the different agroclimatic zones in the state. For making the work more systematic and well planned, these lines need to be collected and maintained at one location under the Biodiversity Centre being built in the state whose mandate and functions are being mentioned here.

### Germplasm Repository

A plant biodiversity centre is being established in the Rajasthan Agricultural University, Bikaner with the World Bank aid under the Agricultural Development Project which will be looking after collection, evaluation, conservation and value identification aspects of various unidentified plant species of economic, medicinal and nutritional importance. The germplasm repository is being constructed such that it meets the modern specifications required for storage and maintenance of plant material. This will be supplied with supplemental source of power in order to assure that all plant material will be well maintained at all times. The collection of clonal material will be sent to the national clonal repository operated by the Indian Government rather than being stored in Rajasthan because of costs and logical requirements associated with such facility.

The number of accessions of the germplasm collections are meagre in the state and are being maintained in started stages. Therefore, there is an urgent need for acquisition of more diverse

germplasm from various sources. Greater emphasis needs to be given for explorations and collection of agri-horticultural plants, medicinal, aeromatic and underutilised plant and life support species in the areas of diversity. The salient points on which immediate attention is to be given for the success of plant genetic resources in the state are as under : (i) Pooling and proper maintenance and documentation of the existing field crop germplasm and collection of more diverse lines, (ii) Exploration and collection of diverse germplasm of agri-horticultural, medicinal, aeromatic, under utilised and life support species from the Great Indian Thar Desert, (iii) The detailed evaluation of germplasm by including as many as possible characters over years at different locations and Study of chemical nature of the rare and unknown species which are being used by the tribal people since very long and their importance should be recognised scientifically.

## REFERENCES

- Anonymous. 1996. Research Highlights. Directorate of Research, Rajasthan Agricultural University, Bikaner 334 006 (India).
- Arora, R. K. 1998. Plant Diversity in the Indian Gene Centre. *In: Plant Genetic Resources, Conservation and Management. Concepts and Approaches.* (Eds. R. S. Paroda and R. K. Arora) IBPGR, Regional Office for Southeast Asia, New Delhi p. 25-44.
- Gautam, P. L. 1998. Agro-biodiversity and Intellectual Property Rights (IPR) related issues. Presented in the Summer Institute on "Plant Genetic resources : Principles, Procedures and Approaches in Collection, Evaluation and Conservation" held from 27th July - 6th August, 1998 at NBPGR, New Delhi 110 012.
- Vinod Shankar. 1988. Life support species in the Indian Thar Desert. Life support species : Diversity and conservation (eds. R. S. Paroda, Promila Kapoor, R. K. Arora and Bhag Mal). NBPGR, New Delhi 110 012. pp 34-37.
- Sharma, B. D. 1998. Phytogeographical and agro-ecological zones of India. *In: Plant Germplasm Collecting : Principles and Procedures* (eds. P. L. Gautam, B. S. Dabas, Umesh Srivastava, S. S. Duhoon). NBPGR, New Delhi 110 012. p 40-43.