



# Central Arid Zone Research Institute

# CAZRI NEWS

Year: 2010

No. 3, October-December

## From the Director...



Climate change is one of the major causes of concern in recent times. The studies on meteorological records in India have shown that average temperature has increased by 0.4°C through the 20<sup>th</sup> century. Temperature has a direct influence on crop yields. In case of rainfall, the broad expectation is fewer wet days but more intense rainfall, meaning more risks of drought and flood. Land degradation and desertification is already a constraint – more so in arid areas.

Securing livelihood, especially for rural poor and vulnerable communities is a great challenge in the present times. In order to tackle this important issue, there is a need for strengthening our focus on comprehensive science based assessments of potential and limitations of agriculture in drylands in the context of climate change impacts. The role of science and technology is very important in this context.

New technology packages such as drought tolerant crops/varieties and integrated management of nutrients and pests will increase output and productivity at a lower production cost. Similarly, intensification and diversification of production systems like protected agriculture, livestock integration, introduction of high value crops and value added products will create new livelihood options.

In coming years greater attention on locally relevant research in vulnerable regions to understand probable biophysical and economic impacts is needed



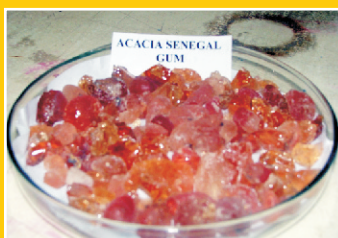
-M.M. Roy

## RESEARCH ACTIVITIES

### DIVISION OF INTEGRATED LAND USE MANAGEMENT AND FARMING SYSTEM

On the recommendations of QRT in 1999, Natural Resource Management Division was created which was later renamed as Division of Integrated Land Use Management and Farming System. The Division has a mandate to carry out research on alternate land use management, evolving sustainable farming systems; soil, water and plant resources management as well as evaluation of trees, shrubs and horticultural crops for diversification and income generation. The Division has scientific and technical manpower in the field of farming system, problem soils and water management, water-shed management, soil and water conservation, agroforestry, silviculture, organic farming, horticulture, agronomy and plant physiology. Well equipped laboratories and experimental areas such as sylvatum, agroforestry areas, range management paddocks, orchards, drip based crop fields, organic farm, lead botanical garden and farming system fields enable conducting multidisciplinary research of both global and local relevance. Sand dune stabilization, shelter belts development, agronomic practices of all major crops of region, drip and sprinkler based irrigation standards, amelioration of sodic-saline soils and mine spoil rehabilitation are some of the notable technologies already in public domain from this Division.

The Division has significantly contributed to fundamental and applied research on water resource management. These include design and construction of check dams, ponds, percolation tanks and sub surface barriers for artificial recharge. To make use of rain water technology, 12000 improved design of rain water harvesting structures called Tanka, were constructed, each of



20,000 to 6 lakhs litre capacity for a population of 1,32,000 in western Rajasthan. Improved design of Nadi (pond) with LDPE lining and Khadin were replicated at many places to meet drinking water requirement and for crop production on conserved soil moisture. Hydrology of small watersheds has been investigated in detail to develop simulation models for predicting run-off, soil moisture and crop yield. Watershed management technology increased yield by 33-43% also enhanced bio-mass, food yield, livestock production besides reducing the silt load and increasing area under irrigated cropping. Vegetative barriers of perennial grasses, *Aloe vera* and low shrubs like *Ziziphium nummularia*, etc., located as per slope were effective in retaining moisture and enhancing crop yields.

Long-term evaluation of different farming systems revealed superiority of combinations of *Prosopis cineraria* with pearl millet, *Ziziphium mauritiana* with pearl millet and *Z. rotundifolia* with *Cenchrus ciliaris*. The best farming system model of 7 ha area was 30% land under agroforestry, 20% agrohorticulture, 30% silvipasture, 10% agropasture and 10% in arable farming. Evaluation of accessions of ber, anar, date palm, gonda, fig, khejri and aonla have resulted in selection of suitable types. Ber variety Gola and Seb, and pomegranate variety Jalor seedless have become popular throughout India and are in demand from African countries. Besides, maturity standards in Kair fruits have been worked out. Pruning time and intensity in Phalsa were standardized for best yield and quality. Top working in ber has been successful in rejuvenating the unproductive and old ber plants. With drip irrigation best fruit yield was in ber followed by aonla and pomegranate. Govt. of India recognized Desert Botanical Garden as Lead Garden in the western region where rare, endangered and threatened plant species are being conserved for future economic exploitation.

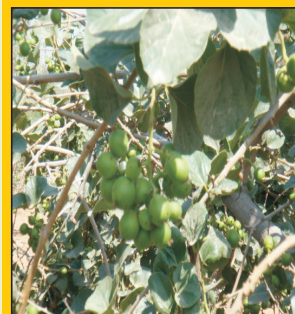
Gum tapping technology in *Acacia senegal*, *A. tortilis* and *A. leucophloea* was standardized. In case of Kummat 40,000 trees treated with gum inducer gave 20 t of gum Arabic worth Rs. 80 lacs in last five years. *Prosopis juliflora* products for livestock (animal feed concentrate and MNB) and human (*Prosopis* coffee, mineral rich sugary concentrate and biscuits) have been made. Based on study of different plantations, it emerged that organic carbon levels of 0.70% are critical for maintaining good soil physical health. A model organic farm under certification has been developed. Organic manures in sesame, clusterbean and green gram recouped some yield (40% of their average) even in poor rainfall. Managing sustained yield of pearl millet grown continuously on the same plot, standardizing weed management in clusterbean and cumin, and developing agro-techniques of Senna are major agronomic contributions. Drip based cropping system of okra, tomato and gladiolus are new and remunerative. Physiological basis of yield improvement of arid zone crops through nutrient management and better performance of clusterbean than pearl millet along with *Tecomella undulata* trees in agroforestry have been understood. Highly heritable physiological traits are identified to breed pearl millet for high yield under water stress.

General public, farmers and corporates are given regular advice and consultancies. Saplings of trees, shrubs, ornamentals and fruits, and fruit products are sold through ATIC generating handsome income.

Research results are published in international and national journals. Scientists of the Division have been honored with various awards and recognitions. Many of them are members of Advisory/Expert Committees at state, national and international levels. Some have been nominated as Experts in UNCCD, FAO, UNEP and IPCC. At present Division is also managing many prestigious programmes funded by NAIP, NRSA, MOEF, RCOF at national level and SUMAMAD by ICARDA, Syria at international level. Current thrust areas of this Division are:

1. Basic and applied research for development of sustainable farming system
2. Multidisciplinary research in agril-horti-silvi-pasture systems and value addition of produce
3. Precision farming through moisture conservation and graded soil fertility in view of climate change
4. Collection, maintenance and evaluation of different trees, shrubs and forbs for diversification of farming system and carbon sequestration.

**-Suresh Kumar**



## Pearl Millet Male Sterile Lines Adapted to Arid Conditions

For a hybrid to be successful under arid conditions, it is essential that its parents are adapted to the harsh climatic conditions of the region. To achieve this objective, efforts to develop pearl millet male sterile lines (A lines) adapted to arid conditions began at CAZRI, Jodhpur in 2004. Crosses were made among selected maintainer (B) lines and F<sub>2</sub> populations and maintainer bulk populations were generated. Evaluation and selection of progenies from these populations led to the development of maintainer inbreds (B lines). These B lines were backcrossed with A lines for six generations to develop sixteen male sterile lines (CZMS 1A to CZMS 16A). Nine of these male sterile lines have A1 type cytoplasm, while seven have A4 cytoplasm. These lines showed variability in plant height, maturity period, tillering and 1000 grain weight. Presently these lines are being utilized in hybrid breeding. Efforts are on to develop more male sterile lines for better choice of female parent for hybrid development programme.



Pearl millet

-V.K. Manga

## Processing Potential of Kachra (*Cucumis melo*)

Commonly known as 'Snap melon' in English, 'Phoot kakdi' in Hindi and 'Kachra' in Rajasthani/Marwari, *Cucumis melo* belongs to the family Cucurbitaceae. It is an annual creeper which is cultivated during monsoon season. The species is drought tolerant to a large extent and thrives well in the region experiencing low rainfall and hot climatic conditions. Shelf life of the fruits is very short due to high pulp and moisture content. The fruits are rich source of carbohydrates, vitamins, minerals, antioxidants and dietary fiber.



*C. melo* fruit

## Development of *C. melo* Value Chains

To develop the value chain for this poor man's fruit for elite class, intervention by utilizing ITK of 'Barani Bari' of Bikaner area started. As no standard variety of the fruit was available, seeds of selection AHS-82 procured from CIAH, Bikaner were used for raising crop. At first instance farmers were motivated to take risk of sowing seeds in early spring i.e. second fortnight of February on limited irrigation taking advantage of residual moisture of rabi. The risk taken paid dividends and after 45 days of sowing, average yield obtained by the farmers per hectare was 40 kg per day continuously for next 30 days. As no other fruit crop of arid zone was available during the season, it was sold at high price of Rs.15-20 per kg, resulting an additional income of Rs. 21,000/- per hectare. Generally the fruits are used as salad in households of elite class and restaurants during hot month of April. The traditional crop of *C. melo*, available at very low rate during kharif season was used for processing. The pulp of fruit was used to prepare squash, jam, cussar, laddoo and melo sip (ready to drink preparation).



Melo sip

**Process Technology for melo sip:** Peeled and cleaned fruit → made into pulp → Mixed with sugar syrup + Citric acid → Cooled, bottled and stored

(Carbohydrate –104 g, Protein - 0.56 g, Fat -1.71 g, Energy - 440 Kcal per 550 ml).

Organoleptic evaluation of *C. melo* food products on a 9 point hedonic scale.

Organoleptic character	Squash	Jam	Cussar	Laddoo	Melo sip
Colour	7.55	8.36	7.73	7.73	8.84
Flavor	7.27	7.18	7.45	7.45	7.92
Taste	7.55	7.91	6.64	6.64	8.00
After taste	6.91	7.82	6.64	7.09	8.61
Mean acceptability	7.38	7.82	7.11	7.58	8.00

-Pratibha Tewari and M.M. Roy

## OTHER ACTIVITIES

### Training of Women Farmers at RRS, Bikaner

Four-day training “ Mahilaon Ke Sarvangeen Vikas Mein Udhayankiki ka Mehatav sponsored by PD, ATMA, Jhunjhunu (December 13-16).

### Sports

Organized ICAR Inter-Zonal Sports Meet (November 9-13)

### Celebrations

CAZRI Foundation Day (October 1)

Mahila Krishi Diwas (December 4)

### Appointments

Dr. A.K. Mishra, Head, Division of Livestock Production Systems and Range Management, October 20, 2010

Dr. S.M. Deb, Head, Regional Research Station, Pali-Mawar, November 10, 2010

Dr. Akath Singh, Sr. Scientist, December 31, 2010

Dr. P. Ratha Krishnan, Sr. Scientist, December 31, 2010

### Transfers

Sh. Sanjay Kumar Dasora, T-5 (TO) from KVK, Pali to Regional Research Station, Pali.

Dr. Shiv Dutt, Sr. Scientist, CAZRI Regional Station, Pali to IP & TM Unit, ICAR, New Delhi on 28.12.2010

### Promotions

1. Dr. Roop Chand, T-6 (TO) to T-7-8 (TO), w.e.f. 01.07.2008

2. Sh. Mota Ram Arya, T-4 (FA) to T-5 (TO), w.e.f. 02.08.2009

3. Sh. Mohan Lal Sharma, T-4 (FA) to T-5 (TO), w.e.f. 02.08.2009

4. Sh. Gaje Singh Jodha, T-4 (TA) to T-5 (TO), w.e.f. 17.08.2008

5. Sh. Rajan Lal, T-4 (TA) to T-5 (TO) w.e.f. 01.10.2009

6. Sh. Ramesh Chandra, T-4 (PCO) to T-5 (TO), w.e.f. 01.01.2009

7. Sh. Bhudha Ram, T-4 (FA) to T-5 (TO) w.e.f. 03.02.2010

8. Sh. Virendra Singh Nathawat, T-4 (FA) to T-5 (TO) w.e.f. 03.02.2010

9. Sh. Pratap Singh Solanki, T-4 (FM) to T-5 (TO), w.e.f. 03.02.2010

10. Sh. Ubed Ullah, T-3 (FM) to T-4 (FM), w.e.f. 07.10.2009

11. Sh. Kailash Detha, T-II-3 (Lib. Asstt.) to T-4 (Sr. Lib. Asstt.), w.e.f. 22.04.2002

12. Sh. Kamlesh Kumar Sharma, T-II-3 (Lib. Inf. Asstt.) to T-4 (Lib. Inf. Asstt.), w.e.f. 24.01.2003

13. Sh. Vinod Purohit, T-I-3 (Computer) to T-II-3 (Computer), w.e.f. 01.01.2005

14. Sh. Arvind Verma, T-2 (Computer) to T-3 (Computer), w.e.f. 29.10.2007

15. Sh. Ravi Kumar, T-2 (FA) to T-3 (FA) w.e.f. 26.11.2010

16. Sh. Mool Singh Gehlot, T-2 (Computer) to T-3 (Computer), w.e.f. 29.10.2007

17. Sh. Sumer Chand Katoch, T-2 (Computer) to T-3 (Computer), w.e.f. 28.06.2009

18. Sh. Rohitas, T-1 (FM) to T-2 (FM), w.e.f. 17.11.2009

### Promotions and left for other Institutes

1. Dr. (Mrs.) A. W. Siddique, Sr. Scientist to Directorate of Rice Research, Hyderabad as Principal Scientist on 1.10.2010

2. Dr. Y.V. Singh, Head, Division of Transfer of Technology, Training and Production Economics to Project Directorate Zonal Coordinator, Zone VI, Jodhpur as Director on 20.10.2010

3. Dr. H.L. Kushawaha, Scientist (SS), CAZRI, Jodhpur to CIAE, Bhopal as Sr. Scientist on 29.12.2010

4. Dr. Bhagirath Ram, Scientist, CAZRI, Jodhpur to DRMR, Bharatpur as Sr. Scientist on 30.12.2010

### Superannuation

October 2010: Smt. Rai, SSS ; Smt. Sugna, SSS

December 2010: Sh. Babu Lal Prajapati, T-5 (TO); Smt. Dhapu, SSS; Smt. Mansukhi, SSS

### Visits Abroad

Dr. P.R. Meghwal, PS visited Morocco to attend VII<sup>th</sup> International Congress on Cactus Pear and Cochineal and VII<sup>th</sup> General Meeting of FAO ICARDA Technical Network on Cactus Pear held at Agadir (October 17-22, 2010)

Dr. Dheeraj Singh, Training Organizer visited Germany to participate in Common Future Conference at Essen and Hanover (November 2-6, 2010)

Dr. R.S. Mertia, Head, CAZRI Regional Research Station, Jaisalmer visited Egypt to participate in 8<sup>th</sup> International Workshop Sustainable Management of Marginal Dryland Phase-2 (SUMAMAD 2), at Alexandria (November 6-9, 2010)

Dr. M.M. Roy, Director, CAZRI, Jodhpur visited Egypt to attend 10<sup>th</sup> International Conference on Development of Drylands (ICDD) (December 12-15, 2010)

### Obituary

Sh. Chanda Ram, SSS: December 10, 2010

Sh. Harish Choudhary, T-2 (Driver): December 31, 2010



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