CAZRI

DEN NEWS

Volume 11 (1) Jan. - June 2009

SUCCESS STORY OF MOTH BEAN

Traditional moth bean used to grow very slow, maturing in 90-95 days, having spreading or mating growth behaviour, yielding very low (300-350 kg/ha), used to be susceptible to YMV and generally known for survival value, conserving soil; and basically fodder type . However, consistent breeding efforts have made marked improvement in a variety of characters as below :

Moth bean varieties developed with different maturity periods of 72-75, 65-67, 60-62 and 57-58 days respectively, with semi-spreading, semi-erect and erect upright plant types suit to 450-500, 300-450, 150-300 and 130-150 mm rainfall, respectively with reasonable grain yield potential from 500-1400kg/ha, on experimental and farmers' fields.

In view to combat exceptionally low rainfall situation of current rainy season (2009) leading to much severe drought, we conducted a Front Line Demonstration as per following details :

1. Name of the village : Neora Road, Osian Tehsil, 45 km away from Jodhpur
2. Name of the farmers' : Mr. Govardhan Ram Choudhary and Mr. Ganesha Ram Choudhary
3. Date of sowing & harvesting : 10.07.2009 and 15.09.2009
4. Varieties used : Mothbean : CAZRI Moth-3, RMO-435
   Bajra : CZP-9802
   Guar : RGC-1066
5. Total rainfall : 130 mm ; 01.06.09 to 15.09.2009
6. Inputs : No seed treatments, no chemical fertilizer, no irrigation,only pure seeds, one pre-sowing ploughing , two times weeding and planting through power planter
7. Cropping history : Bajra + moth been mixed cropping have been cultivated for past 3 yrs, no rabi crop.

Results: Thus, inspite of hardly 130 mm rainfall with 30-35 days interval between two rains and atmospheric temperature mounting 35-40°C, we have proved and demonstrated a very good technology which can certainly corner the drought and can return Rs.10,000 to 11000/ha. in just 60-65 days. It works on choosing drought hardy, early maturing (60-62 days), variety like CAZRI Moth-3 and planting at 40 cm inter-row spacing with 10 kg, seed rate/ha. This system has given C:B ratio 1:2.78 to 1:2.92. On the other, crops planted at 25 cm have given hardly 1: 0.029 to 1:0.67 C:B ratios. Wide spacing helps reduce competition for available soil moisture. This system is cheap and convenient and can certainly thwart and face drought like situations this year.

CAZRI MOTH -2

It has become success story during Kharif-2009.
Details of Trials : Neora Road Village (Jodhpur) Mr. Goverdhan Ram Farmer
Conditions : Rainfall 140mm., 30-35 days interval between rains temp. 40-42°C.
Inputs : Pure seed, improved planting method.
No Fertilizer , no seed treatment, no plant production.

CAZRI Moth-3

Crop/Var/Inter row spacing	Total grain yield (kg/ha.)	Benefit (Rs.	C : B
Moth (CZM-3) : 40 cm	435	+11450	1 : 2.92
Moth (RMO-435) : 25 cm	100	-1950	1 : 0.67
Guar (RGC-1066) : 25 cm	150	-3250	1 : 0.45
Bajra (CZP-9802) : 25 cm	175	-4000	1 : 0.03

Future tips for such situation. We may not be able to predict rainfall exactly; hence following approaches would be quire ideal:

- Use CAZRI Moth -2 or CAZRI Moth-3 varieties maturing in 60-65 days.
- Plant them individually or mixing seed 1:1 by weight, using seed rate @ 10 kg/ha.
- Planting at 40-50 cm will be most crucial and essential requirement under less rain (150-250cm).
- Even in more rains, the wide inter row space; will be useful and covered by these varieties.

D. Kumar

WATERSHED MANAGEMENT FOR SUSTAINABLE DEVELOPMENT OF HOT ARID ZONE

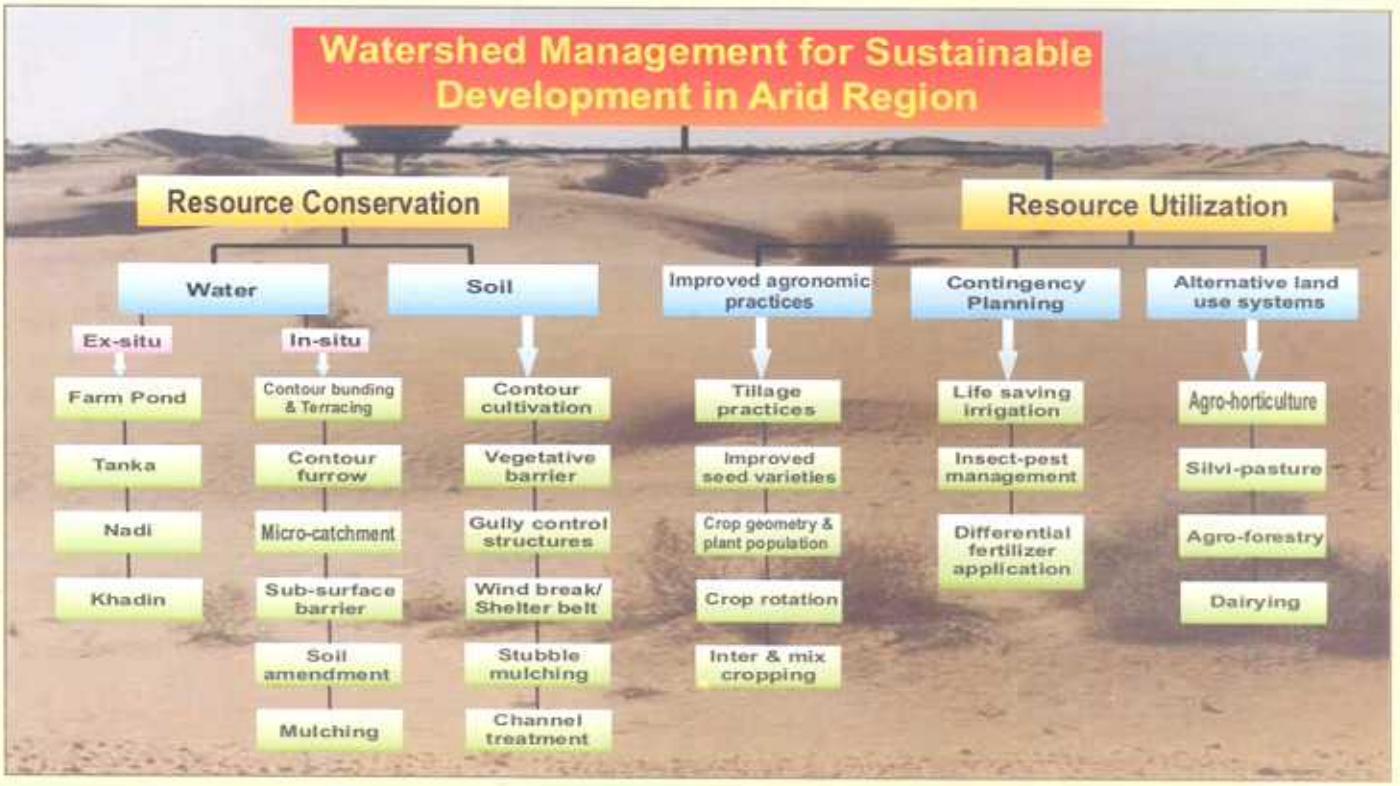
Integrated watershed development is a universally accepted approach for management of land and water on sustained basis. However, watershed development in arid areas is different from those in semi-arid or humid areas. The lower rainfall in arid areas (100-500 mm yr^{-1}) compared to humid climates does not necessarily mean corresponding low level of soil erosion by water. Infact rainfall erosion is higher in arid areas than in any other climatic zone. In response to rainfall, large quantities of sediments deteriorate the quality of water and also reduce storage capacity of reservoirs by 1.9 to 7.8% annually. Soils in this region are generally more vulnerable, either because they have poor resistance to erosion, or because of their chemical and physical properties and suffer a high loss of productivity per unit loss of soil. Evaporation losses are very high and varies from 1.5 to 3.0 m $year^{-1}$. Due to the general scarcity of water in arid areas, unlike humid, even a small runoff or temporary inundation of water in local depression have a very high value and therefore the use and recharge of runoff becomes extremely important. The Planning Commission while emphasizing the role of local level planning in Five Year Plans, highlighted the role of drought prone and dryland areas in augmenting the food production level of the country by way of adopting the watershed approach.

Watershed Management

The interaction between land and water determines the productivity of a given area, which can be made more productive by adequate understanding of physiography, climate, socio-economic conditions etc. and hydrological behavior of watershed. The PRA, land capability, choice of appropriate soil and water conservation measures, improved management practices, soil conservation technologies are unique feature of detailed watershed planning. Optimization of different possible combinations and alternative uses of a specific resource should be tested. Priorities for the maximum benefits in the shortest possible time have to be selected. The inter-relationship between all factors has to be carefully studied and final decision must be made with local participation. Due to multidisciplinary nature of watershed development projects the various improvement activities need to be co-ordinated between farming community and government agencies. Therefore, success of such projects depends very much on the degree of co-ordination and co-operation between various organizations.

CAZRI Experience

Central Arid Zone Research Institute, Jodhpur has done several studies on hydrological behavior of different process in the arid zone and developed techniques for development of arid watersheds. CAZRI has done extensive instrumentation work in Pundlu and Madpuria watershed to study different hydrological process and developed about 6000 ha area under Jhanwar, Sar, Kukma and Baorali-Bambore watersheds. For rainwater management, institute has designed underground tanka of 10 m^3 to 600 m^3 capacities for different rainfall and catchment conditions. These tankas were successfully constructed in Jhanwar, Sar, and Baorali-Bambore watersheds. Harvested water of these tankas was used to provide life saving irrigation to plants. The Benefit cost ratio of tanka ranged from 1.25 to 1.40 under different uses. About 60 ha area were covered under contour bunding in Jhanwar, and Baorali-Bambore watersheds. Bunding helped in increasing the yield of Pearlmillet by 40% over control (3 q ha^{-1}) in Jhanwar



watershed. Contour vegetative barriers of perennial grasses or shrubs were constructed for conserving soil and water in sloping lands. In general the plant-to-plant spacing of 20 to 30 cm at 50 to 100 cm vertical interval between the barriers has been found effective for soil and water conservation and runoff volume and specific peak discharge were reduced by 28 to 97% and 22 to 96% respectively. Under *ex-situ* rainwater management a Khadin of 20 ha areas was developed in Baorali-Bambore watershed with surpassing arrangements. Before construction of Khadin, uncontrolled runoff from upper catchment used to wash away seeds, fertilizers, and standing crops besides loss of valuable water. After construction of Khadin, farmer could take excellent Kharif and Rabi crops. For farm water management, a farm pond of 20,000 m^3 capacity was constructed at Kukma watershed at Bhuj in Gujarat. Construction of this farm pond resulted in assured availability of 20,000 m^3 water even in as small as 150 mm rainfall region. The collected water was used to provide irrigation to Datepalm, ber, aonla and other fruits plants in nearby area. For individual household roofwater harvesting system was designed and demonstrated at many places in watershed areas. For in-situ rainwater management, circular micro-catchment of 5% inward slope with LDPE lining was successfully demonstrated in watershed area for establishment of ber and other trees. For severally eroded and gullied catchment Loose stone check dams (LSCD) at 1 m V.I. were constructed in Jhanwar watershed on 17 gullies. Regular observation on these gullies indicated that LSCD proved to be very effective in controlling further extension of gullies and all these gullies got stabilized with adoption of LSCD. For channel treatment three masonry anicuts and two loose stone anicuts were constructed on main streams in Jhanwar and Baorali-Bambore watersheds respectively. Construction of these barriers resulted in substantial reduction in velocity of water thereby reduction in erosion at downstream and precipitation of suspended sediments at upstream. Temporary inundation of water at upstream helped in regeneration of vegetation in upstream beside recharge of groundwater. In Sar watershed, artificial recharge of groundwater was superimposed in a 2.8 ha m pond with three infiltration wells to improve water availability for conjunctive uses. For moisture conservation soil, straw and plastic mulch were tried in Baorali-Bambore watershed. The grain yield of

Masonary anicut to control flow of water in an active stream at Jhanwar watershed

An open tanka of 271 m^3 capacity at farmer's field in Jhanwar watershed

Pearlmillet was 32.67 and 28.12% higher for plastic and straw mulch respectively over no mulch.

In alternative land use system various systems like agro-horticulture with Pearlmillet/Mung/Moth + Ber/Aonla/Pomegranate, Silvi-pastoral system with Cenchrus ciliaris + Prosopis cineraria/Colophospermum mopane/Harwickia binata were successfully established in watershed areas. Ditch-cum-mound fencing and cut and carry system was adopted for pasture development in Jhanwar watershed. For wastelands alternative crops like Cassia angustifilia and Lawsonia alba were successfully raised at appropriate locations in the watershed. For arable farming improved varieties of Pearlmillet, clusterbean, mungbean, mothbean etc. were introduced in the watershed areas.

R.K. Goyal

INTERNATIONAL CONFERENCE ON "NURTURING ARID ZONES FOR PEOPLE AND THE ENVIRONMENT: ISSUES AND AGENDA FOR THE 21ST CENTURY"

An International Conference on "Nurturing Arid Zones for People and the Environment: Issues and Agenda for the 21st Century" was jointly organized by Arid Zone Research Association of India and Central Arid Zone Research Institute (CAZRI) at Jodhpur from November 24-28, 2009 as part of Golden Jubilee celebration of the CAZRI. The Conference was co sponsored by ICAR, FAO, WMO, UNESCO, ICARDA, ICRISAT, NABARD, ISRO etc. In all 504 abstracts were received, of which 123 papers were selected for oral presentations and other were under poster presentations. Besides participation from India, scientists from 20 other countries also participated in the Conference.

The conference was inaugurated by Dr. R.S. Paroda, former Secretary DARE and DG, ICAR on 24.11.09. Inaugural ceremony was followed by special lectures by Dr. Mohd Solh, ICARDA (presented by Dr. Kamel Shideed); Dr. MVK Siva Kumar, WMO; Dr. AK Singh, DDG (NRM) ICAR; Dr. Gopi N. Ghosh, FAO and Dr. A. Ashok Kumar, ICRISAT. In the evening a special lecture was delivered by Dr. R.S. Paroda. From 25.11.09, Technical Sessions were organized. The eminent plenary speakers included Dr. Kamel Shideed, Syria, Dr. Donald Gabriels, Belgium, Dr. Ali Nefzoui, Tunisia and Dr. Panjab Singh, India. The Valedictory Function was held on 28.11.09. After a brief welcome address by Dr. N.V. Patil,

Director CAZRI, Dr. A.K. Singh, DDG (NRM) ICAR presented the recommendations of the Conference. Dr. Mangala Rai, Secretary, DARE and DG ICAR gave the presidential Address. Hon. Union Minister of Agriculture, Shri Sharad Pawar addressed the delegates as the chief Guest of the Function. Some major recommendations of the conference are;

THEME 1: CLIMATE CHANGE & DESERTIFICATION

- Monitoring of greenhouse gases under different land use systems and studies on their effects on arid ecosystems should be taken up.
- Monitoring of dust emission, transport and deposition in the drylands and their fringes be strengthened for effective control measures.
- Strengthen research on monitoring, assessment and impact analysis of drought and desertification and develop pro-active strategies for enhanced resilience, especially in view of fast changing global scenario.
- Develop IPM practices to reduce dependence on off-farm inputs, including pesticides under changing environment.
- Strengthen research on Modelling of Plant Growth and Productivity under different phenophases and carry out Satellite Sending of the actual growth stages for better understanding of climate change Impacts.

THEME 2: NATURAL RESOURCES MANAGEMENT

- Monitoring and assessment of natural resources through modern tools needs to be carried out for sustainable land use planning.
- Integrated watershed management practices for livelihood generation, food and nutrient security and maximizing multiple water productivity requires greater emphasis.
- Rehabilitation of degraded CPR-based management and suitable land use plans are to be developed on priority and with peoples' participation.
- Groundwater depletion has reached a critical level and urgently needs remedial measures including artificial recharge.

THEME 3 : CROP PRODUCTION

- Diversify and develop integrated perennial-based farming systems for higher income generation and profitability.
- Low input conservation farming practices be developed to make farming more profitable and lucrative. Emphasis needs to be given on INM and farm waste utilization to economize on chemical fertilizers and improvement of soil conditions.
- Germplasm enhancement using wild adopted cultivars needs priority, adopting molecular marker assisted selection.
- Low-cost, farmer-friendly farm tools be developed to reduce drudgery of farm workers.

THEME 4 : LIVESTOCK MANAGEMENT

- Genetic characterization, conservation and improvement of native arid livestock breeds, both for milk and draft power, needs strengthening.
- Develop livestock-based diversified profitable farming systems through feed, fodder, health and shelter.
- Improve and develop feed storage and fodder banks for nutritional security of livestock.

- Monitoring and improvement of community grazing lands through plantation of suitable grasses and trees needs emphasis, and capacity-based sustainable grazing management strategies needs to be developed.

THEME 5 : BIOTECHNOLOGY & ENERGY

- Molecular basis of stress tolerance needs investigation, and stress-tolerant microbes and plants are to be developed adopting bio-and nano-technological tools to cope with changing climate.
- Develop and harness environment-friendly renewable energy resources for improving socio-economic conditions of dryland dwellers.
- The planting material need to be improved to enhance total factor productivity and biotechnological tools may be utilized.
- The advantage of molecular biology needs to be fully harnessed in terms of dissection of agronomically important quantitative traits in crops and for precise transfer of genes to improve tolerance to biotic and abiotic stresses.

THEME 6 : ITK & VALUE ADDITION

- Development and marketing of value added farm produce including fruits, dairy, etc., be encouraged to generate livelihood and farm income.
- Minimize post-harvest spoilage and enhance shelf life of farm produce, including dairy products.
- Inventorization, validation and refinement of traditional knowledge be strengthened for the sustainable management of drylands.

THEME 7: SOCIO-ECONOMICS & EXTENSION

- Technology transfer, human resource development and capacity building needs more strengthening for rapid diffusion of technologies to stakeholders.
- Enhance women empowerment through income generation.
- Socio-economic monitoring, impact assessment of market and credit flow and development of strategies for arid farming communities need to be continued.
- Networking among National and International Arid land Research Institutes like CAZRI and ICARDA may be strengthened and new areas of common interest with respect to nurturing arid zones of the world for people and the environment be explored.

Central Arid Zone Research Institute, Jodhpur 342 003, INDIA

ENVIS : Desert Environment Newsletter, Volume 11, Issue 1 (Jan.-June 2009)

Editors : Tirth Das and R.K. Dave; *Advisor* : Dr. Uday Burman

Web: www.cazri.res.in E-mail: tdas@cazri.res.in Fax: 0291-2788706 Phone: 0291-2786931