DEN NEWS

Volume 12 (1) January - June, 2010

ECO-FRIENDLY MANAGEMENT OF PLANT DISEASES

Diseases, insect pests and weeds inflict considerable damage to crops. Globally, about 40% of output is lost due to pests before harvest. Post-harvest losses account for another 10-20%. If pests are not controlled, the losses could rise to about 70%. But, in recent years, the use of pesticides has come under severe criticism because of their technological failure in terms of pest resistance, resurgence and secondary outbreak of diseases and the hazards they pose to both ecology and human health. On the farm economy, this has led to an escalation in cost of production, greater crop losses and fall in farm profitability. These concerns have given rise to a demand to curtail pesticide use in agriculture. However, there are apprehensions that reducing pesticide use without effective technological alternatives may lead to a decline in crop yields and food supplies and increase output prices. Thus, the focus of plant protection research is gradually shifting towards the development of environmentally safe and economically feasible alternatives to chemical pesticides using approaches of biotechnology.

Table 1. Validation of using milk in managing crop diseases from India and abroad

Crops	Pathogens	Treatments	References
Zucchini squash	*Sphaerotheca fuliginea*	Raw cow milk	Bettiol, 1999
Cucurbita pepo	Yellow mosaic virus (ZY MV)	Raw cow milk	Bettiol, 1999
Cucumber	*Oidium* sp.	Raw cow milk	Ribeiro *et al.* 2001
Other Vegetables	*Macrophomina phaseolina* *Fusarium oxysporum* f.sp. *lycopersici* (Mycelia)	Goat milk spray (10%) once and twice a week	Raja and Kurucheve 1997
Chilli	*Tobacco leaf curl gemini virus (TLCuV)*	Seed treatment with raw cow milk (50% dilution with water) and *Trichoderma viride* (0.6%) + *G.virens* (10g/m^2) with FYM as soil treatment	Arun Kumar, 2006
Rice	Tungro and stunt virus	Seed germination and soaking in milk mixed with water and sown immediately	Winter, 1997
Rye *(Secale cereale)*	*Ustilago occulta*	Seed treatment of milk powder and mustard flour	Borgen *et al.* 2001
Winter wheat	*Tilletia caries, Gerlachia nivalis, Fusarium graminearum, Septoria nodorum*	Seed treatment with skim milk powder and warm water (45°C for 2 h)	Surpala's Vrikhsayurveda (circa1000) Balasubramanian *et al.* 2000
Pearl millet	*Sclerospora graminicola*	Seed treatment with raw cow milk (50% dilution with water) for 18 h and *Gliocladium virens* (0.6%)+*G.virens* (10g/m^2) with FYM as soil treatment	Arun Kumar *et al.*, 2004
Tobacco	Cowpea chlorotic mottle bromovirus	Spray of whole cow milk	Patel and Patel, 1993

Bio-control agents have emerged as a new method of managing plant diseases by inducing systemic resistance (ISR). This method is based not on direct pathogen suppression as it occurs in the application of pesticides, but on stimulating natural defense mechanisms in plant tissues. ISR is one of the mechanisms by which bio-agents like plant growth promoting rhizobacteria (PGPR), animal product like milk, plant extracts such as leaf proteins and farmer friendly fungi such as *Trichoderma* spp. reduce diseases in many plant species through the manipulation of the host plant's physical and biochemical properties. Milk has been described as natural inhibitor of plant viruses, fungi and bacteria. Milk is being used as Indigenous Technical Knowledge (ITK) by farmers of a few States in India for managing diseases in crops and now its use in managing plant diseases has been validated by a number of workers in India and abroad also (Table 1).

Validation of Using Milk for Crop Disease Management in Arid Zone

Practically sound and encouraging results were recorded when validation the use of milk against major fungal and viral diseases of arid zone crops were done. These results are discussed here for the benefit of arid zone farmers:

1. Raw cow milk (RCM) and Gliocladium virens against downy mildew of Pearl millet:

Sclerospora graminicola, the biotrophic fungus causing downy mildew (DM) or green-ear disease, is a major constraint in the productivity of pearl millet. Downy mildew infected plants develop severe disease syndrome from the very beginning and succumb even before reaching maturity. Reductions in plant height, number of leaves and nodes are commonly observed in susceptible cultivars resulting in reduced grain and

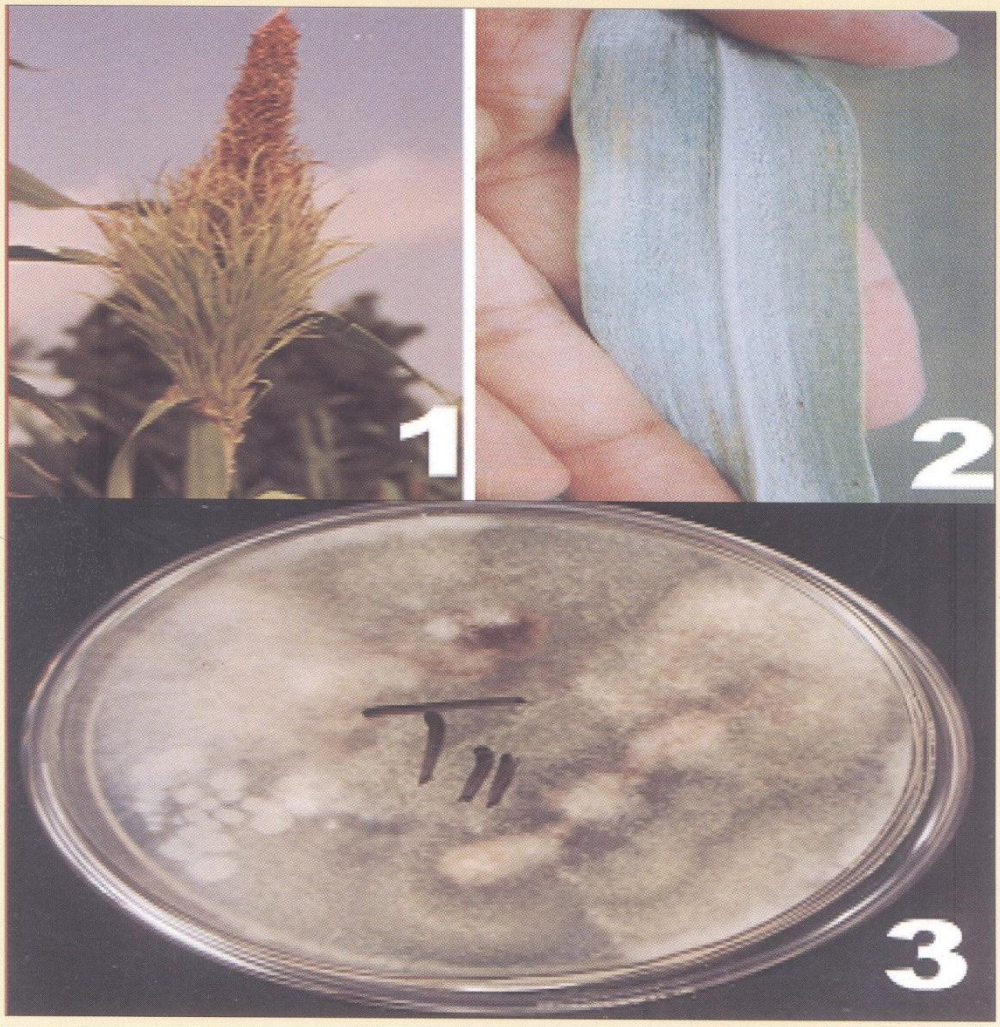

Fig. 1. Green ear affected lower half of the panicle
2. Leaf showing downy growth on lower surface
3. Growth of bio-control fungus G. virens emerging out from the isolated root of G. virens treated pearl millet plants on PDA medium

fodder yields. Popularly, the disease is known as 'green-ear' disease. At the time of panicle emergence green ear symptoms appear on ear head with all possible degrees of proliferations and malformations. In malformation the florets are converted into leafy structures of diverse appearance (Fig.1). Systemic symptoms generally appear on the second leaf in the form of chlorosis at the base of infected leaves followed by production of sporulation on the lower side of leaves known as the 'half-leaf' symptom (Fig. 2). Cultivar resistance is not truly established and chemical seed treatment and cultural practices are often not satisfactory for its management. Field experiment conducted at the Central Arid Zone Research Institute (CAZRI), Jodhpur with 'Nokha-local', a DM-susceptible cultivar, established the efficacy of raw cow milk (RCM) and *Gliocladium virens*. Seed treatment with RCM for 18 h in 1:1 ratio at the room temperature; seed treatment with *G. virens* (6kg / kg seed), soil treatment with *G. virens* (10g/m^2); combination treatments (RCM + G. virens seed treatment) with G. virens in soil were compared with control (no soil or seed treatment). Effective DM management requires a definite reduction in primary inoculum from seed and soil. On this count, *Gliocladium virens* appeared to have an edge over the RCM in reducing the DM incidence since it grows readily along with the developing root system of the treated plant and protects the roots from initial infection (Fig. 3). In terms of disease incidence and protection over control, the results revealed that integration of seed treatment of RCM and *G. virens* provided 72.9% disease protection over control.

2. Use of Raw Cow Milk and Trichoderma viride in Management of Leaf Curl Disease of Chilli:

Chilli is another important irrigated crop in arid western Rajasthan. The popular cultivars of chilli are susceptible to leaf curl disease (LCD) and in about a decade, the yield of chilli in Jodhpur region has declined by about 28 per cent. The disease is caused by Tobacco Leaf Curl Gemini Virus (TLCuV). The affected leaves show curling, puckering and distortion with blistering of inter-veinal areas and shortening of internodes (Fig. 4). The disease is transmitted by insect vectors such as white fly (*Bemisia tabaci*), thrips (*Scirtothrips dorsalis*) and mites (*Polyphagotarsonemus latus*). Pesticides do manage vectors but are not so effective for the disease. Resistant cultivars exist but they also perform poorly.

The alternative disease management technology was tested on farmers' fields. It involved 24 h seed treatment with RCM (diluted to 50% with water), treatment of soil with *Trichoderma viride* (6kg / kg seed) and this was followed by pre-transplant dipping of seedlings in raw cow milk for 20 minutes. In net house, treated plants and fruits were healthy in comparison to the control (Fig. 5). This practice was introduced on farmers' fields in some villages around Jodhpur. It achieved 46 to 60% protection of plants from LCD with improved quality and yield. Economic impact evaluation in these villages showed that reduced incidence of LCD and yield improvement increased the monetary return (Rs. 8849.47 ha^{-1}) in the treatment in comparison to farmer's practice with benefit: cost (B: C ratio) of 1.68: 1.31. As a treatment option RCM and *Trichoderma* spp. are very promising for managing DM of pearl millet and LCD of chilli by seed treatment which is economical and environment-friendly. These treatments, apart from their action against the diseases are good plant growth promoter, which is an added advantage. The results are likely to pave path for further experiments resulting in newer innovations with indigenous knowledge.

Dr. Arun Kumar

Fig. 4. Leaf curl disease affected chilli plant

Fig. 5. RCM and *Trichoderma* treated plant (Left) and control plant (Right)

World Environment Day, 2010

ENVIS Centre on Desertification at CAZRI, Jodhpur celebrated the World Environment Day with joy and enthusiasm on 5th June 2010. An essay competition for High School children was organised on theme "Importance of Biodiversity Conservation and Future". On this occasion Neha Rathi and Vidya Bawankar were awarded. Most of the participants felt that these types of essay competition increased the awareness towards the environment protection. A keynote address on this occasion was also delivered by Dr. K.R. Solanki, Former ADG (Agroforestry), ICAR, New Delhi on "Forestry for Environment Protection". Dr. M.M Roy, Director, CAZRI presided over the session. More than 50 scientists and other officers participated in the discussion and suggested scientific solutions to the problem. Dr. Suresh Kumar delivered the welcome address. Tirth Das, ENVIS Coordinator briefed about ENVIS activities at CAZRI and gave Vote of Thanks.

World Day to Combat Desertification, 2010

The Centre celebrated the World Day to Combat Desertification on 17th June by organising an invited lecture, followed by a group discussion, wherein more than 45 scientists and other officers from CAZRI participated. The speaker, Dr. J.C. Tarafdar, National Fellow and an eminent Soil Scientist and shared his expert views on the theme "Improving Soil Quality through Beneficial Soil Biota: Current Status and Researchable Issues for Indian Desert". Dr. J.C. Tewari (PS) delivered the welcome address and Dr. Mahesh Kumar (SS) briefed about ENVIS activities at CAZRI. Tirth Das, ENVIS Coordinator gave Vote of Thanks.

Forthcoming Conferences and Events:

9th Session of the UN Forum on Forests and Launch of the International Year of Forests, 24 .1. 2011 to 04 .2. 2011, at UNForum on Forests Secretariat, UN headquarters, New York. Contact:http://www.un.org/esa/forests/session. html

26th Session of the UN Environment Programme Governing Council of the Global Ministerial Environment Forum, 21 .2. 2011 to 25 .2. 2011, at UNEP, Nairobi, Kenya. Contact: http://www.cifor.cgiar.org/events/upcoming-events/

Symposium on ecosystem and landscape-level approaches to sustainability, 22 .3. 2011 to 24 .3. 2011, at Burgos, Spain. Contact: http://www.globalforum2011.net/content/seminar

3rd Intl. Group Meeting, Great productivity Enhancement Under Changing Climate (India), 09 .2.2011 to 12 .2. 2011, at Karnataka, India. Contact: http://www.dwr.in/images/banners/igm. pdf

5th International Conference on community Based Adaptation to Climate change , 24.3.2011 to 31.3.2011, at Dhaka, Bangladesh. Contact: www.bcas.net

Greenhouse 2011, 4.4.2011 to 8.4.2011, at Cairna, Australia. Contact: www.greenhouse2011.com

2nd International Eco Forum for Waste & Water Management Recycling, 13.4.2011 to 15.4.2011, at Sofia, Bulgaria. Contact: www.viaexpo.com

World Environmental & Water Resources Congress, 22.5.2011 to 26.5.2011, at Palm Springs, USA. Contact: www.content.asce.org/conferences.ewri2011/index.html

Institute News in Brief

Selection

Dr. M.M. Roy, PS, from IG&FRI, Jhansi to CAZRI as Director
Dr. N.V. Patil, HD from CAZRI to NRCC, Bikaner as Director
Dr. O.P. Yadav, P.S. from CAZRI to ARS, Mandor, Jodhpur as a Project Coordinator

New Appointment

Dr. Arvind Kumar (Scientist, Plant Breeding)- Presently posted at RRS-Bhuj

Transfer

Dr. (Mrs.) Sharmila Roy, Sr. Scientist from IG&FRI, Jhansi to CAZRI on same post

Superannuation/Retirement

Smt. Alyamma Varghese , P.A. Div. II

Sh. Gokul Singh (Tubewell Operator)

Sh. Girdhari Lal Meena (T-6)

Smt. Chuki (Regular Mazdoor)

Homage

Sh. Girdhari Lal , T-2

Smt. Sayer , Regular Mazdoor

Central Arid Zone Research Institute, Jodhpur 342 003, INDIA
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DEN NEWS

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SOLAR COOKER FOR ANIMAL FEED

During the survey of rural arid areas, it was found that huge amount of firewood, animal dung cake and agricultural wastes are burnt for boiling of animal feed using traditional fuel wood stove. The solar cookers available are costly and cook only 2 kg of animal feed per day. Considering this, a novel solar cooker using locally available materials e.g. clay, pearl millet husk and animal dung have been designed, developed and tested that can boil 10 kg of animal feed per day.

Design

A pit of dimensions 1980 mm x 760 mm x 100 mm is dug in the ground. The clay, pearl millet husk and animal dung are mixed in equal proportion with water to make paste. 50 mm deep layer of this paste is provided at the bottom of the pit. The sides of the solar cooker are also made by the same material. 150 mm pearl millet husk insulation has been provided at the bottom. 24 SWG galvanised steel absorber painted with black board paint has been put over the insulation. Two glass covers (4mm thick) on a removable steel angle and wooden frame have been provided over it. Four aluminium pans (tagari) with lid can be kept inside cooking chamber for boiling of animal feed. The solar cooker for animal feed can also be constructed using brick/stone masonry or vermiculite- cement. Fig. 1 depicts installation of solar cooker for animal feed in the field.

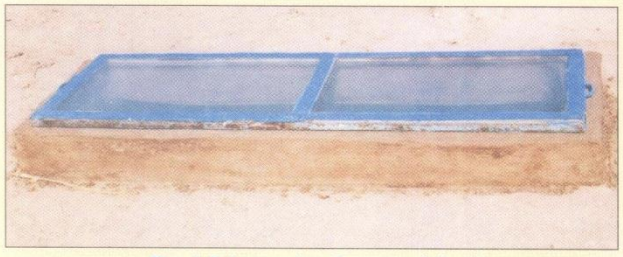


Fig. 1 Solar cooker for animal feed

Performance

Crushed barley (Jau Ghat), guar korma, and gram churi with water were kept at 9 AM and can successfully be boiled by 4 PM. With the use of the solar cooker 10 kg animal feed can be boiled per day.

Demonstration

Twelve low cost solar cookers for animal feed were installed at village Osia (Fig.2). The body of the cookers has been fabricated by an unskilled labour. Animal feed mixture cotton seed and oil cake have been successfully boiled by the farmers.

Fig. 2 Solar cookers for animal feed installed at village Osia

Advantage

The solar cooker saves time of farm women and 1059 kg of fuel wood per year equivalent to 3611 MJ of energy. It is easy to fabricate at village level at a cost of about Rs 3500 per piece. Conservation of firewood help in preserving the ecosystem and animal dung cake could be used as fertiliser, which enhances agricultural productivity.

N. M. Nahar

MULTI-NUTRIENT FEED BLOCK: AN APPROPRIATE MEANS FOR SUPPLEMENTATION OF ESSENTIAL NUTRIENTS TO DESERT LIVESTOCK

Rajasthan covers 3.42-lakh sq km area, which makes 10.4 % of total geographical area of our country. Of which, 62 % area is under hot desert (arid region) consisting of 12 districts in southwestern region. Due to low and erratic rainfall, agriculture becomes a gamble, and thus animal farming became a major occupation for the livelihood of the rural population particularly in the 12 western arid districts of the state. A study by the National Council of Applied Economic Research reported that revenue from milk sales alone accounted for 22 per cent of the family income in the state, as this state contributes 10% of the total milk produced in the country. The animal husbandry contributes 19 per cent of the state GDP. The livestock sector is more labour intensive than crop cultivation and accounts for a major share in rural employment with 4.5 per cent annual growth as compared to 1.75 per cent for all sectors and 1.1 per cent for agriculture.

Most of the livestock population in the arid regions are range managed, except during monsoon period, thrives upon dry grasses in the ranges and pastureland, and crop residues in the fallow lands. These grasses and crop residues are very low in essential nutrients including fermentable energy, protein, minerals and carotene, which is a precursor of vitamin A. The problem of mineral deficiency is further aggrieves due to high calcium and very low phosphorus content of the crop residues. Calcium-phosphorus imbalance adversely affects the availability of calcium as well as the phosphorus. The dry fodder scarcity is as an another problem. Even in the normal rainfall years, the dry fodder and green forages availability, respectively, is 30% and 59% of total requirement of the state. This situation is further worsens during drought years. Under such circumstances crop residues like straws and stovers are imported from the neighboring states. The productivity and survivality of desert livestock during scarcity and drought conditions can be ensured by supplementation of essential nutrients to these animals.

There are different means of supplementation of essential nutrients to the livestock, which are fully or mainly thrive upon roughage diet. The feed-block (Fig.1) is considered to be the most convenient and appropriate means of self-feeding of the nutrients by the livestock. Extensive studies on development of appropriate formulations and production technology of baked multi-nutrient feed block have been carried out at CAZRI and simple and appropriate formulations, and process technology for production of backed multi-nutrient feed block, using locally available feed resources and the simple gadgets, which can be fabricated by local artisans, have been developed (Fig.2). In India and world over inorganic compounds like calcium/and or magnesium oxide, cement, gypsum etc., are being used as a binder, whereas, in CAZRI's feed block formulation, an organic plant product is being used as a binder. Elsewhere the blocks are dried by the exothermic reaction initiated by mixing chemically active substances, whereas, CAZRI's feed blocks are produced by drying in the solar or electrically operated dryers. Total 13 different formulations of compact feed blocks have been developed. In the standard formulation wheat bran, sugar cane molasses, urea, vitaminized mineral mixture, dolomite, common salt, deoiled soya bean meal, and the guar gum dust is used as a binder. It has been noticed that partial or complete replacement of wheat bran in block formulations with other fibrous feed ingredients like maize/barly milling products, malt sprouts, deoiled rice barn, *Bajra* husk, *Prosopis juliflora* ground pods, and *Neem* & *Ardu* leaves, though reduced production cost, but resulted into low density blocks. Pressing of high-fibre containing ingredient-mixture required more energy and resultant product will be of convex instead of flat, as desired in the final product. Due to low density of such blocks, these are liable to be over consumed by the animals; however, their bulk density can be improved by increasing the binding material. The partial or complete replacement of wheat bran with other fibrous materials reduced the bulk density and subsequently elevated compressive strength of the blocks, however, this rule does not hold true in case of the blocks in which the wheat bran has been fully replaced by chaffed *Cenchrus ciliaris* grass. Principal feed block ingredients and its appropriate substitutes have been listed in Table 1.

MNB supplementation in the livestock brought out an appreciable improvement in the health and productivity of the animals. These blocks are well accepted by all the types of the animals. Feed block supplementation in all most all types of animals, increased feed and water intakes, corrected rumination and pica, and showed increase in wool yield in sheep, milk yield in lactating cattle, buffaloes, goats and in sheep also. Digestibility trial conducted in Rathi cattle showed higher feed and water intake and better feed utilization efficiency.

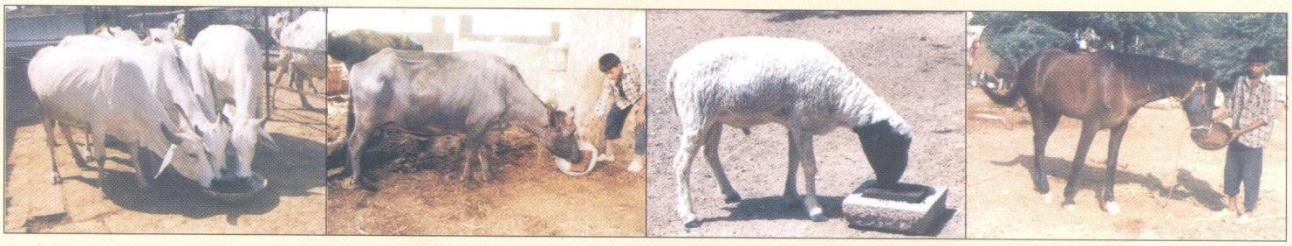


Table 1. Principal and Alternative Ingredients of Multi-nutrient Feed Block

S. No.	Principal constituent	Alternate constituent (s)
1.	Sugar cane molasses	Sugar beet molasses/ cattle feed grade *jaggery*/ maize strip liquor (maize starch industry by-product)
2.	Urea	-
3.	Common salt	-
4.	Dolomite	Calcite/low silica, dried marble slurry
5.	Mineral mixture containing, amino acids and vitamins (A,D,E)	Mineral mixture containing vitamin A/Mineral mixture containing calcium and phosphorus
6.	Wheat bran	Rice polishings and/or deoiled rice bran, Pearl barley by-products/Malt sprouts/Dried *Neem* or *Ardu* leaves, seed free powdered *Prosopis juliflora* or *Acacia tortilis* pods/ ground *dhaman* grass, *bajra* grain husk and rice polishing mixture/maize gluten feed
7.	De-oiled soyabean meal	*Guar* meal: *korma* or *churi*/any cake of oil bearing seed/ Cotton seed whole, ground
8.	Organic binder (*guar* gum dust)	1. Organic: Fenugric seeds, ground 2. Inorganic: Cement, Magnesium oxide, Bentonite or sodium bentonate/ Gypsum/Calcium oxide

Nitrogen balance in block supplementation was improved appreciably. The lambs and kids of block supplemented mothers recorded higher live weight. An off campus trial conducted under NATP'S, TAR programme in which the block was supplemented to the farmer's livestock. As per the farmers' view the feed blocks formulated and produced at CAZRI were well accepted by the livestock. Feed block supplementation, increased feed and water intake. It corrected the craving of animals for unwanted materials (including geophagia) caused by the pica. Farmers' noticed that the block feeding corrected rumination, and there was an increase in the daily milk yield by 20-25%. It became discernible from 5-6th-10th day of introduction of the block. 1, 2-kg block, in case of a cattle and buffalo lasted for 7 and 5 days, respectively. The farmers of Kalyanpur village reported that block introduction in buffalo increased daily milk yield by 1 lit over its initial production of 3.5 to 4.0 lit/day. In case of a buffalo, an increase in 1.5 lit/day had been recorded. The blocks were also distributed to the farmers of Kutchch region, even a few urea-free blocks, prepared for horses were also distributed. Both were well accepted by the animals. Presently, 2-kg feed blocks are marketed through institute ATIC out let at Jodhpur.

Establishment of feed block production unit at farmers' level was found to be economic preposition. The initial cost of establishment of village level production of 20 blocks/day, including cost of feed ingredients required for production of 100 blocks (Rs.1453/-), essential gadgets and drying oven, comes to Rs. 40,000/-. It excluded the cost of land and infrastructures. The production can be initiated in ventilated, asbestos shade of approx 70'x20', in which 2, 15'x20' spaces, situated at each end of the shade, can be used for storing the ingredients and finished blocks, and a central space of appox., 40'x20', provided with three phase electric connection for ingredient mixer, block press and draught type electric oven can work as production space. The cost of production of 100 blocks using feed grade jaggery

Fig. 2 : CAZRI'S Feed Block Production Technology

(J) and sugar cane molasses (SCM) comes to Rs. 1460/- and Rs. 1310/-, respectively. Assuming a person can daily produce 20 blocks and if working days in a year are considered to be 300 days, the annual profit on production of (20x30=600 blocks comes to Rs. 32,400 (Rs. 2700/-) and Rs. 41,400/- (Rs. 3450/- per month) if J and SCM, respectively, are used for block production.

H.C. Bohra, A.K. Patel, B.K. Mathur and P.P. Rohilla

WORLD ENVIRONMENT DAY, 2009

The ENVIS Centre at CAZRI celebrated the World Environment Day on 5th June. An essay competition for High School children was organised on themes " Climate Change and its Impact on Environment" and "Unite to Combat Climate Change". On this occasion two best essays by Mahavir Singh and Shinju Sathyadava were awarded. Most of the participant's felt that these types of essay competition increased the awareness towards the environment protection. Hon'ble Justice Rajesh Balia, Former Chief Justice, Patna High court agreed to grace the occasion. He also delivered a lecture on "Balancing Human Survival and Pace of Economic Development". Dr. K.P.R. Vittal, Director, CAZRI, presided over the function. Dr. Raj Singh, Principal Scientist welcomed the guests and briefed about ENVIS activities at CAZRI. Shri Tirth Das, ENVIS Coordinator proposed the Vote of thanks.

WORLD DAY TO COMBAT DESERTIFICATION, 2009

The Centre celebrated the World Day To Combat Desertification on 17th June. Organised an invited lecture, followed by a group discussion, wherein more than 40 scientists and other officers from CAZRI were participated. The speaker was Prof. Sunil Sharma, Department of Environment Engineering, MBM College, Jodhpur. Dr. K.P.R. Vittal, Director, CAZRI, presided over the function. Dr. Uday Burman, Chairman LAC, welcomed the Chief Guests and participants. Shri Tirth Das, ENVIS Coordinator proposed the Vote of thanks.

Forthcoming Conferences and Events

FAO Conference (36th Session). 14-21 November 2009 at Rome, Italy Contact:Mekouar@fao.org and http://www.fao.org/events/

Second Workshop on Productive and Sustainable Use of Saline Waters and Salt-affected Soils in Agriculture, 15-18 November 2009 at Aleppo, Syria Contact: http://www.icarda.org/Announcement/2009/Int_Workshop_on_Saline_Water/Int_Workshop_on_Saline_Water_2009.htm

International Conference on Nurturing Arid Zones for People and the Environment: Issues and Agenda for the 21st Century. 24-28 November 2009 at Jodhpur, CAZRI Campus. Contact: http://www.cazri.res.in/azconf2009 and http://www.azconf2009.org

ECOSA International Seed Trade Conference. 2-4 December 2009 at Antalya, Turkey. Contact : www.ecosaseed.org

15th Conference of the Parties to the UNFCCC and Fifth Meeting of the Parties to the Kyoto Protocol. 7-18 December 2009, at Copenhagen, Denmark Contact : Website:http://unfccc.int/meetings/unfccc_calendar/items/2655.php?year=2009, http://www.cop15.dk/en

International Conference on Food Security And Climate Change In Dry Areas, 1-4 February 2010. at Amman, Jordan. Contact : http://www.icarda.org/Announcement/2009/IntlConfrnc_FoodSecurity/FoodSecurityAndClimateChangeInDryAreas_2009.htm

5th International Food Legumes Research Conference (IFLRC V) and 7th European Conference on Grain Legumes (ECGL VII). 26 to 30 April 2010, at Antalya, Turkey. Contact : http://www.iflrc-ecgl.org/

The 23d World Congress of the International Union of Forest Research Organisations 'Forests for the Future: Sustaining Society and the Environment'. 23-28 August 2010 at Seoul, Republic of Korea. Contact : http://www.cifor.cgiar.org/Events/CIFOR/iufro-congress.htm

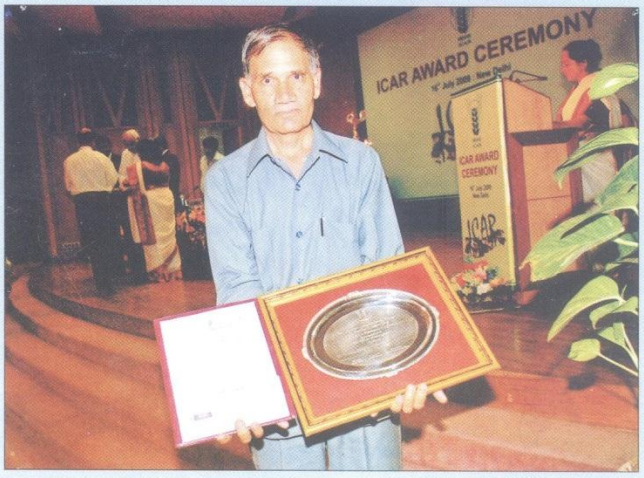
CHAUDHARY DEVI LAL OUTSTANDING ALL-INDIA CO-ORDINATED RESEARCH PROJECT AWARD 2008

CHAUDHARY DEVI LAL Outstanding All-India Co-ordinated Research Project Award 2008 was bestowed upon the All-India Co-ordinated Research Project on Arid Legumes, CAZRI, Jodhpur, for its stupendous role in developing profitable and implementable technologies for arid legumes.

During the past 10 years, the project developed 11 varieties of guar, 8 of moth-bean, 6 of cowpea and 8 of horsegram. These varieties gave 20-30% higher grain yield and matured earlier than checks.

The project has developed need-based production and protection technologies for subsistence and corporate farming. The results in farmers' fields have indicated that grain yields of guar and moth-bean can be 2,00-2,200 kg/ha and 1,200-1,400 kg/ha, respectively, with full package under rainfed conditions.

Development of high-yielding and early-maturing varieties of guar with improved gum content and high viscosity of gum has led to consistent increase in guar-gum and subsequent monetary gains.



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