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SAARC AGRINEWS

Promotion of Agricultural Research and Development in South Asia

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Highlights

Regional Training on Molecular Techniques in Diagnosis of Diseases of Farm Animals and Poultry



SAARC Agriculture Centre (SAC) in collaboration with High Security Animal Disease Laboratory (HSADL) organized a regional training on "Molecular Techniques in Diagnosis of Diseases of Farm Animals and Poultry" at HSADL, Bhopal, India during 22th April to 1st May 2013. The participants from SAARC member countries namely Bangladesh, Bhutan, India, Nepal, and Sri Lanka attended this useful on hand training. Dr. J. M. Kataria, Director, Central Avian Research Institute (CARI), Izzatnagar, Bareilly, Uttar Pradesh, India was present as chief guest and Dr. Md. Nure Alam Siddiky, Senior Program Officer (Livestock) was present as guest of honour in the inaugural function. Dr. H. V. Murugkar, Joint Director of HSADL presided over the inaugural session.

The aim of the training programme was to refresh trainess in newer concept in animal disease diagnosis as well as in molecular and conventional diagnostic techniques. The training programme was consist of a good blend of lectures and laboratory demonstration sessions. It covered the recent and conventional disease diagnostic techniques with more concentration on advanced molecular biological techniques of livestock and poultry diseases. The molecular techniques have broadened the scope of animal diagnostics and are now powerful tools that assist in a comprehensive elucidation of animal pathogens, their molecular epidemiology and are very helpful for the diagnosis. Conventional diagnostic techniques such as agar gel immunodiffusion, hemagglutination inhibition and enzyme linked immune sorbent assay, fluorescent antibody test, neutralization test etc. along with cell culture techniques were included. The training also given exposure on DNA/RNA extraction, polymerase chain reaction (PCR), nucleotide sequencing and many other newer and emerging technologies for disease diagnosis.

In this training programme, the practical knowledge provided excellent opportunities to the participants to gain first-hand working knowledge of various techniques and will broaden their research aptitude in the area of animal disease diagnosis with special reference to pathology and molecular tools. The training provided a common platform for all participants to interact and exchange their ideas among each other.

Barani Agricultural Research Institute, Pakistan

New Varieties

Ug-99 resistant wheat variety "Dharabi 2011"

A new Ug-99 resistant bread wheat variety "Dharabi 2011" was developed by Barani Agricultural Research Institute (BARI), Chakwal, Pakistan. This variety showed resistance to leaf and yellow rust. Dharabi 2011 has rolling, waxy and erect leaves with long fibrous root system. Presence of these traits enables the plant for less evapo-transpiration and encourages drought tolerance.

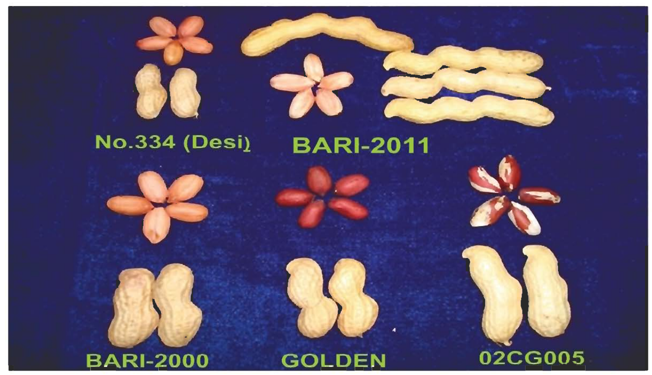
A new Ug-99 resistant wheat variety "Dharabi 2011

Dharabi 2011 (Root Length)

3-4 seeded groundnut variety "BARI-2011"

A new 3-4 seeded groundnut variety "BARI-2011" has been developed by Barani Agricultural Research Institute, Chakwal, Pakistan. It has high yield potential (5500 kg ha^{-1}), profused branches, 40% shelling percentage, 3-4 seeded pods with variegated seed colour having pink and white strips. This variety is becoming very popular among farmers and fetching higher price in the consumer market.

A new groundnut varieties "BARI 2011"



Comparison of BARI 2011 with its old varieties

Source: Director, BARI, Chakwal, Pakistan

Contribute to SAARC AgriNews

SAARC AgriNews is a widely circulated Newsletter devoted for disseminating agricultural research and development findings as well as information on applied technology for the farmers of South Asian region.

SAARC Agriculture Centre (SAC) has been publishing this Newsletter quarterly (formerly SAIC Newsletter) since 1991 and distributing it to about 6,500 readers in SAARC member countries. The Centre has been distributing SAARC AgriNews to the relevant agricultural institutions, scientists and extension service providers of SAARC member countries for better livelihood of the farmers free of cost. Please send your articles, success stories and news on applied research, extension activities, proceedings and/or recommendations of seminars, symposium, consultations and workshops in the field of agriculture with relevant photographs either by post or through e-mail: sac@saarcagri.org. Please note that unaccepted articles are not returned to the authors.

SAARC AgriNews
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Institutional Profile

National Institute of Bioremediation, NARC, Islamabad, Pakistan

Introduction

National Institute of Bioremediation (NIB) is a pioneer institute of its kind established in April 2009. Institute consists of multidisciplinary team including environmental chemist, analytical chemist, soil microbiologist, environmental microbiologist, plant taxonomist, engineers and horticulturist working in following principle areas;

1. Bio-remediation and Integrated Farming

Treatment of used water and contaminated soil through bioremediation processes. The institute is committed to conserve 23 MAF waste water per annum to meet irrigation requirements, eliminate environmental pollution posed by it, reclaim water, land and improve agricultural productivity. Integrated farming is second component exercising in the field of livestock, fodder, poultry, fruits and vegetables, honey bee, alternate energy resources (biogas plants) and sericulture practices to create a model for various stake holders through use of bio-remediated water thus putting step towards poverty elimination.

Phytoremediation/ Bioremediation

Phytoremediation is an emerging cleanup technology for decontamination of wastewater through use of aquatic plants to render harmless. These macro-pbytes takes advantage of the unique and selective uptake capabilities of plant root systems together with the translocation, bioaccumulation, and contaminant storage/degradation abilities of the entire body. Nutrients, such as ammonia, nitrite, nitratc, heavy metals, and phospborus and bacterial pathogens are common contaminants in water bodies that directly or indirectly affect public health and ecosystem integrity with acute and chronic harmful outcome. Wastewater before being released under natural environment must be reclaimed to prevent the spread of disease and recycling its nutrients or producing useful products from this waste material. Bioremediation of wastewater through green plants is sustainable, cost effective, do able and energy efficient process as fast emerging a viable alternative to conventional remediation methods and will be most suitable for developing countries. NARC a bub of National agricultural research with rich human resource was facing water shortage due to prolonged drought thus suffering the major research objective where as ChakShahzad, an adjacent location was discharging 0.65 million US gallons used watcr in the nearby vicinity polluting peri-urban agriculture and causing environmental issue, which placed CDA under threat by EPA. PARC decided to harvest wastewater of Chakshahzad, treated it and further utilized for 500 acres of agricultural land high efficicncy irrigation systcm by National Institute of Bioremediation (NIB), whicb has the state of art capabilities to mitigate the subject issues faced by said institutions. National institute of Bioremediation was established in May 2009 with researchers from diversified applied field is pioneer institute of its kind with diverse cxpertisc, successfully accomplished a Bioremediation Model in April 2010 to reclaim used water of NARC under NEQs through cost effective, environmental friendly with negligible use of energy through Bioremediation.

2. Ecotoxicology Research Program

Analysis of pesticides residues in the agro ecosystems and their eco-toxicological implications on the non-target organisms, wildlife, human health etc.

Services

1. Provide bioremediation facilities at national level to reclaim used water & soils.

2. Analytical services of waste water testing..

a. Water Quality Lab at NIB, NARC currently provides analytical facilities for following chemical/microbial parameters i.e. Turbidity, Hardness, Ca-Hardness, Mg-Hardness, pH, Electrical Conductivity, Total Dissolved Solids, Total Suspended Salts, Salinity, Chlorides, Free Carbon Dioxide, Carbonates, Bicarbonates, Nitrates, Sulphates, Phosphates, Dissolved Oxygen, Oil/Grease and microbial contaminates (Fecal Coliform and Total Coliform) in the waste water. Instruments for the COD/BOD determination have been procured through RADP; both analyses will be included in the routine waste water parameters after optimization of their respective methods and purchase of consumables.

3. Introduce Integrated Farming techniques by using the reclaimed water.

a. Provision of Training facilities for kitchen gardening, ornamental flowers, plant production, composting techniques of water lettuce and Nursery management.

b. Provision of seasonal, ornamental, fruit plants, vegetables and other nursery plants.

4. Provision of aquatic plants throughout the country for bio-remediation purposes.

5. Awareness raising in the field of used water treatment through bioremediation.

6. Capacity building in bio-remediation of waste water to the concerned/stakeholders.

7. Pesticide residue analysis in soil, water, crops and other biotic matrices to evaluate impact on non-target organisms.

Aquatic plants nursery

National institute of Bioremediation has establisbed aquatic plants nursery with diverse collection indigenous aquatic flora. Pakistan flora is known by its richness (approximately 6000 species) taxonomic diversity with high number of endemic species. Nursery at the National level of the institute as is necessary for the conservation, readily available, re-vegetation and dissemination for the wastewater management at National level. A total 35 species and sub-species of the aquatic plants have been collected, among these 25 species screened and applied as a candidate potential species under local environmental conditions to treat wastewater at National level.

Current Research

1. Research on screening of indigenous aquatic plants for their bio-remediation potential against different industrial and domestic effluents is in process.

a. **Effect of Opuntia-cactus (Chittar Thor) On the Quality of Sewage Water:** Study was conducted to investigate the

(Continued on page 7)

National fruits fair in Bangladesh

National fruits fair 2013 of Bangladesh was held at the Campus of Bangladesh Agricultural Research Council (BARC) during 15-17 June, 2013. The fruits fair was inaugurated by honourable Minister for Agriculture, Government of Bangladesh, Begum Matia Chowdhury, MP as Chief Guest. Dr. Hassan Mahmud, MP, honourable Minister for Environment & Forest, Government of Bangladesh also present as special guest in the occasion. Related Public and Private Institutions participated with their attractive fruits stall. Ministry of Agriculture, Government of Bangladesh organized the national fruits fair.

SAC Governing Board Meeting

The 7th Governing Board (GB) Meeting of SAARC Agriculture Centre (SAC) is scheduled to be held 24-25 September 2013 at SAC Conference Room, Dhaka, Bangladesh. SAC is expected that all honourable GB members from SAARC member countries will attend in the forth-coming Meeting.

New SAC Professional Staff

Dr. Tayan Raj Gurung, Farming Systems Specialist of Ministry of Agriculture and Forests (MoAF), Royal Government of Bhutan joined SAARC Agriculture Centre (SAC) as Senior Program Specialist (Natural Resource Management) in April 2013. Prior to joining at SAC, Dr. Tayan worked as Head of Information Management Services, Department of Research and Development Services, MoAF and Program Director of RNR Research and Development Centre, CoRRB, MoAF. He obtained his Ph.D from Université Paris Ouest Nanterre La Défense, Paris, France in the field of Natural Resource Management.

Visit

Dr. Rasheed Sulaiman V, Director, Centre for Research on Innovation and Science Policy (CRISP), Hyderabad, Andhra Pradesh, India visited SAARC Agriculture Centre (SAC) on 18 June 2013 and discussed with the Centre's Director and professional about activities of SAC & CRISP specially AESA Blog for horticultural extension in South Asia.

Professional Development

Dr. Tayan Raj Gurung, Senior Program Specialist (NRM) and Dr. Muhammad Musa, Senior Program Specialist (Crops) of SAC attended a regional experts meeting of SAARC Monsoon Initiative Programme at Dhaka, Bangladesh during 28-29 April 2013 organized by SAARC Meteorological Research Centre (SMRC). Dr. Tayan presented a paper in this expert meeting.

Celebrating the International Year of Quinoa

The United Nations (UN) has declared 2013 as the International Year of Quinoa (IYQ). The existence of this "miracle" plant has been a well kept secret from most of the world. It is time for "*Chenopodium quinoa* Willd." more commonly known as "quinoa" to make its debut in the international scene and in what better circumstances than through an international year?

Quinoa can play an important role in eradicating hunger, malnutrition and poverty. It is a new ally in the fight against hunger and food insecurity. It is a healthy food due to its high nutritional value with high protein content (9.1-14.8%), contains all of the essential amino acids and fatty acids and is rich in minerals, vitamins and other nutrients. Quinoa is a hardy crop and is resistant to drought and salinity and hence can adapt to different climate and geographical conditions. Different quinoa varieties are known to grow in a temperature range from -4 0C to 35°0C and from sea level to 4000 meters above sea level.

The beneficiaries are multiple and diverse from governments to small farmers and indigenous populations, from the private to the agro-bio sector - fair trade, slow food, organic agriculture, cosmetic and pharmaceutical industries and others. At least 130000 small quinoa growers from South America will benefit from increased sales, higher prices for their crops and a return to indigenous practices in a sustainable manner. It has the potential to be successfully grown in many countries in the Asia-Pacific region.

Common aquarium fish genome decoded

The zebrafish, Danio rerio, is a tropical freshwater fish popular amongst aquarium fishes and are frequently sold under the trade name zebra danio. It is native to the streams of the south-eastern Himalayan region, and is found in parts of India, Pakistan, Bangladesh, Nepal, and Burma. The species inhabits streams, canals, ditches, ponds, and slow-moving or stagnant water bodies, including rice fields. It is so named because of the five uniform, pigmented, horizontal, blue stripes on the side of the body, which are reminiscent of a zebra's stripes. It is identified as genetically tractable organism since 1980s because of its ability to regenerate its fins skin, heart and, in larval stages the brain. However, the muscle regeneration does not make use of stem cells; instead, mature heart muscle cells regress to a stem cell-like state and re-differentiate. It is also an important vertebrate model organism in scientific research for these notable regenerative abilities, and has been modified by researchers to produce several transgenic strains. As a model biological system, the zebrafish possesses numerous advantages for scientists. Its genome has recently been fully sequenced and annotated with easily observable and testable developmental behaviors.

The common aquarium fish "Zebrafish" as model system for gene studies in humans

The welcome Trust Sanger Institute started the zebrafish genome sequencing project in 2001, and the full genome sequence of the Tuebingen reference strain is publicly available at the National Center for Biotechnology Information (NCBI). The zebrafish reference genome sequence was published in April, 2013 with automatic and manual annotations. It provides evidence of more than 26,000 protein-coding genes and in comparison to the human reference genome, it shows approximately 70% of human genes have at least one zebrafish orthologue.

The high quality of this genome assembly provides a clearer understanding of key genomic features such as a unique repeat content, a scarcity of pseudogenes, an enrichment of zebrafish-specific genes on chromosome 4 and chromosomal regions that influence sex determination. The virtually transparent embryos of this species, and the ability to accelerate genetic studies by gene knockdown or over-expression, have led to the widespread use of zebrafish in the detailed investigation of vertebrate gene function and increasingly, the study of human genetic disease.

Source: Agbiotech Digest, ICAR, India

Success Story

Floricure: Herbal formulation to ameliorate fluoride toxicity

Indian Council of Agricultural Research has developed a drug Floricure under Outreach Programme on Ethno-veterninary Medicine. The results of field-testing of the drug formulation (Fluoricure) have documented the ameliorative potential of this formulation in fluorotic cattle and buffalo reared in high-risk environment of repeated F exposure without any side effect. In India people suffer from fluorosis due to natural and industrial sources. Clinically, fluoride toxicity is manifested mainly by over bony and dental lesions. The predominant site of fluoride accumulation is bone and teeth. However, soft tissues like liver, kidney, heart and lung also accumulate fluoride in the body (WHO, 2002). Therefore, vital organs like liver and kidney are also susceptible to its toxic effects and pathological changes occur even before the development of over clinical signs of fluoride toxicity and toxic effects of F can occure at exposure far lower than those producing clinical symptoms. Amelioration of toxic effects of fluoride in man and animal remained unresolved and controversial till date due to lack of safe-effective ameliorative agents that can remove F from the body and can ameliorate toxic effects as well.

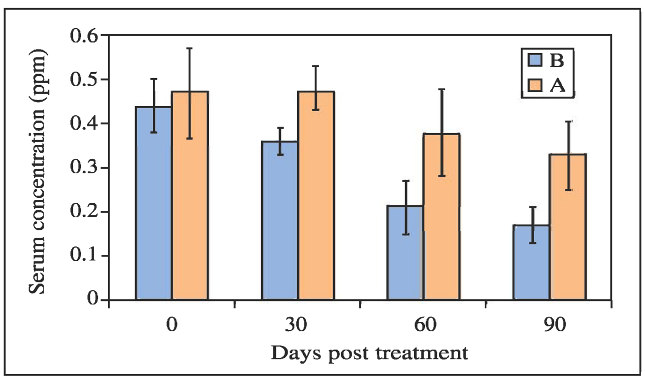


Fig. 1: Effect of test drug on serum Floride concentration (ppm) in cattle and buffalo

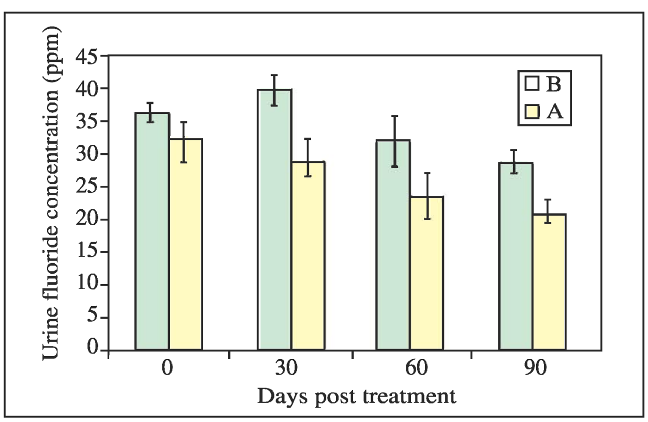


Fig. 2: Effect of test drug on urine Floride concentration (ppm) in cattle and buffalo

Chemical compounds such as aluminum sulphate, ascorbic acid and boron have been reported effective in experimental fluoride exposure with variable success. These agents are generally not indicated for prolong use due to their toxic side effects, which underlines need for evaluating a nontoxic-safe agent that can reduce F burden in body and ameliorate toxic effects of F (WHO, 2002). Conventionally ethno-veterinary practitioners consider tamarind (*Tamarindus indica*) fruit as an excellent natural product that has immense therapeutic potential in many pathological conditions. In this endeavor the laboratory of comparative system of medicine tried to develop an herbal amelioration for fluorosis.

Development of a formulation for ameliorating toxic effects of Fluoride

Being encouraged by the beneficial results of the medicinal herbs, ICAR tried to develop some herbal formulation in ameliorating fluorosis. Among eight different formulations, Fluoricure (Coded under act of secrecy for Intellectual Property Rights) gave excellent results in *in vivo* experimental rat mode without any side effects. The formulation is therefore chosen for testing of its efficacy under field condition. During last 3 years ICAR has studied exhaustively two medicinal plants: *Tamarindus indica* fruit pulp and *Moringa oleifera* pods and scientifically validated their in vivo efficacy and safety in experimental condition. Being encouraged by the beneficial results, ICAR tried to develop some herbal formulation in ameliorating fluorosis. The study site was located at Singpur area of Rajasthan 30 km South West of Chitorgargh. A through cross sectional study was performed to ascertain clinical cases of fluorosis. Both biotic and abiotic samples were collected from 2 km radius of the phosphate fertilizer plant (source of F pollution). Sixteen cattle and buffaloes having visible clinical lesions and elevated fluoride levels in blood (e”0.40ppm) and urine (e”6.0ppm) were selected for this study. The animals were divided into two unequal groups (A and B) comprising 6 and 36 animals respectively (Table 1)

Fig. 3: Before treatment

Fig. 4: After treatment

Table 1: Treatment schedule given of Fluorotic cattle and buffalo

Group	Numer of Animals	Observation period (days)	Treatment
A	6	90	Nil
B	36	90	Drug formulation @200 mg/kg/day orally

The animals of Group A served as untreated control while cattle and buffaloes of group B were given the test Drug formulation Fluoricure@of200 mg/kg/day orally for 90 days. The efficacy of the test drug was assessed based on F concentration in blood and urine as well as improvement in quality of life of treated animals. The concentration of F in serum and urine of different groups is presented in Figs 1 and 2. On day 0 the fluoride concentration in serum and urine of animals of Gr A (control) was estimated as 0.47± 0.10 and 31.95 ± 3.04 ppm respectively and in animals of Gr B (Treated 0.44 ±0.06 and 36.36 ± 1.48 ppm respectively. Cattle and buffalo received test drug formulation (Gr B(, showed significantly (pd"0.01) lower serum F concentration from day 30 onwards and lowest values recorded on day 90 (0.17 ± 0.04 ppm) almost the values recorded in healthy cattle and buffalo. Results were analysed statistically and expressed in ppm.

The detail clinical examination of the cattle and buffaloes showed an overall improvement of general health, performance (milk production and work efficiency) and welfare (pain, and agony) of animals received the drug formulation.

Animal owners reported improvement of work efficiency and reduction of fatigue and symptoms of pain in cattle and buffalo receiving the drug formulation. A comparatine study of treatment is shown in Figs. 3 and 4.

National Institute of Bioremediation (from page 3)


Free floating


Submersed


Bottom rooted Emergent


Stream bank

effect of the plant Opuntia-cactus on the chemical/microbial parameters of sewage water. Findings showed that there is no significant impact of Opuntia-cactus (Chittar-thor) on the chemical parameters i.e. pH, EC, HCO31-, Cl1-, Ca+Mg, Na and K in time series of experiment i.e. 12 hours, 24 hours, 36 hours, 48 hours, 60 hours and 72 hours except increase. However this plant can be successfully applied to reduce the microbial count in the sewage water.

b. **Temporal Study of Variations in Raw and Bio-remediated Wastewater of Shehzad Town, Islamabad:** Bioremediation Orchard is capable of treating about 0.6 million gallons of wastewater from Shehzad Town daily which is sufficient to irrigate 550 acre land through high efficiency irrigation system at an interval of 20 days. Various plant species with different phyto-remediating potentials were employed owing to changing nature of the sewage water. It was sought out that on temporal basis some plants were more useful in Islamabad climate than the others and their treatment potential was directly linked with the sewage nature.

Therefore "Temporal Study of Variations in Raw and Bio-remediated Wastewater of Shehzad Town, Islamabad" was planned at Bio-remediation Orchard to monitor the variations in the sewage water on temporal basis and also to determine phyto-remediation potential of certain plants.

2. Seasonal variations in the phyto-treatment potential of aquatic plants at Bio-remediation field stations by manipulation of plant species.

3. Effect of different additives on composting of water lettuce.

4. Determination of pesticide residues in peach and peach orchard workers in Malakand Division, Khyber Pakhtunkhwa.

5. Use of Bio-remediated Water to explore quality and production in Peas (*Pisum sativum* L.)

6. De-contamination of Pb from the Volta battery effluents, Hattar, Hazara.

Facilities

1) Waste water quality analysis facility.

a. Water Quality Lab at NIB, NARC was strengthened by addition of new chemical parameters this year i.e. Turbidity, Hardness, Ca-Hardness, Mg-Hardness, COD and BOD. Other parameters regularly monitored i.e. pH, Electrical Conductivity, Total Dissolved Solids, Total Suspended Salts, Salinity, Chlorides, Free Carbon Dioxide, Carbonates, Bicarbonates, Nitrates, Sulphates, Phosphates, Dissolved Oxygen, Oil/Grease and microbial contaminants (Fecal Coliform and Total Coliform) in the waste water of domestic and industrial origin.

2) Provision of integrated farming approaches to the farmer's community.

a. Kitchen gardening services., Ornamental plant Nursery. Summer or winter vegetables.

b. Scented Rose Nursery. Water lettuce composting technology. Seasonal flowers.

3) Pesticide residues analysis lab where various environmental matrices including plants and animals tissues are analyzed for possible contamination.

a. Equipment's available at NIB include i.e. GC, HPLC, Rotary Evaporator, Sonicator, Soxhlet apparatus, Spectrometer, Water Distillation Unit, combined pH meter, DO meter etc.

ACHIEVEMENTS

Bioremediation

1. Established Bio-remediation Garden to reclaim sewerage water of NARC offices through bio-remediation.

2. Established Bio-remediation Orchard for treatment of 0.65 million gallons waste water of Shehzad Town, Islamabad.

3. Established integrated farming facilities through usage of reclaimed water at Bio-remediation Garden and Bio-remediation Orchard.

a. Prepared and analyze lettuce based compost by using different additive

b. Establishment of small scale ornamental plant nursery.

c. Establishment of scented Rose nursery for perfume extraction.

(Continued on page 9)

Fruit-based cropping systems for sustainable production

To mitigate risk of total crop failure, suitable crop combinations, involving perennial fruit-crops, seems to be a promising proposition to get multiple outputs for ensuring production and income generation in a sustainable manner.

In the cropping system, aonla (*Emblica officinalis*) is taken as a base crop; perennial crops aare ber (*Ziziphus mauritiana*), bael (*Aegle marmelos*), khejri (*Prosopis cineraria*), drumstick (*Moringa oleifera*), karonda (*Carissa carandus*); and fodder crop, sewan grass (*Lasiurus sindicus*), is a component crop. Orchard interspaces are used to grow clusterbean and seed spices in *kharif* and *rabi*, respectively, to generate extra income, improve productivity, and to ameliorate ecological niche in a sustainable manner.

Systems comprised of cropping models– *aonla-ber*-clusterbean-fennel, *aonla-bael*- clusterbean-coriander

Average yield of over-storey and ground-storey crops in fruit-based cropping system

Fruit crops	Sole crop (tonnes/ha)	Multi-species (tonnes/ha)
Over-storey perennial crops		
Aonla	6.8	7.4
Ber	7.9	9.5
Bael	1.6	1.9
Khejri	0.3	0.6
Drumstick	7.6	8.3
Karonda	6.1	9.4
Ground-storey crops		
Fennel	1.4	1.5
Coriander	1.4	1.7
Ajowain	3.3	3.8
Dill	2.6	2.9
Mustard	5.8	7.1
Clusterbean	6.0	6.2
Sewan grass	-	15.7

Microbial population under different fruit-trees

Fruit-crops	Microbial population		
	Bacteria	Fungi	Actinomycetes
Aonla	1,543 ml x 10-6	8.6 / ml x 10-3	74 / ml x 10-5
Ber	2,020 ml x 10-6	11.33 / ml x 10-3	69.6 / ml x 10-5
Bael	1,290 ml x 10-6	7.7 / ml x 10-3	178 / ml x 10-5
Khejri	1,691 ml x 10-6	10.3 / ml x 10-3	181 / ml x 10-5
Drumstick	1,115 ml x 10-6	11.33 / ml x 10-3	107 / ml x 10-5
Karonda	1,745 ml x 10-6	11 / ml x 10-3	125 / ml x 10-5
Bare soil	973 ml x 10-6	6.6 / ml x 10-3	62 / ml x 10-5

Heavy fruiting in *aonla* under diversified cropping system (inset: *top left: ber; bottom left:* drumstick, *top right*: bael; *bottom right: Karonda)*

aonla- khejri-clusterbean-*ajowain, aonla*-drumstick-clusterbean-dill and *aonla-khejri*-sewan grass. No negative allelopathic effects of the over storey crops (*aonla, ber, khejri, karonda* and drumstick) on the growth and production potential of the ground storey crops (*kharif* and *rabi* annuals) were observed. Besides, the yield of intercrops was found higher under multiple cropping systems than under the sole crop; probably, due to the synergistic interaction among the ground-storey and over-storey crops. The inclusion of the perennial fruit-crops improved soil fertility through litter fall. The physical and chemical properties of the soil under the canopy of the perennial crops resulted in increased porosity and water-holding capacity of the soil, while soil bulk density decreased as compared to open sites. Available N, P and K contents in the soil under trees growing in diversified pattern of cropping were considerably higher than that under the sole cropping as well as in the bare field. Similarly, microbial population in soils also was noticed to be improved under fruit-trees. Additionally, aonla, grown in combination with other fruit-crops, was found to contain higher content of antioxidants than the sole crop. Canopy of perennial fruit-crops was also managed through regular pruning. Crop combinations such as *aonla-ber-* clusterbean-fennel, *aonla-bael-* clusterbean- coriander, *aonla-khejri*-clusterbean-ajowani were found sustainable and remunerative under the arid ecosystem.

Source: Hare Krishna, I.S. Singh, R. Bhargava and S.K. Sharma, Central Institute for Arid Horiculture, Beechwal, Bikaner (Rajasthan) 334 006, India, E-mail: kshun@rediffmail.com

Dairy co-operatives role in enhancing milk production

Dairy development in India has been acclaimed as one of the most successful development programmes in the world. Much of the success of the 'White Revolution' in India has been attributed to co-operative framework of dairy development strategies. The network of dairy co-operatives expanded considerably especially after the launch of the Operation Flood in 1970. In 2010-11, more than 14 million dairy-farmers got associated with dairy co-operatives. Integration with co-operatives has benefited farmers, and indeed has served as a catalyst for linking Indian dairy smallholders to markets – domestic as well as global.

Nonetheless, the potential of dairy co-operatives in the context of emerging and globalizing markets is often questioned. The emergence of several integrated marketing models backed-up by giant multinationals is posing shift competition to co-operative models of milk marketing. However, the earlier studies in India suggested that farmers' participation in dairy co-operatives resulted in a significant increase in milk production and productivity and reduction in per unit cost of milk production. The Government has been supporting milk co-operatives for strengthening infrastructure for quantity and clean milk production. Therefore, this study aimed to empirically examine the impact of co-operatives on the performance of dairy farmers pertaining to production and quality of milk, based on the primary data collected at the farm levels in threes states of India – Bihar, Punjab, and Uttar Pradesh in 2007.

Are the co-operatives significantly better off compared to non-member farmers in terms of the different indicators? The co-operative farmers have relatively bigger herd size and also composition of their herd size is qualitatively better than their counterparts. The average herd size of co-operative dairy farmer is 5.6 Standard Animal Units (SAUs), as compared to 3.6 SAUs for non-cooperative farmers. Similarly, on an average, 54% of bovine-milch animals of co-operative dairy farmers were of improved breeds, while only 40% were of non-cooperative dairy farmers. The herd size of co-operative dairy farmers in Bihar was about 68% bigger than their non-cooperative counterparts. Similarly, level of adoption of improved breeds on dairy co-operatives farms in Bihar was almost three times higher than the independent farms.

The average co-operative farmer contributes to about 14 litres of milk per day and his herd's productivity is 6 litres per milch animal per day. On the other hand, the average independent farmer contributes only 8 litres with a productivity of 5.3 litres. In bihar, household milk production by the co-operative dairy farmers was more than three times of the independent dairy farmers. On an average, co-operative dairy farmers fetch an operating profit of 2.6 per litre as compared to only 0.60 per litre by the independent farmers.

Performance of co-operative farmers and independent dairy farmers

	Co-operative Farmers	Independent Farmers
Herd size (no.)	5.6	3.6
Adoption of improved/ cross-bred animals (%)	53.8	39.8
Milk production (litres/day)	13.9	8.0
Milk yield (litres/animal/day)	6.4	5.3
Margin (per litre)	2.6	0.3
Food safety Index	0.52	0.43
Cost of compliance with food safety (litre)	0.41	0.50

Source: Author's calculations based on the field survey

In conclusion, co-operatives have a positive impact on herd size and its composition, milk production, productivity and profitability. It also has a positive impact on the adoption of milk safety measures. Further expansion of co-operatives can induce an increase in milk production and productivity as well as improvement in the quality of milk. The integration of dairy farmers with the co-operative would also enhance dairy farmers' competitiveness.

Source: Anjani Kumar, National Centre for Agricultural Economics and Policy Research, New Delhi, E-mail: anjani@ncap.res.in; k.anjani@cgiar.org

National Institute of Bioremediation (from page 9)

d. Establishment of 30,000 ornamental, fruits and forest plants under high density plantation.

e. High efficiency sprinkler irrigation system at Bioremediation garden.

4. Established water quality laboratory.

5. Production of high nutritive value crops i.e. duck weed, water lettuce from used water for poultry and livestock feed.

6. Awareness Generation

a. At least 300 visits were conducted from policy makers, academicia, progressive farmers, print & electronic media, NGO's and members of civil society, Published a Newsletter and 3 Brochures. Developed Institute's website www.nib.org.pk Established collaboration with media partners i.e. TV Channels, Radio and Print media. (PTV, ATV, Sohni Dharty,, FM 99, FM 100 etc.)

7. Academician achievements

a. Courses Offered PARC Institute of Agricultural Sciences, i) Ecotoxicology, ii) Environmental Microbiology, iii) Bioremediation

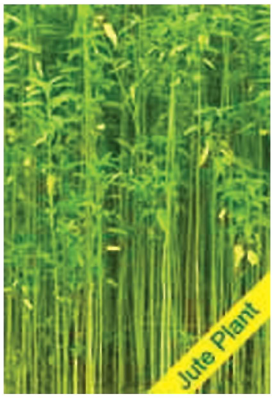
b) Students Thesis/Internships:

i) B.Sc -20, ii) M.Sc 08, iii) M.Phil 10, iv) Ph.D 03

Eco-toxicology

1. Inter-lab. calibration trials with Plant Protection Department in Denmark.
2. CIPAC – Collaborative studies.
3. Pesticide residues monitoring in food chain and ecosystems of Pakistan.
4. Pesticide residues monitoring in cotton leaves, lint, seeds, in cotton growing areas of Pakistan.
5. Pesticide residues in fruits, vegetable and water in cotton growing areas of Pakistan was monitored.
6. Pesticide residues in exportable fruits and vegetables of Pakistan.
7. Assessment of persistent organic pollutant and heavy metals in rice belt of Pakistan.
8. Colonial water-birds were used as bio-indicators of pesticide pollution.
9. Fate of pesticide residues and their impact on human health and livestock in cotton growing areas of pakistan.
10. Impact of pesticides on female cotton pickers was studied by determining the acetylcholine esterase level.
11. The effect of pesticides residues on the health of tobacco farm workers was evaluated.
12. Collaboration with Lab of Microbiology, WUR, QAU, ARID, AMC, FJWU

Fibre retting and extraction practices of Jute



Jute (*Corchorus capsularis* & *Corchorus olitorius*), Kenaf (*Hibiscus cannabinus*) and Roselle (*H. sabdariffa* var (*Altissima*) are vegetable bast fibre plants next to cotton in importance. In trade there are usually two names of jute, White and Tossa. *Corchorus capsularis* is called White Jute and *Corchorus olitorius* is called Tossa Jute. In general usually in India both kenaf and mesta designated as mesta. Jute fibres are finer and stronger than Mesta and are, therefore, better in quality. Depending on demand, price and climate, the annual production of jute and allied fibres in the world remains around 3.5 million tones. Bangladesh, India and Nepal are jute growing countries in SAARC Region.

The fibre finds its use in producing as well as in consuming countries in the agricultural, industrial, commercial and domestic fields. Sacking and Hessians (Burlap) constitute the bulk of the manufactured products. Sacking is commonly used as packaging material for various agricultural commodities viz., rice, wheat, vegetables, corn, coffee beans etc. Sacking and Hessian Cloth are also used as packing materials in the cement and fertilizer manufacturing industries (New J.H. 1993). Fine Hessian is used as carpet backing and often made into big bags for packaging other fibres viz. cotton and wool.

Jute ranks next to cotton as a natural fibre. Jute is a bast fibre crop along with a family of few other natural fibres together generally called as Jute & Allied Fibre Crops (JAF). They mainly occur in the equatorial, the tropical and the sub-tropical zones. The main species of jute and kenaf, which are the major components of JAF, under cultivation include tossa jute (Corchorus olitorius), white jute (C. capsularis), kenaf (Hibiscus cannabinus) and roselle/ mesta (H. sabdariffa)

The preference for cultivation of one species or the other varies from country to country. Jute is preferred by Bangladesh, India and Nepal; and kenaf is mainly grown in China and Indonesia, while roselle/ mesta is preferred in Thailand. The cultural and other aspects of JAF crops are more or less same while the fibre characteristics differ. The fibres of jute are relatively finer than those of kenaf and roselle; together these are called 'raw jute' because of vast similarity in majority of the characteristics and their use.

Retting practices

In general, the practice of retting jute plants in the jute growing regions is to immerse the jute bundles in clear slow flowing water, in canals, rivulets, tanks, ponds or ditches. The minimum ratio of plant material to water in stagnant water should be 1:20. The important conditions for good retting are:

World production of Jute, Kenaf and Allied Fibres from 2005/2006 to 2011/2012 in '000 Tonnes (1 tonne = 1000 Kg)

Total Jute, Kenaf & Allied Fibres:	2005/2006	2006/2007	2007/2008	2008/2009	2009/2010	2010/2011	2011/2012 (provisional)
World	2724.13	3021.1	2997.32	2596.6	2883.9	3 361.6	3 460.5
Developing Countries	2717.13	3014.1	2990.32	2589.6	2876.9	3 354.9	3 453.8
Far East	2660.87	2957.21	2934.26	2534.2	2821.4	3 308.2	3 407.1
Bangladesh	965	990	990	931	1080	1 404.5	1 323.1
China	82.82	86.8	86.8	80	80	69.0	70.0
India	1530	1800	1782	1476	1620	1 800.0	1 980.0
Cambodia	0.8	0.6	0.3	0.3	0.3		
Indonesia	7	3.1	4	3.8	3.8	4.0	4.0
Myanmar	36.89	43.6	19.1	12.9	8	7.8	3.8
Nepal	17.66	17.1	16.8	2.9	1.8	14.4	15.0
Thailand	4.6	3.6	2.2	2.9	1.8	1.7	1.3
Vietnam	15	10.6	31	8.8	9	5.0	8.2
Other	2.41	2.36	1.8	1.8	1.8	1.8	1.8

Source: Food and Agriculture Organization (FAO)

(Continued on page 12)

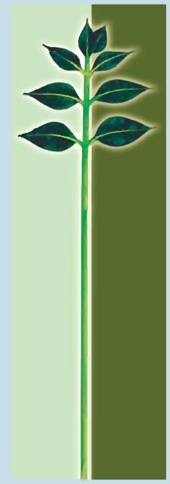
Joining

Mrs. Mafruha Begum joined SAARC Agriculture Centre (SAC) as Senior Program Officer (Information and Communication) on 1 April 2013. Before joining the present position she worked as Communication Media Officer at SAC since 1993. Mrs. Mafruha did her Masters in Drawing and Painting from the Faculty of Fine Arts, University of Dhaka. She was the lecturer at Mymensingh Girls Cadet College.

Mr. Md. Nure Alam Siddiky, has been appointed as Senior Program Officer (Livestock) on 1st April 2013 at SAARC Agriculture centre (SAC). Earlier he was as Program Officer (Livestock) of the centre. He started his career at SAC on 5th July 2009. Before joining at SAC he was scientist of national livestock system. He awarded his DVM and MS in Microbiology degree from Bangladesh Agricultural University, Mymensingh.

Mr. Golam Mustafa joined SAARC Agriculture Centre (SAC) as Senior Program Officer (Fisheries) on 1 April 2013. Prior to joining at SAC he was as Program Officer (Fisheries) at the centre. He has more than eight years experience in the field of fisheries, ecology and water resources in different national and international organizations.

Submit research or review article for SJA



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Fibre retting and extraction (from page 10)

• The water should be non-saline and clear

• The volume of water should be enough to allow jute bundles to float

• Bundles, when immersed, should not touch the bottom

• The same retting tank or ditch should not be used when water becomes dirtier

Retting has been used for a long time in case of extraction of fibres from jute and allied vegetable fibre plants. Since the fibres are contained in the bark or the outer skins of stems, either stems or the outer skins called ribbons are retted for extracting the fibres. If the stems are retted, it is called stem retting. If ribbons are retted it is called ribbon retting. Retting is an important step in the production of good quality fibre. The existing practices of retting in the major producing countries are described below.

Retting Practices in India and Bangladesh

Crop is harvested at different stages of maturity depending on various circumstances. Most common harvest stage is when 50% of the plants have produced pods. If the crop is harvested at this stage, both the yield and fibre quality are good. Bundles are kept under water in 2-3 layers. The retting of the whole plants gets completed in about 15-20 days

Retting Practices in China

Jute is harvested at 50% flower and 50% capsule stage. Kenaf is harvested at 50% leaf shedding and a few capsule-maturing stages. After harvesting, the plants are dried for 1-2 days for defoliation. Each bundle contains about 30 plants. The bundles so made are transported to retting places which include ditches, ponds, lakes, streams and rivers.

Double Immersion / Single-Wash-Retting in China:

Harvested or uprooted JAF plants are kept immersed under water for 5-7 days first. For weighing down the plants under water, stones or soil are used. After this period of submersion, the plants are taken out and ribboned. The ribbons are bundled and again immersed in water for retting until the fibre can be extracted from the ribbons.

Extraction Practices

After completion of retting of the plants/stems, the extraction of fibres from the retted plants, their washing and drying starts. If the stripping is delayed, biodegradation of the fibres takes place and the fibre quality is affected

Single Stem Stripping

In this step bundles of retted plants are placed in front. Two to three plants are taken out of the bundles at a time. using fingers, the heavy non-fibrous matters of the basal areas are scraped off, some fibres of the area are peeled, the fibres of the basal areas are grabbed and the fibres of the whole plants are peeled off from the woody core called jute sticks

Stripping and Washing or Wash-Jerk-Method

Stripper stands in 0.5 - 0.7 m deep water, picks up 8-10 stems at a time, mallets the butt ends till the fibre is loosened, separates the fibres, wraps it around the fingers, and jerks the remaining portion horizontally on the water surface. As fibre is separated further, it is wrapped around the palm / wrist and the process is continued till the fibre has been completely separated. After this, the fibre is lashed on the water surface 2-3 times completing the washing. The washed fibre is folded, wrangled and kept on the bank of the retting place.

All process in the jute sector are free from child labour . None of these activities can be physically performed by children. IJSG regrets the inadvertent and mistaken presentation of facts in this regard

Fibre Quality

Quality of Fibre and Economic significance

The quality of jute fibre is judged by its suitability for the production of various types of yarn and its behaviour in the manufacturing process. The fibre which spins into the finest yarn is considered to be of very good quality.

Jute fibre is marketed in bundles of fibre hanks. A fibre hank is composed of about 10-15 fibre reeds obtained from 10-15 plants. Each fibre reed is composed of thousands of fibre strands made of ultimate fibres with lignin and pectic substances, the cementing materials. Commercially fibre quality is assessed by taking a hank out of a lot, spreading the individual reeds on the ground and then assessing the different characteristics by `look & touch' method.

Fibre Characteristics

The different characteristics of the fibre which are usually taken into consideration for the assessment of quality usually include root content, colour, lustre, strength, defects etc. They are described below

Root Content

These are hardy incompletely decomposed basal or root areas of the fibre. It occurs more in white jute than in tossa jute. For processing in the factories and before export, these, constituting about 12.5 to 39.0 cm, are cut away and separately sold at a much cheaper price

Source: http://www.jute.org/plant.htm

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