Volume 14 No. 3 July-September 2008

# ICAR

## A SCIENCE AND TECHNOLOGY NEWSLETTER

# NEWS

## RESEARCH UPDATE



## PROMISING TECHNOLOGIES

# Production of enriched compost

IARI, New Delhi. In India, about 160 million tonnes of rock phosphate deposits are available, mostly of low-grade containing less than 20% $P_2O_5$ that are considered unsuitable for manufacturing commercial phosphatic fertilizers. The low-grade indigenous reserves perform reasonably well in acid soils but need suitable modifications for their use in neutral and slightly alkaline soils.

And so the production of phosphatic fertilizers mainly depends on the import of raw materials, high-grade rock phosphate and sulphur, imposing heavy burden on government exchequer.

Potassic fertilizers used in the country are also imported.

### Advantages of the compost

- Large quantities of crop residues/ stubbles may be recycled back to field.
- Substantial amounts of rock phosphate and waste-mica may be recycled in agriculture.
- Huge amount of foreign exchange can be saved.
- Production of enriched compost may be taken up as a viable rural entrepreneurship.

**Indian Council of Agricultural Research**
Krishi Bhavan, New Delhi 110 001, India
www.icar.org.in

# PROMISING TECHNOLOGIES

With enriched compost, 50% N could be substituted for potato (*left*) and greengram (*right*)

The world's largest deposits of muscovite mica, a K-bearing mineral containing 9-10% $K_2O$, are distributed over a total area of about 4,000 $km^2$ in Munger district of Bihar and Koderma and Giridih districts of Jharkhand. Waste micas which are generated in large quantities during cleaning of raw micas after their mining are dumped near mica-mines.

Further, huge quantities of crop residues, particularly rice straw, which is generally burnt in the field for sowing wheat in northern India, can be effectively recycled to agriculture by converting them into good quality manure.

A new technology has been developed to prepare rock phosphate and waste-mica enriched organo-mineral fertilizer (rock phosphate and waste-mica enriched compost). This would reduce dependence on costly inorganic P and K fertilizers and save precious foreign exchange, besides providing an environmentally sound and economically feasible solution to problems of waste management.

## Enriched compost preparation

Rock phosphate and waste-mica enriched compost can be prepared by trench or pit method.

**Filling trench or pit**. Trench or pit is filled layer-wise (5-6 layers). Biodegradable organic material—crop residues, farm wastes, animal feed wastes and tree leaves are spread on the floor of the trench (about 20-cm thick layer). A layer of rock phosphate, followed by waste mica is then spread over biodegradable organic material. Cattle-dung is made into slurry by adding water, and this is sprinkled over rock phosphate and waste-mica layer. Layering is repeated till whole compostable materials are added. Moisture content is maintained throughout the composting period at 60% of water-holding capacity. Periodic turning (monthly interval) is done to provide aeration. After one month of composting, surface of composting mass is plastered with slurry of cow-dung and soil. To protect composting mass from rainwater, the surface of composting trench or pit is covered by suitable polyethylene. Composting is continued for 4 months. This compost contains higher available $P_2O_5$ and $K_2O$ than ordinary compost.

## Economics of enriched compost

Cost of retail price of 1 kg $P_2O_5$ and $K_2O$ from diammonium phosphate (DAP) and muriate of potash (KCl) is Rs 16.22 and Rs 7.43 respectively. And cost of preparation of enriched compost using rock phosphate and waste mica is only Rs 7.

## Effects on crops

This compost was also effective in terms of its residual effects on the succeeding crops. Besides significant build-up of organic C, available N, P and K were noticed with the addition of this compost over ordinary compost. Enriched compost enhanced exchangeable, non-exchangeable and total K in soil after crop harvest. With this, 50% N could be substituted for wheat, greengram, potato, soybean and other crops. Demerits of bulky organic materials like FYM and ordinary compost can also be overcome to a greater extent through the compost.

**D.R. Biswas, IARI,** New Delhi
e-mail: drb_ssac@yahoo.com;
drb_ssac@iari.res.in

# Carp breeding in controlled environment for the first time

Rohu and catla were bred during winter, and spawn (seed) was produced successfully at carp hatchery, CIFA, under controlled conditions manipulating environmental cues to advance gonadal maturation. For the first time, rohu was bred on 24 January, 9 February and 12 March 2008 and catla was bred on 26 February 2008, while season of carp breeding in India is usually during May-August, depending on the onset of monsoon. Therefore, suitable fish fingerlings

Mature catla female ready for breeding in February 2008

(80-100 mm) for grow-out culture are normally available earliest by September. The present breakthrough would enable farmers to have fingerlings by May for stocking

Mature rohu female ready for breeding in January 2008

in ponds and reservoirs, and they will be available to be utilized for at least five more months as growing period under suitable environment for fast growth during April-October. The farmers and entrepreneurs are expected to be highly benefited from this. Besides, this may open-up future possibilities of breeding and seed production of carps round-the-year.

**N. Sarangi,** CIFA, Bhubaneshwar
e-mail: cifa@ori.nic.in

# A cost-effective IPM module for fruit-fly management on mango

Mango is an important host for fruit-fly. This fruit crop is cultivated all-over India, and serves as the major source of income to many farmers. Fruit-fly incidence on mango is severe in many states up to 40%. A cost-effective and low pesticide demanding IPM module for fruit-fly management consisting of male annihilation technique (MAT) and bait application technique (BAT) has been developed and tested on a large area in Orissa.

## Male annihilation technique

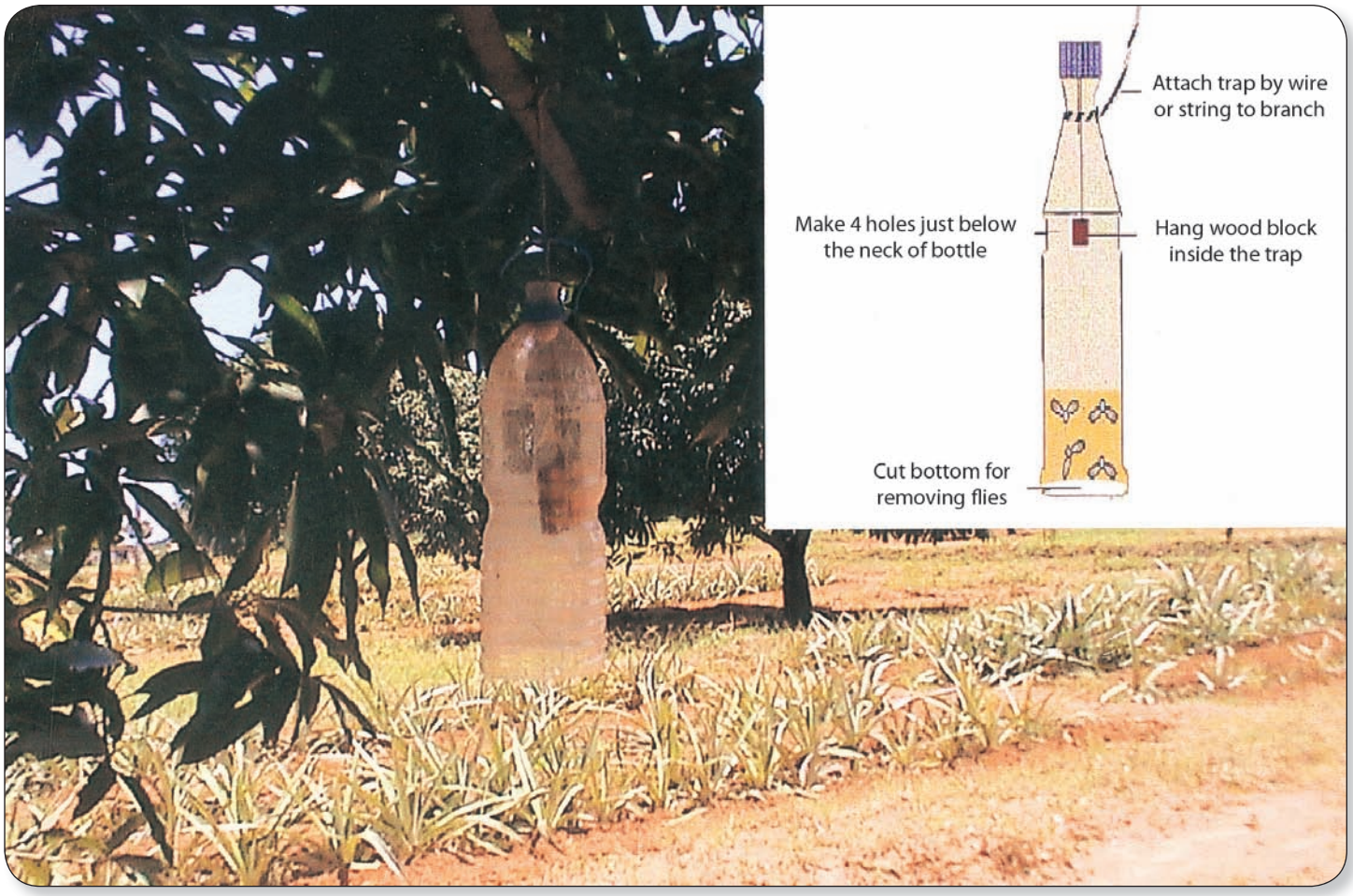
Preparation and application of male lure combined with an insecticide to reduce male population of fruit-flies to such a low level that mating does not occur is called male annihilation technique (MAT). Methyl eugenol is a sex para-pheromone (female pheromone analogue). This pheromone analogue supplemented with insecticide attracts and kills a large number of males. Thereby there is less or no female fertilization leading to infertile eggs. A home-made trap can be prepared with used plastic bottles.

## Bait application technique

After emerging from pupae, adults require protein and sugar for maturation. Taking the advantage of this, poison bait is prepared and spot sprayed on the orchard. Bait sprays have advantage over insecticide sprays, as they are applied as spot treatment that has minimal impact on natural enemies. This technique works in two ways: first, male flies escaping MAT are attracted and killed, further reducing chances of mating and second, emigrating fertilized females from non-treated areas as well as locally fertilized females are killed.

Spot spray is done at one place in the centre of tree canopy in high density crop and at two places in low density plantation. Since fruit-flies rest in surrounding bushes and non-host trees, these should also be spot sprayed.

The MAT- and BAT- treated orchards had only 2.43% fly infestation as against 35.67% in non-treated orchards and 16.43% in




### Tips

- Field application may be started 45 days prior to fruit maturity.
- One or two rounds of MAT and 6-8 rounds of BAT are needed in 45 days.
- For enhanced efficiency, field sanitation (orchard cleaning, collection and destruction of fallen fruits) may be carried out regularly.

pesticide-sprayed orchards. Demonstration at the farmers' fields indicated that lesser number of BAT sprays provide lesser protection and vice versa. Therefore, it is recommended that two applications of MAT and 6-8 rounds of BAT at 6 to 8 days intervals can give high degree of fruit protection as well as high benefit: cost ratio.

## Socio-economic implication

The technology is resource neutral; hence, even resource-poor farmers may reduce the use of pesticides in mango. There is no negative impact of the technology. The technology results in high degree of fruit protection as well as high benefit : cost ratio in comparison to pesticide spray. As the technology requires meagre quantity of insecticides in traps and as spot spray, it has little impact on the ecosystem, natural enemies and health of consumers.

**H. S. Singh, A. Verghese, G. Naik, S. George, V. Pandey** and **Vishal Nath**
Central Horticultural Experiment Station
P.O. Aiginia, Bhubaneshwar, Orissa 751 019

# Collection of sunnhemp and documentation of traditional knowledge

NBPGR, New Delhi. An exploration was undertaken for collection of sunnhemp germplasm from Bundelkhand region of Madhya Pradesh and Uttar Pradesh by the National Bureau of Plant Genetic Resources (NBPGR), New Delhi, in collaboration with the Central Research Institute for Jute and Allied Fibres (CRIJAF), Barrackpore, in December 2007. A total of 24 accessions were collected from Datia, Chhatarpur, Tikamgarh, Sagar (Madhya Pradesh), and Mathura, Jhansi, Mahoba and Hamirpur (Uttar Pradesh). Thick and long stemmed accessions (IC 558471, 558472, 558473) were collected along with short stem and thin lint type (*desi*), which are desired characters for improvement of sunnhemp.

Sunnhemp basically rainfed is being cultivated by the tribal/farming communities of the region. Seeds are sown in July-August, just after pre-monsoon rains. About 75 kg seeds/ha are sufficient for sowing in one acre (0.4 ha) of land. Manuring and weeding is not done. The crop is cut down for green manuring in September-October; only some stands are kept for seeds up to December. The fibres extracted from September-October are considered good as far as quality is concerned. For extraction of fibres, cut stem bundles are dried in the sun for 10-12 days and then dipped into muddy water for 6-7 days. Muddy water enhances process of retting. For extraction of fibres, a bundle of about 10-12 retted stems/sticks is broken at the top by applying gentle force downwards that separates bast fibres. Extracted fibres are hung either on wooden sticks or ropes for drying and draining-out water. For making ropes, raw fibres are again dipped into water for about 10-15 minutes. The rope is prepared by a wooden structure, which has three main parts, called *takali*, *takan-bai* and *peedi* (used for sitting during rope-making process). End-products from fibres are ropes, which are mostly used for making cots and for tying cattle. The seeds are kept in jute bags for next year's sowing. The straw from the crop is used as fodder. The flowers are cooked as vegetables in scarcity and are considered good for stomach problems. It is believed that using seeds as fodder help in increasing quantity of milk. Sticks are also used for thatching material. The farmers of the region informed that they earned about Rs 12,500/ha annually by selling sunnhemp products.

**K. C. Bhatt**[1], **A. K. Mahapatra**[2] and **Dipankar Shah**[2]
[1]National Bureau of Plant Genetic Resources
New Delhi 110012;
e-mail: kcbhattps@yahoo.com
[2]Central Research Institute for Jute and Allied Fibres
Barrackpore, West Bengal

Drying of extracted raw fibres

Traditional method of rope-making from fibres

## Residue management saves irrigation water in rice–wheat crop

PDCSR, Modipuram. In irrigated areas about 90% of wheat is cultivated after harvest of rice and cotton, leading to short window of time available for land preparations for wheat. It normally takes 2-3 weeks for rice fields to become suitable for land preparations due to its high moisture. Delay in planting of wheat after 20 November reduces potential wheat yield by 1% per day.

Wheat crop raised under *in-situ* managed rice stubbles gives better yield

The on-farm evaluation trial was conducted with 12 farmers in 2006-07 by using second-generation machinery, Happy and Turbo Seeders when 6 tonnes of rice residues/ha were left on the field that was to be cultivated for the next wheat crop. Wheat was sown with these machines under zero-till condition. There was increase in wheat grain yield with Happy Seeder (5.75 tonnes/ha) and Turbo Seeder (5.8 tonnes/ha) over conventional method (5.55 tonnes/ha). Resource saving was recorded when seeders were used, 7-10 days time-saving was recorded with the seeders as compared to the conventional method. About Rs 1,500-2,000 and Rs 1,200-1,800 were saved respectively with Happy and Turbo seeders. Use of the seeders also saved 20-30% water for first irrigation after sowing and 10-15% in subsequent ones.

**M.S. Gill,** PDCSR
Modipuram, Meerut
Uttar Pradesh
e-mail: director@pdcsr.ernet.in

## Bio-intensive cropping system ensuring efficient resource use

Greengram in summer rejuvenates soil system for the next *kharif* crop

Mustard and lentil in *rabi*

PDCSR, Modipuram. The bio-intensive system of raising maize for cobs + vegetable cowpea in 1:1 ratio on broad beds and sesbania in furrows in *kharif* and mustard in furrows and 3 rows of lentil on broad beds in *rabi* and 3 rows of greengram on beds in summer proved better, and resulted in rice equivalent yield of 17.82 tonnes/ha with productivity of 48.83 kg grain/ha/day and profitability of Rs 176.7/ha/day as compared to conventional cropping of rice–wheat (rice equivalent yield of 11.07 tonnes/ha). The furrows served as drainage channels during heavy rains in *kharif* which were utilized for *in-situ* green manuring with 40 tonnes of green foliage/ha, incorporated 45 days after sowing, and timely-sown mustard crop in these furrows resulted in a good harvest (2.24 tonnes/ha), besides additional yield of lentil (0.13 tonne/ha) and saving of 33% of irrigation water; applied only in furrows. In the summer, greengram yielded 1.2 tonnes/ha as grains while incorporation of green foliage of 4.5 tonnes/ha in soil favoured the system.

**M.S. Gill,** PDCSR
Modipuram, Meerut
Uttar Pradesh
e-mail: director@pdcsr.ernet.in

# Mango Genetic Resource Database and Information System

CISH, Lucknow. Mango Genetic Resource Database and Information System was developed to manage genomic, phenotypic and crop information. The database was developed in MySQL (mysql, 2007) on a Linux platform and is being updated regularly. The database contains three major components: (i) Phenotypic data of the plant and fruits, the details of the fruit and the characteristic features, which can be used in deciding the economic importance of the accessions, (ii) Molecular data include curated molecular data from NCBI, USA, and accession characterization information, and (iii) Published information and links including research papers, reports, proceedings, journals, authors etc. from 1972 to 2008. The interface of the database is Hypertext Pre-processor, especially suited for web development. It is used for searching dataset by allowing, and also to create dynamic content that interacts with database. Server-enabled script was used for keyword search such as accession number, local name, overall quality, use and period of maturity. The digitized literature is also accessible in dynamic manner. The database is based on relational database model with records. The information system reveals about the geographical distribution, *Mangifera* species, varieties, botanical description and taxonomy, area, production and productivity, production technology, diseases and pests etc. The information system will also work as the National database for the accessions available in the field genebanks in different parts of the country. The database offers accession information input facility for the field genebank curators.

**Shailendra Rajan Ram,**
**Shankar Barai, Tanmaya Kumar Sahu** and
**L.P. Yadava**
e-mail: director@cish.ernet.in

# NEW INITIATIVES

## First buffalo calf born through ovum-pick-up (OPU) technology

From 313 OPU sessions in 6 buffaloes, 729 oocytes were collected, and from these 139 embryos were produced. Twentynine embryos were transferred into 27 synchronized surrogate mothers. Two buffaloes (M21, M69) were found pregnant 90 days after embryo transfer, one buffalo (M21) aborted at 4½ month of gestation (male calf with gross structural abnormalities), and the other buffalo (M69) carried pregnancy full-term; in this buffalo the embryo derived through OPU-IVF technology was transferred in the left horn on 23 November 2007 at 12:30 pm. She delivered normal male calf weighing 25 kg on 28 September 2008 at 5:00 am. Surrogate mother (M 69) was quite healthy and expelled fetal membranes within three hours. Calf was quite active after feeding colostrum three hours after birth.

This is a significant achievement in the field of Animal Reproduction, as it has proved that progenies could be produced from not only elite animals but also from infertile animals of high pedigree. This technology would help increase reproductive efficiency of particular animal many-fold, even faster than embryo transfer technology (ETT). Also it would be utilized for production of quality embryos at faster rate in the laboratory which could be further used for micromanipulations, genetic studies, transfer or production of transgenic animals in future. It will be directly useful in producing elite animals at faster rate and high pedigreed males can be utilized for production of high quality semen and further use in genetic improvement of livestock at wider scale.

**Shiv Prasad**, GBPUAT
Pantnagar, Uttarakhand 263 145
e-mail: anilpsharma2000@yahoo.com

## FRP fishing boats in Rajasthan

CIFT, Cochin. Earlier CIFT had been successful in introducing FRP boats in Asom, Manipur, Kerala and Arunachal Pradesh.

College of Fisheries, Maharana Pratap University for Agriculture and Technology (MPUAT), Rajasthan, and the Fisheries Survey and Investigation Office, Department of Fisheries, Rajasthan, collaborated with the CIFT for these boats. Rajasthan offers vast potential for the development of fisheries with about 3,131 water-bodies.

The initial investment on boat is slightly higher but it is compensated by maintenance-free life provided by it. The boats are durable and an estimated life of 30 years is guaranteed for such boats.

FRP boats can be used for surveillance purposes, and will aid in better management of water-bodies.

**K. Devadasan,** CIFT, Cochin
e-mail: cift@ciftmail.org

## Ultra-violet chamber for sterilization of *Corcyra* eggs

NCIPM, New Delhi. For mass production of Trichogramma, Corcyra eggs need to be sterilized before use. And for quick and uniform sterilization of the eggs, a new type of sterilization chamber has been developed.

The chamber comprises a cuboid box, 105-cm long, 88-cm broad and 105-cm high. It is closed on all sides except from the front. And is divided into two equal parts by a horizontal partition. Each partition is provided with a drawer which has semi-circular base of 35 cm radius. The cross section of this drawer is semi-circular. The length of the drawer is 100 cm. In the inner surface of the semi-circular base, the drawer is provided with longitudinal flanges of 2-mm thickness and 9-cm apart. These flanges prevent egg bearing cards to glide one over other from curved surface. Postcard size cards 75 in total bearing eggs on its upper surface can be arranged in one drawer. The drawers can be pulled out and pushed back in place easily.

The ceiling of each drawer is provided with a 30W UV tube-light. Each tube is connected with a 30 minutes timer. The timer can be set for a least count of one minute. The timer prevents over-exposure or under-exposure of cards.

Cards are exposed to UV radiations in a closed box, hence undesired exposure to UV radiations is ruled out.

### Sterilization chamber features

Since source of light is at the centre of the curve, exposure by UV rays is uniform on the card surface.

As there are two drawers, time required to arrange cards in one drawer is sufficient to sterilize cards in the other drawer. Thus 75 cards per 10 minutes can be sterilized using these drawers alternately.

**O.M. Bambawale,** NCIPM, New Delhi
e-mail: ipmnet@bol.net.in

# Indian Veterinary Research Institute

## IN THE SERVICE OF NATION

**The Indian Veterinary Research Institute (IVRI) is one of the premier research institutions in the South-East Asia, where integrated training and research facilities in livestock health, production and extension are being carried out. The Institute takes a legitimate pride in its contributions and distinguished services pro rata in achieving the national goals of self-sufficiency and progress, and has earned a status of National Institute.**

| LANDMARKS | |
|---|---|
| 1889 | Foundation of Imperial Bacteriological Laboratory (IBL) at Pune, Maharashtra |
| 1890 | Appointment of Dr Alfred Lingard, a noted medical scientist as the founder Director |
| 1893 | Shifting of the IBL to Mukteshwar, Kumaon Hills of Uttar Pradesh (now in Uttarakhand). |
| 1897 | Historical visit of renowned bacteriologists, Dr Robert Koch, Dr R Pfeiffer and Dr G Gaffky |
| 1899 | Production of first batch of anti-rinderpest serum |
| 1913 | Birth of Izatnagar campus |
| 1925 | Renaming as Imperial Institute of Veterinary Research |
| 1927 | Development of goat tissue vaccine (GTV) by Dr JT Edwards |
| 1930 | Renaming as Imperial Veterinary Serum Institute |
| 1936 | Renaming as Imperial Veterinary Research Institute (IVRI) |
| 1940 | Development of vaccine against Ranikhet disease of poultry |
| 1947 | Shifting of Headquarters of the Institute from Mukteshwar to Izatnagar and renaming as Indian Veterinary Research Institute (IVRI) under Govt of India |
| 1958 | Establishment of a post- graduate College of Animal Sciences at Mukteshwar, affiliated to Agra University |
| 1966 | Transfer of administrative control to Indian Council of Agricultural Research and recognition as a National Institute |
| 1967 | Establishment of Regional Station at Palampur (Himachal Pradesh) |
| 1969 | Establishment of Regional Station at Port Blair (A&N Islands) |
| 1970 | Establishment of a Regional Station at Kolkata (formerly Calcutta) |
| 1971 | Establishment of IVRI Campus at Bangalore |
| 1973 | Development of irradiated lung worm vaccine and establishment of Vaccine Production Centre at Srinagar |
| 1982 | Establishment of Germplasm Centre at Izatnagar |
| 1983 | Conferment of Deemed University status by the University Grants Commission to IVRI, Izatnagar |
| 1986 | Establishment of National Biotechnology Centre (NBC) at Izatnagar |
| 1986 | Establishment of a Centre for Animal Disease Research and Diagnosis (CADRAD) at Izatnagar |
| 1988 | Establishment of High Security Animal Disease Laboratory at Bhopal |
| 1990 | Special convocation |
| 2000 | Dedication of High Security Animal Disease Laboratory to the nation |
| 2001 | Development of competitive- ELISA diagnostic kit for rinderprest, approved by OIE and validated by IAH, Pirbright, UK |
| 2001 | P2 facility for FMD vaccine quality control created at animal experimental station, Yelhanka, IVRI, Bangalore |
| 2001 | Conferment of Sardar Patel Outstanding ICAR Institution Award |
| 2002 | Development of live modified PPR vaccine |
| 2004 | Establishment of Kisan Call Centre at Izatnagar |
| 2004 | Inauguration of University-cum-Administrative Building |
| 2004 | Dedication of Polyclinic to the nation |
| 2005 | Awards of ISO 9001:2000 Certificate by the International Certificate Services Asia to the CADRAD |
| 2006 | Bird Flu Vaccine developed at IVRI, Bhopal Campus |
| 2007 | Development of synthetic crossbred cattle – Vrindavani |
| 2007 | Freedom from contagious bovine pleura pneumonia (CBPP) infection in India |
| 2008 | A low volume saponified HS Vaccine found safe and effective in farm cattle |

# PROFILE

## HISTORY

On the recommendation of the Cattle Plague Commission, the Institute, then known as Imperial Bacteriological Laboratory, had its genesis on 9 December 1889 at Pune, and was later relocated at Mukteshwar, the Kumaon Hills in 1893 to facilitate segregation and quarantine of highly contagious organisms. The Izatnagar Campus, the present Headquarters of the Institute, came into existence in 1913. In 1925, the former Imperial Bacteriological Laboratory was redesignated as the Imperial Veterinary Research Institute. After independence, the name of the Institute was changed to Indian Veterinary Research Institute. The Institute was conferred the Deemed-to-be-University status by University Grants Commission, Govt of India in 1983.


## MANDATE

- To conduct research, to provide post-graduate education and to transfer technologies in all areas of animal sciences with emphasis on animal health and production.
- To act as the National Referral Centre for veterinary type cultures, disease diagnosis, biologicals and immunodiagnostics etc.

## INFRASTRUCTURE

The Institute has 4 campuses, viz. Izatnagar (Uttar Pradesh), Bangalore (Karnataka), Mukteshwar (Uttarakhand) and Bhopal (Madhya Pradesh) and 3 regional stations at Kolkata (West Bengal), Srinagar (Jammu and Kashmir), presently stationed at Mukteshwar and Palampur (Himachal Pradesh), and functions through 21 research divisions, besides Centres for Animal Disease Research and Diagnosis, and Wildlife Conservation, Management and Disease Surveillance sections and other supporting central facilities. In its 119 years of eventful journey, the Institute has been the torchbearer for pioneering research contributions and quality post-graduate education in veterinary and animal sciences.

### National Library of Veterinary Sciences

The library was started as an integral part of the Imperial Bacteriological Laboratory since its inception in 1889. It subscribes 225 foreign and 130 Indian journals. The library also subscribes AGRIS, BEAST, VET, BIOLOGICAL ABST., BIOTECHNOLOGY ABST., FSTA, MEDLINE EXPRESS and Current Contents on life sciences and Agri.bio.environmental sciences databases on CD-ROM. A microfilming unit has been set up. About 782 files containing 38,968 pages of manuscripts on Rinderpest research records, 66 theses and 210 rare, very old publications have been microfilmed. The library is connected on LAN with facilities for internet to all important libraries of the world

### ARIS Cell and Bioinformatics Centre

Statistical analysis using computer programmes was initiated in 1972. The computer centre was established in 1986, the Bioinformatics centre in 1992 and the ARIS cell came into existence in 1996-97. The ARIS cell and the Bioinformatics centre provide internet accessibility and LAN facility at the IVRI, Izatnagar. They have developed databases including Theses database, Publication database, Archive database, Rumen Microbiology database, Lignin, FMD database, Biotechnology database, Embryo Transfer database, Plasmids and recombinant DNA database, Yak database and Scientists' biodata database.

### Recognitions at a glance

The Institute made rapid strides, and achieved all-round progress leading to award of the prestigious Sardar Patel Outstanding ICAR Best Institution Award, Best Annual Report Award, Hari Om Ashram Trust Award, ICAR First Prize for Rajarshi Tandon Rajbhasha Puraskar Yojna, Swadeshi Puraskar and Aryabhat Puraskar of Vigyan Bharti, Rafi Ahmed Kidwai Memorial Awards, ICAR Special Awards for Women, Jawaharlal Nehru Awards, Lal Bahadur Shastri Young Scientist Award, Swami Sahajanand Saraswati Extension Scientist Award, Sneh Lata Memorial Award, National Bioscience Award and WIPO, Geneva Award for outstanding PG research for outstanding contributions in research, education and technology transfer activities.

Modular laboratory building

## Communication Centre

The centre established in 1986 mainly consists of Press Unit, Central Photo Laboratory, Media Unit, Central Arts Section, Bindery Section, Reprography Section, Central Typing Pool and Publication and Information Section.

## MISSION

Undertaking pioneering research in veterinary and animal sciences with holistic approach, promoting high-quality education and training, developing systems and technologies for better animal health-care and production, and their transfer to end-users, functioning as an effective instrument for nutritional security, poverty alleviation and rural construction.

## Centre for Animal Disease Research and Diagnosis (CADRAD)

The CADRAD was established in 1986 with the main objective to act as an apex body in disease diagnosis, monitoring and surveillance of notifiable and reportable diseases, standardize diagnostic tests, develop linkages with central and state agencies dealing with control and prevention of diseases, and to impart teaching and training to personnel.

Vrindavani, synthetic crossbred cattle

## Agriculture Technology Information Centre (ATIC)

The ATIC was established in 2000. This centre is effectively involved in providing technical information to farmers. The centre is also involved in conducting educational tours of farmers, students, extension workers and other officials to various divisions and sections of this Institute. The centre is also providing consultancy services through telephone and postal media.

## Kisan Call Centre (KCC) and Helpline

A node of KCC is situated at the IVRI which is a toll free number (1551) and caters to livestock owners of four states-Uttar Pradesh, Madhya Pradesh, Uttarakhand and Chattisgarh. Another telephonic advisory service is provided through IVRI helpline number 2311111.

## Krishi Vigyan Kendra (KVK)

The KVK is involved in dissemina-ting information to livestock owners.

## Others

Farm Machinery and Power, Feed Technology, Engineering, Medical Hospital, Estate, Horticulture, Rajbhasha Anubhag, Security, Guest Houses provide constant support to the Institute.

## Campuses and Regional Stations

**IVRI, Mukteshwar.** This campus was established in August 1893. It focuses research on animal viruses and viral disease of livestock and poultry, preparation and production of antigens, diagnostic sera, vaccines, epizootiological and pathological studies on viral diseases, monitoring, surveillance and diagnosis of economically important diseases.

**IVRI, Bangalore.**The Bangalore Campus established in 1972 focuses on research and improvement of existing FMD vaccine production and evaluation of quality.

**IVRI, Bhopal.** One of the major achievements of IVRI was the development of a High Security Animal Disease Laboratory in 1998. The laboratory has the state-of-the-art hi-tech biocontainment facilities to maintain absolute microbiological safety and security for handling exotic animal disease problems threatening Indian livestock and poultry. The laboratory was dedicated to the nation in 2000.

**IVRI, Palampur.** The Palampur regional station established in 1959 cater to research needs of livestock owners in North-West

Humid Himalayan Region. The focus is on the development of animal feeding systems using locally available feed resources and investigation of various health problems.

**IVRI, Kolkata.** The station at Kolkata was established in 1970 for training specialists in veterinary public health. The Regional Station extends referral diagnostic services to whole of eastern and north-eastern states, especially on rabies, brucellosis, tuberculosis, hydatidosis, amphistomiasis, leishmaniasis, theileriasis, poultry diseases and mycotic diseases.

**IVRI, Srinagar.** The regional station at Srinagar was established in 1973 following recommendations of the National Commission of Agriculture for control of parasitic bronchitis in sheep.

## Deemed University

The Institute acquired deemed university status in 1983, and at present offers Master's programmes in 22 disciplines, PhD programme in 19 disciplines, and National diploma courses in 9 disciplines, besides several short-term specialized training courses.

### TECHNOLOGIES COMMERCIALIZED

- Indigenous drug formulations against skin diseases of animals 'Olinall"
- Technology for an "area- specific mineral mixture to increase productivity of bovines for Uttarakhand and Uttar Pradesh"
- Development of an indigenous methodology "IVRI Crystoscope as a field tool for determining optimum time for fertile insemination in animals".
- An Asian origin "live attenuated homologous vaccine for peste de petits ruminants (PPR)".
- Foot- and-Mouth Disease Vaccine

### TECHNOLOGIES PATENTED/ REGISTERED FOR PATENT

IVRI has registered around fourty (40) technologies for patenting which makes it a leader institute of ICAR in patent submission.

## TECHNOLOGIES DEVELOPED

The major focus of the Institute has been on the development of sensitive and specific diagnostics and immunoprophylactics. More than 44 immunobiologicals against many bacterial, viral and parasitic diseases of economic importance have been developed making country self-reliant in veterinary medicine.

### Veterinary Biologicals

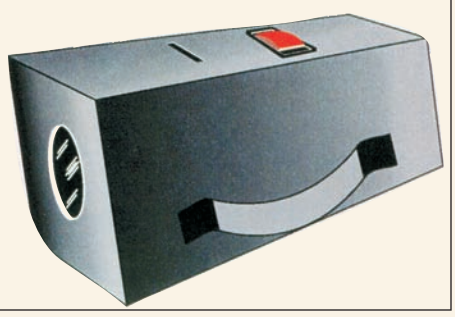
• Goat, calf kidney and lamb kidney tissue culture anti-rinderpest vaccine • Monovalent and polyvalent foot-and-mouth disease vaccine • Sheep and goat pox vaccine • African horse sickness vaccine • Canine distemper vaccine • Attenuated live infectious bovine rhinotracheitis (IBR) vaccine • Crystal violet vaccine against swine fever • Ranikhet disease (Mukteshwar strain) vaccine • HVT vaccine against Marek's disease • Vaccine against infectious bursal disease (IBD) • Egg drop syndrome (EDS) strain 76 inactivated oil emulsion vaccine • Anti-anthrax serum and Anthrax spore vaccine • Anti-haemorrhagic septicaemia (HS) serum and oil adjuvant HS vaccine • Vaccines against black quarter (BQ),

FMD vaccine production, Bangalore

Veterinary biologicals

Veterinary biologicals

Crystoscope



### New Feeds and Improved Techniques

- Area-specific mineral mixture for livestock of Uttar Pradesh, Uttarakhand and Delhi
- Strategic supplementation modules for better utilization of crop residues
- Economic and user-friendly techniques for effective use of agro-industrial byproducts as feed supplements
- Development of urea molasses liquid feed, urea molasses mineral block and sugarcane bagasse as scarcity feeds
- Feeding schedules and practices for optimizing animal productivity and health
- Strategies of rumen manipulation to improve fibre utilization and reduce environmental pollution
- Technology for complete feed block to ease roughage transportation

enterotoxaemia, contagious caprine pleuropneumonia • Carbolized anti-rabies vaccine and Live attenuated vaccine • Metazoan radiation attenuated vaccine (DIFIL) against *Dictyocaulus filaria* • Vaccine against *Theileria annulata* • Tissue culture PPR vaccine.

## Veterinary Diagnostics

• Counter-current-immuno electro-phoresis, micro-snt-ELISA, single radial haemolysis test for diagnosis of rinderpest disease • Micro CFT, micro SNT, Sandwich ELISA, Liquid Phase ELISA, dot-blot technique for FMD diagnosis • Diagnostic kit (AGPT) ELISA for bluetongue in buffalo, sheep, goat and cattle • Kit for monitoring immune response against Ranikhet disease • MATSA test for detecting pre-clinical Marek's disease in chicken and quail • Embryo susceptibility test for avian encephalomyelitis diagnosis • Allergic test for diagnosis of acute respiratory mycoplasmosis in poultry • COFAL test for diagnosis of avian leucosis virus (ALV) infection • Bronchoscopy for diagnosis of respiratory infections • Latex agglutination test, Dot-ELISA for diagnosis of leptospirosis • Mammalian and avian tuberculin and ELISA for diagnosis of tuberculosis (TB) and ELISA for paratuberculosis • ABR antigen for diagnosis of brucellosis • IFAT and ELISA techniques for detection of echinococcosis and hydatid disease • Diagnostic tests (IFAT, ELISA, SELISA, Dot-ELISA, CI-ELISA) for latent surra • MAb-based diagnostic kit for FMD • MAb-based C-ELISA kit for sero-surveillance of rinderpest • MAb-based C-ELISA kit for PPR antibody detection, sandwich ELISA and PCR-ELISA kit for PPR diagnosis • Molecular diagnostic techniques (nucleic acid probe, PCR) for IBD, Newcastle disease, EDS76 virus syndrome, Avian Reovirus infection, IBD, duck plague, FMD, BTV, rinderpest, PPR, hog cholera, tuberculosis, salmonellosis, mycoplasmosis, leptospirosis, paratuberculosis, brucellosis,HS, and trypanosomosis • IVRI Crystoscope for determining ovulatory heat in animals.

Skin ointment

## Drugs and Therapeutics

• Olinall skin ointment • Indigenous formulations for mange from cedar wool oil, onion, garlic, lemon, turmeric, etc • Commercialization of a cure (Olinall ®) for chronic skin ailments • Custard apple seed oil for lice • Ointment from sal tree resin for burns and wounds • Homeopathic drugs arsenic album and berberin hydrochloride against trypanosomes • Drug against ringworm from *Cassia tora* seed • Drugs for diabetes treatment from neem oil, leaves of *bel*, *aonla*, mango and bark of arjun • Synthetic drugs for analgesic and local anaesthetic action • Bovine horn plates and external skeletal fixation device for fracture management • Acupuncture for post-operative rehabilitation • Technique for intestinal anastomosis • Technique for peritoneal and pleural dialysis • Arsenic compounds for trypanosomiasis (surra).

## FUTURE THRUST AREAS

- Disease surveillance, monitoring and forecasting
- Rapid and sensitive disease diagnosis
- High potency vaccine production at low cost
- Development of recombinant DNA vaccines
- Indigenous drug formulations for major diseases
- Improvement in nutrient bioavailability and exploration of newer feed resources
- Development of functional feed additives for livestock health and manipulation of rumen microflora for green livestock production
- Value-addition and shelf-life improvement of livestock products
- Quality assurance of animal food chain to reduce human health risks
- Development of computer-based multimedia packages for technology dissemination to farmers

*(see ICAR News July-September 1995)*

**S.P.S. Ahlawat,** Indian Veterinary Research Institute, Izatnagar, Bareilly 243 122 (Uttar Pradesh)
e-mail: dirivri@ivri.up.nic.in

# Varietal Releases

## Vivekananda Parvatiya Krishi Anusandhan Sansthan, Almora

### Vivek QPM 9 maize

It is the first extra early, QPM yellow single-cross hybrid developed through SSR marker-assisted selection, and has been released for Zone I (Uttarakhand, Himachal Pradesh, Jammu and Kashmir and NEH Region) and Zone IV (Maharashtra, Andhra Pradesh, Karnataka and Tamil Nadu, as well as for Uttarakhand Hills) under organic conditions. Its mean grain yield (6,118 kg/ha in Zone I and 3,531 kg/ha in Zone IV) is at a par with check Vivek Maize Hybrid 9 (6,360 kg/ha in Zone I and 3,502 kg/ha in Zone IV). Under organic conditions, it yielded 8.86% higher over best check Vivek Maize Hybrid 9.

Vivek Maize Hybrid 9

Vivek QPM 9

Vivek QPM 9 possesses 0.83% tryptophan as compared to 0.59% in Vivek Maize Hybrid 9 (40.7% increase in tryptophan); besides 28.9% increase in lysine, 23.3% increase in Fe and 16.0% increase in Zn over Vivek Maize Hybrid 9.

### Vivek Maize Hybrid 25 (FH 3248)

An extra-early single-cross hybrid (V 341 × V 346) has been released and notified for Zone I. It yields 6.0-6.5 tonnes/ha, which is 23.9 to 49.7% higher over best check HIM 129, and matures in 85-90 days, and has shown high degree of tolerance to *turcicum* leaf blight. It responds better to lower doses of nitrogen of 40 kg/ha.

### Vivek Maize Hybrid 27 (FH 3288)

An extra-early single-cross hybrid (V 335 × V 345) has been released for Zone III (Eastern Uttar Pradesh, Bihar, Jharkhand, Orissa, Chhattisgarh and West Bengal) and Zone IV. It yields 4.0-4.5 tonnes/ha (Zone III) and 4.5-5.0 tonnes/ha (Zone IV), which is 17.4 to 62.1% higher over best check HIM 129. It matures in 80-85 days (Zone III) and 85-88 days (Zone IV). The hybrid exhibits moderate tolerance to turcicum and maydis leaf blight in natural as well as artificial epiphytotic conditions. It responds better to higher doses of nitrogen.

### Vivek Sankul Makka 31 (VL 103)

This is an early composite developed through mass selection in a population involving seven experimental and released varieties (VL Makka 16, Pop 31 C4 HS bulk (Alm), VL 87, VL 89, VL 90, D 931 and D 941). In spite of being composite, it yields 4.5-5.0 tonnes/ha, which is 10.1% higher over popular hybrid HIM 129 and 26.2% higher over composite Surya. It silks in 55 days and matures in 90-95 days. And exhibits high degree of tolerance to *turcicum* under natural conditons. It responds better to higher doses of nitrogen in hills.

### Vivek Maize Hybrid 33 (FH 3352)

An extra-early, single-cross hybrid (V 372 × CM 212) has been released and notified for Zone I. It yields 6.0–6.1 tonnes/ha,

which is 19.19% higher over best check HIM 129 and 13.89% higher over latest introduced check Vivek Maize Hybrid 17.

**VPKAS**, Almora
Uttarakhand 263 601

# Central Horticultural Experiment Station, Bhubaneshwar

## CHTG 2 (Neelachal Gaurav): A soft-seeded teasel-gourd variety

Teasel-gourd (*Momordica subangulatata* sp. *renigera*) is an important cucurbitaceous crop of eastern and north-eastern India. A large number of its lines were collected and evaluated. Out of 25 variable germplasm, CHTG 2 (Neelachal Gaurav) has been selected with dark-green and oval fruits along with small spines. Its fruits are 6.0 cm long and 3.8 cm thick with an average weight of 50 g. The plant produces 230-250 fruits in full cropping season with sufficient pollinators. The variety needs hand pollination for assured yield which varies between 12 and 15 kg per plant per year. The selected variety is vigorous with dark-green foliage, strong vine and fairly long growing period (15 June-15 October). It produces large number of female flowers and shows moderate resistance to *Diaphania indica* infestation, and moderate susceptibility to anthracnose and downy mildew diseases in the field.

## CHSG 28 (Neelachal Shree): An elegant spine-gourd variety

Spine-gourd (*Momordica dioica*) is a very popular and high-value vegetable in Orissa. More than 60 collections of this are maintained at the station. Uniform conical or elliptical fruits with medium spines of light-green colour have high market preference. Evaluation of large gene pool collected locally from eastern parts of the country has resulted in selection of a high-yielding variety CHSG 28 (Neelachal Shree). Neelachal Shree has good appearance, high yield (4-5 kg/plant) and high market preference. Its vine is thin and spreading which grows very well on 3-line wire-trellis system. The variety is moderately resistant to anthracnose and downy mildew in fields, and is moderately susceptible to angular leaf blight and *Diaphania indica*.

**Vishal Nath, Sudhamoy Mandal, L.K. Bharathi, G. Naik** and **H.S. Singh**
CHES, IIHR, Bhubaneshwar, Orissa
e-mail: headches@rediffmail.com

# Sardar Vallabh Bhai Patel University of Agriculture and Technology, Meerut

## Vallabh Urd 1

The variety of urd (*Vigna mungo*) was developed by mutation breeding. The mutation was induced in Pant Urd 19, the popular variety in western Uttar Pradesh, by gamma irradiation. Vallabh Urd 1 is suitable for irrigated and rainfed agro-ecosystems in *kharif* in areas of north-western India including western Uttar Pradesh, Haryana, Punjab, Rajasthan, Himachal Pradesh, Uttarakhand and Jammu and Kashmir. It has erect-type canopy (height 50 cm) and has pigmentation on stem, branches and some parts of leaves. Its leaves are compound with trifoliate pinnae, green, with pigments and slightly pubescent, and flowers are yellow. Pigmentation on stem and branches can be used as the marker for maintaining seed purity. The variety flowers in 50 days and matures in 84 days in *kharif*. The plant bears about 110 pods and 6-7 seeds per pod. Its seeds are bolder (4.1g / 100 seeds) than prevailing varieties of the crop in the zone. The variety expressed moderate resistance against insects and pests; and it was found resistant against yellow mosaic virus, Cercospora leaf spot, Macrophomina blight, anthracnose and bacterial leaf spot. Vallabh Urd 1 has been identified as the broad-based resistant variety in the AICRP trials. Its average yield is 1,069.2 kg/ha which is 16.29% higher than the best check Uttara.

## Vallabh Basmati 22 (MAUB 162)

This rice variety has been developed from a cross of P 1121xType 3, followed by pedigree method. It is suitable for irrigated ecosystem (all under Agri Export Zone for basmati rice) in the north-western India, and is identified for release in Uttar Pradesh and Haryana. MAUB 162 (IET 19492) is a photosensitive genotype of evolved-type basmati rice. The variety is erect and of short stature, 90 cm in height. It flowers in 115 days. Unlike other basmati rices, it has compact panicle, exerted and with small awns. It can be easily distinguished with pinkish apiculus at maturity. Its average yield is 3.62 tonnes/ha which is 27.87 % higher over Taraori basmati. The variety requires less water and performs well under aerobic conditions. This variety expressed all quality characters of scented rice accepted in the global market, and is therefore suitable for export. Test weight of variety is 21.00 g with kernel length 7.45 mm. Kernel breadth is 1.72 mm with length:breadth ratio of 4.33. Hulling and milling recovery is 60% and 69.37%. Head rice recovery is 52.01%. Hundred grams of long cylinder kernels require 250 g water for cooking. Kernel length after cooking is 14.8 mm which is more than that of traditional type Taraori basmati. The variety cooks excellently and remains soft and flaky after cooking, and is resistant to gall midge and moderately resistant against rice tungro disease, neck blast and bacterial leaf blight.

**M.P. Yadav**
e-mail: yadav_mp@hotmail.com

# Govind Ballabh Pant University of Agriculture and Technology, Pantnagar

## Pant Karela 3 bittergourd

It is an early-duration, high-yielding variety. It has cylindrical fruits (24 cm) of dark-green colour, and is suitable for plain and hilly areas of north India. Yield potential of this variety is 16 tonnes/ha.

## Pant Vegetable Pea 5

It is an early-maturing vegetable pea variety, suitable for cultivation in Kumaon hills and plains of Uttarakhand. The plant is dwarf with green foliage. The pods are long, well-filled; and slightly curved towards the tip. Seeds are green and wrinkled at maturity. The green seeds are sweet in taste. The variety is resistant to powdery mildew. The first green pod picking can be taken in 60-65 days. Its pod yield potential is 9-10 tonnes/ha.

### Pant Lauki 4 bottlegourd

It is a medium duration, high-yielding variety. It has hairy fruits (40 cm) of light-green colour with light strips. The variety bears

heavily. It is suitable for plain and hilly areas of north India. Yield potential of this is 35 tonnes/ha.

**Y.V. Singh, Hari Har Ram, D.K. Singh, H.R. Jaisawal** and **Sanjeev Kumar,** GBPUAT, Pantnagar 263 145

## Central Plantation Crops Research Institute, Kasaragod

### Kalpa Pratibha coconut

This is derived from CPCRI accession IND 016. It is a regular bearer, tall, relatively tolerant to drought and is suitable for Kerala, Andhra Pradesh, Tamil Nadu and Maharashtra. Its fruits are large, round and predominantly green; the annual yield is 91 nuts with copra out-turn of 23.25 kg/palm. It produces on an average 15,874 nuts/ha/annum, 4.07 tonnes copra/ha/annum and 2.73 tonnes oil/ha/ annum. The estimated copra and oil yield/ha was 40.11% and 38.05% higher than West Coast Tall. The quality of tender nut water is good with 5.5 g total sugars/100 ml, 1.1mg free amino acids/100ml, 2,150 ppm potassium and 21.7 ppm sodium.

### Kalpa Dhenu coconut

This is derived from the CPCRI accession IND 006, originally collected from the Andaman and Nicobar Islands. It is a regular bearer, tall, relatively tolerant to drought and is suitable for Kerala, Tamil Nadu and the Andaman and Nicobar Islands. The average per palm yield is 86 nuts, while copra out-turn is 20.81 kg. Variety produces annually 15,012 nuts/ha, 3.66 tonnes copra/ha and 2.40 tonnes oil/ha. The estimated copra and oil yield was 26.07% and 21.44% higher than West Coast Tall. Its oil is rich in lauric acid (50.26%). The tender nut water contains 4.92 g total sugar/100 ml, 1.3 mg free amino acids/100 ml, 2,650 ppm potassium and 24.6 ppm sodium.

### Kalpa Mitra coconut

This is derived from the CPCRI accession IND 022. The variety is a regular bearer, tall, relatively tolerant to drought and produces large, yellowish-green, oval-shaped fruits; is suitable for cultivation in Kerala and West Bengal. The annual per palm nut yield is 80 nuts, while copra out-turn is 19.25 kg. The variety produces annually 13,973 nuts/ha, 3.37 tonnes copra/ha and 2.24 tonnes oil/ha. The estimated yield of copra and oil was 16.01% and 13.45% higher than WCT. The tender nut water contains 5.7 g total/100 ml, 1.3 mg free amino acids/100 ml, 2,150 ppm potassium and 23.5 ppm sodium.

### Kalpa Raksha coconut

This variety has been released for cultivation in the root (wilt) diseased tract of Kerala as this has shown high yield and resistance (field resistance) to root (wilt) disease. And this is a selection from Malayan Green Dwarf with a semi-tall habit. It has large-size green fruits with good quality of copra and oil. Its annual yield is 65 nuts/palm, while the copra out-turn is 13.95 kg in root (wilt) disease-affected tracts. The oil content in copra is 65.5% and its annual per hectare yield is 11,375 nuts with 2.44 tonnes copra. It is suitable for tender nuts and contains 290 ml of sweet nut-water/nut.

**V. Niral, R.V. Nair** and **George V. Thomas**
CPCRI, Kasaragod
e-mail: cpcri@nic.in

## Dr Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli

### Coconut variety D × T 2

It is developed from a cross between Gangabondam Green Dwarf (GBGD) and East Coast Tall (ECT). It is a high yielder with better copra quality than West Coast Tall and Pratap and with better oil content than ECT (67.10%).

This coconut hybrid comes to bearing after 5 years, and may yield even up to 80 years, like other hybrids. It is resistant to stem bleeding, and is moderately resistant to leaf blight and bud rot. Its average yield is 121 nuts/palm/year, and 20,300 nuts/ha/year.

## Banana Konkan Safed Velchi

It is a selection from a somaclonal natural cross hybrid. Plants growing up to a height of 3 m are with slender, yellowish pseudostem with reddish petiole margin. Leaves are dark-green to pale-green, about 2.5 m in length with a long petiole of about 0.5 m. Flowering takes place 300 to 330 days after planting. Fruits are ready for harvesting within 150–170 days after flowering. It has small fingers, firm flesh and thin whitish yellow skin with high fragrance. This selection is heavily in demand in local market with a good price. No major incidence of pest and disease has been observed. The average yield of the sole crop is 25 tonnes/ha and of mixed crop is 15 tonnes/ha.

## Cinnamon Konkan Tejpatta

It is a selection from Ceylon cinnamon seedlings. Leaves have good taste and more volatile oil content (2.8%), and selection has high dry leaf yield (7.68 tonnes/ha), high eugenol content (80.30%) and the odour is comparable to Ceylon oil. Minor incidences of pests and diseases have been observed.

## Rice Ratnagiri 24

This was developed by pedigree method from cross between Zinic 63 and T (N) 1. The variety has high percentage of milling (72.5) and head rice recovery (63.8). It has kernel length of 5.31 mm, breadth of 1.78 mm and L:B ratio of 2.98, with 15.39 g test weight (1,000-grain weight). And its translucent kernel type indicates superior grain quality. This rice variety is of mid-tall stature (105 cm) and matures in 105-115 days with an average grain yield of 3.64 tonnes/ha. It is moderately resistant to blast and bacterial leaf blight and is tolerant to brown plant hopper, white-backed plant hopper, grass leaf hopper, stem borer and gall midge.

## Rice Karjat 184

This variety was developed through pedigree method from a cross between T (N) 1 and Kolamba 540. It is an early-duration variety (100–105 days) of dwarf stature (80–85 cm) with medium slender grain type of 18.5 g test weight (1,000-grain weight). This has high percentage of milling (75) and head rice recovery 55.6%. Its L:B ratio is 2.95 and is of translucent kernel-type. Its average grain yield is 3.0-3.5 tonnes/ha. It is moderately resistant to leaf blast and bacterial leaf blight and tolerant to brown plant hopper and white-backed plant hopper.

e-mail: ag_powar@mailcity.com

# Indian Institute of Pulses Research, Kanpur

## Shubhra, a high-yielding *kabuli* chickpea

India imports chickpea from Mexico, Australia, Canada, Syria and Turkey spending over Rs 300 crore every year, and major share is of extra large/large-seeded kabuli chickpea.

In recently held Annual Rabi Pulses Group Meet at Maharana Pratap University of Agriculture and Technology, Udaipur, a high-yielding and large-seeded (34-35 g/100 seed weight) *kabuli* chickpea variety Shubhra (IPCK 2002-29) has been identified for release. This variety will be suitable for cultivation in Madhya Pradesh, south Rajasthan, Maharashtra, Gujarat, Bundelkhand tracts of Uttar Pradesh and Chhattisgarh. In irrigated areas this will produce 20-25% higher (2041 kg grain/ha) yield than the best available varieties, JGK 1 and KAK 2; that will reduce import of *kabuli* chickpea.

**Shiv Kumar**
Indian Institute of Pulses Research, Kanpur
e-mail: ShivHPR@email.com

# Pumpkin fruit-borer management on bittergourd with trellis systems

CHES, Bhubaneshwar. Three different types of trellis systems for growing bittergourd were evaluated for their performance– farmer's traditional bower (covered pandal), double row system trellis and single line trellis, having height of 165 cm.

## Various systems comparative performance

- Individual fruit weight and yield per unit area were significantly higher in single line (59.56 g/fruit and 234.04 q/ha), followed by double line (55.35g/fruit and 209.87q/ha), and was lowest in bower system of trellis (54.33 g and 194.11 q/ha).
- Significantly higher borer population 1.41/fruit and fruit loss in terms of number (31.10%) and weight (27.44%) was recorded in bower system and lowest was in single line trellis system (0.67, 11.87 13.70 respectively).
- Fruit fly infestation and downy mildew incidence were higher in bower (24.96 and 75.84% respectively) and lowest in single line trellis system (6.89 and 33.57% respectively).
- Insecticides and *Bt* had reduced efficacy (up to 30% less) in bower system compared to single line trellis. In single line trellis system, both vertical sides were properly accessed and sprayed.
- Due to open-top in single line trellis, application of fertilizers, plant growth regulators, manual and spot irrigation and pesticide spraying could be done easily in straight and standing position without bending body. This resulted in increased efficiency and reduced drudgery of worker (s), easy access to target area for spray with least drift exposure, more sunlight, low relative humidity and easy pest monitoring.

**H.S. Singh, V. Pandey, G. Naik** and **Vishal Nath**
Central Horticulture Experiment Station
IIHR, P.O. Aiginia
Bhubaneshwar, Orissa 751 019

## IPM module for management

1. Grow bittergourd on single line trellis made of bamboo or wooden pole fixed with 14 gauge G I wire. This leads to reduced pest infestation, better inter-cultural operations, reduced drudgery, better coverage through spray and increased efficacy of pesticides. The cost of this structure is less than covered *pandal*.
2. Avoid pesticide spray in October to January when activity of the parasitoids, *Trathala flavoorbitalis* and *Aphanogmus* sp., is high. Use neem-based products such as multineem 3 ml/litre for controlling jassids and aphids during this period.
3. Apply *Bt* 1 g alternated with neem products such as multineem 3 ml/litre (each at 10th day), starting from 15 January for controlling *Diaphania*. And apply Carbaryl 3 ml/litre in emergency when borer damage exceeds 10%.
4. For fruit fly control, Male Annihilation Technique (MAT) and Bait Application Technique (BAT) may be used.
5. Use fungicide such as Ridomil 2 ml/litre against downy mildew.

# Management of white grubs in Uttarakhand Hills

VPKAS, Almora. To minimize damages caused by white grubs, the Institute has developed an insect trap for mass trapping of beetles and a biocontrol agent for killing beetles. The integrated effect of these technologies has shown a reduction of 70-90% grubs population in 2 years in 18 adopted village spread across the Uttarakhand.

## VL white grub beetle trap 1

Light weight, user-friendly, low-cost and efficient new model of insect trap has been fabricated to replace earlier bigger sized and heavy models. It is 10% more efficient in trapping beetles, and is of about half the cost of the previous models. And more than 90% population of white grubs can be reduced within 3 to 5 years, when this is used in an integrated manner on the community basis.

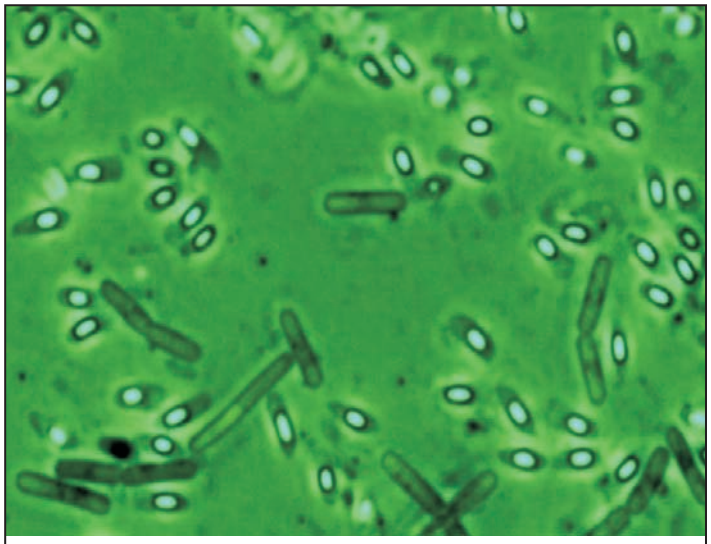
This technology has been transferred to a private firm for large-scale commercialization. Patent for trap has also been filed.

## Biocontrol agent

New entomopathogen *Bacillus cereus* strain WGPSB 2 has been identified as the most potent one, which kills grub larvae up to 90% in the laboratory, and from 70 to 90% in the fields. Out of 48 local bacterial strains isolated and tested against first and second instar grubs of predominant species *Anomala dimidiata*, the isolate WGPSB 2 was found highly toxic. Talc-based formulation of the bacterium was prepared with a spore count of 1x1010 spores/g. The bacterium has also been found compatible with fungal antagonist *Trichoderma harzianum* (Tr 28), which can be used for management of soil-borne pathogens.

## Integrated use of technology

Severely affected 18 villages (including two experimental farms) covering low, mid and high altitudes were selected for demonstration on the community basis. Altogether 127 light traps were installed, and beetle catch was recorded from June to October. A beetle catch of 9.1 lakh and 5.02 lakh was recorded during 2006-07, which resulted in an expected reduction of grub



*Bacillus cereus* strain WGPSB2

VL white grub beetle trap


Talc formulation of WGPSB 2

Normal grubs

Infected grubs by *Bacillus cereus* WGPSB 2

population to around 20 million. Overall 44.27% reduction in beetle population was recorded.

Besides installation of traps, talc formulation of *B. cereus* strain WGPSB 2 was applied in compost pits in villages and subsequent applications were made in fields. Significant decrease in grub population of 70.5-84.3% in low hills, 85.3-90.9% in mid-hills and 70.7-93.4% in high hills was recorded.

Considerable increase in yield of tomato, capsicum, chilli, Frenchbean, cauliflower, cabbage, brinjal, potato and garden pea was recorded in adopted villages over non-adopted villages.

**S.N. Sushil, G. Selvakumar, M. Mohan, J.C. Bhatt** and **H.S. Gupta,** VPKAS
Almora, Uttarakhand 263 601

## Modified zero-till drill with rotary slit opener for straw covered fields

A tractor-mounted zero till slit drill has been designed and developed for direct sowing of wheat in combine harvested rice fields, covered with straw. An ordinary zero-till-drill does not perform well in combine harvested rice fields. Modified drill consists of rotary slit cutters, press wheels, seed and fertilizer unit and transmission system. Seven rotary disk-type openers with trapezoidal shaped blades are mounted on a shaft powered from tractor PTO through gear and side chain drive for cutting surface straw and opening narrow slits in soil. Narrow furrow slit helps in conserving residual soil moisture. Secondary furrow openers with small shoe and delivery boots for seed and fertilizer are positioned right behind rotary slit openers. The effective working width of the machine is 1,600 mm for 7-row operation. The machine is suitable for operation with 45 hp (or above) tractor. Average field capacity and field

efficiency of the drill is 0.41 ha/hr and 85%. Approximate cost of machine is Rs 35,000.

**S.K. Rautaray and B.K. Garg,**
Central Institute of Agricultural Engineering, Bhopal
e-mail <skr@ciae.res.in> & <bkgarg@ciae.res.in>

## Cotton - ramie blended fabrics developed


Garments made from cotton-ramie blend

CIRCOT, Mumbai. Ramie was degummed, bleached, stapled and blended with Shankar 6 cotton and spun. Blending trials indicated that 30% ramie with 70% cotton resulted in better fabric properties. Woven fabrics were converted into garments in addition to preparation of towels and table spreads.

e-mail: circot@vsnl.com

## Molecular typing of *Brucella* cultures from goats

CIRG, Makhdoom. *Brucella melitensis* causes zoonosis worldwide. It is one of the major causes of abortion in goats and sheep and the organism is secreted in the milk of infected animals. For molecular typing of *Brucella isolates* most promising molecular apporach PCR-RFLP has been used. The omp 2 gene of *Brucella* sp. is used as a locus of 2 nearly homologous repeated copies omp 2a and omp 2b that differ slightly among *Brucella* species and biotypes in presence or absence of Pst 1 site to differentiate between them. This information was utilized to design specific primers that amplify a 282-bp fragment, flanking upstream sequences of 5 terminus of omp 2a and omp 2b and expanding downstream of Pst 1 sites. Results revealed that DNA fragments obtained from *B. melitensis* standard 16M strain and two isolates from seropositive goats identified as *B. melitensis* Rev1 strain produce three bands, an intact 282-bp fragment from the amplified omp2a gene that lacks Pst 1 site and two smaller fragments of 238 and 44 bp, the product obtained from digestion of the omp 2b amplified fragment. In contrast, *B. melitensis* biovar 3 produced only two smaller fragments from both genes, a 238-bp fragment and a 44-bp fragment. Because of the existing Pst 1 site polymorphism between *Brucella* strains, the test may distinguish between *B. melitensis* Rev1 vaccine strain from *B. melitensis* biovar 3 field strain in less than 12 hours. This method can be used in clinical samples directly.

**V.K. Gupta, S.V. Singh, V. S. Vihan** and **N. P. Singh**
Central Institute for Research on Goats
Makhdoom, P.O. Farah, Mathura, Uttar Pradesh 281 122

## Pengba *(Osteobrama belangeri)*, a rare species, spawned successfully

CIFE, Mumbai. *Osteobrama belangeri* (Val.) locally known as pengba is an endemic species of Loktak lake, Manipur. It is rather a rare species and fetches high price in the local market. Very little information was available on its biology and behaviour, particularly spawning. This is phytophagous and a good candidate species for freshwater culture. A seed consignment received from Manipur was reared for 2 months at the Institute and 325 nos (20-25-mm size) was sent to institute's Powerkheda Centre on January 2007 for further rearing. The fish attained maturity in captivity and was successfully bred under controlled environment. One female fish weighing 372 g released 1.4 lakh eggs; out of which 0.60 lakh spawn were recovered with 54% hatching success. About 30,000 fry (20-30 mm) have been stocked for further rearing.

**Dilip Kumar**, CIFE, Mumbai
e-mail: dkumar@cife.edu.in

## Hand-held device for e-pest surveillance

This is a portable, hand-held device like Personal Digital Assistant (PDA) for capturing data on pests and beneficial insects, and the collected data can be sent to the NCIPM through Internet (see *NCIPM Newsletter* July-December 2007). The device can withstand rough field conditions (dust and water, high temperature, poor visibility, etc.) and has high battery life for long field use. The device has software with simple and easy user interface for entering data by field workers.

The latitude and longitude of the surveyed field are automatically stored using in-built GPS system along with the date and time of the observation. This device is a very important step towards achieving high level of pest surveillance and issue of farm advisories for effective pest management. The centralized database, to be maintained at the NCIPM, would, in a long run, be able to provide valuable information on pests, crops, weather and beneficial insects along with spatial and temporal information so that in-depth crop-weather-pest-beneficial studies can be taken up leading to robust pest forewarning models. The device has been successfully tested in a pilot study in rice, cotton, greengram, blackgram and groundnut in 4 districts of Andhra Pradesh.

NCIPM, New Delhi
email: ipmnet@bol.net.in

# IMPACT OF TECHNOLOGY
## Impacts of New Agricultural Technologies

Application of improved technologies have increased productivity manifold in various crops and species and feeding millions of population in the country. As a consequence some ill-effects of these technologies like poverty and environmental degradation are also brought about. Donors who are critical of the past agricultural research strategies/ technologies seek accountability of investments towards these broader goals. This note focuses to provide broad impacts of a few technologies.

Analysis has revealed that at all-India level nearly 19.8% gains in wheat yields were contributed by improved technologies during 1999-2000 to 2004-05. Technological change contributed to 21%, and increased input-use contributed to –1.23%. Zone-wise yield gain analysis showed that technological improvement contributed maximum in north-west plains zone (7.6 of 7.6%), followed by north-eastern plains zone (28.9 of 33.1%) and central zone (14.8 of 22.2%). Further, improved variety in timely sown conditions contributed to 23.1% to India's wheat production during the period. Of this, technological change shared 26%, and contribution of input quantities was negative (–2.9%).

A study on the long-term effect of pulses on soil health and crop productivity revealed higher productivity of maize-wheat-mungbean crop sequence in terms of maize equivalent yield compared to other maize-based cropping sequences like maize-wheat, maize-wheat-maize-chickpea, and pigeonpea-wheat during 2003-06.

Rotation of rice-wheat system in Indo-Gangetic Plains (IGP) has created a lot of management problems including degradation of natural resources like soil and water. A study on resource conservation technologies (RCTs) like zero-tillage, bed planting and irrigation in Punjab, Haryana, Rajasthan, Uttar Pradesh and Bihar has revealed that nearly 50% RCT adopters in the region belonged to small category. Among adopters, above 70% were using tube-well for irrigation and rest were using canal. RCT adopters in Punjab and Haryana were using zero-tillage technology for cultivation of wheat, which has potential to save large quantity of water, diesel and reduction in $CO_2$ emission per year. These result in reduction in cost and addition in net returns. System of rice intensification (SRI) is another method of conserving scarce resources. This technology has potential for yield improvement and water saving. In Bhubaneshwar, SRI provided grain yield up to 6 tonnes/ha which is 36-49% higher over conventional method. SRI has potential to save 40% water to produce 1 kg of seed, and labour inputs by 14% for various cultural practices.

In north-west Himalayan region, diversification towards vegetables resulted considerable increase in annual income (Rs 8.6 lakh/ha and Rs 14.5 lakh/ha) in 2005-06 and 2006-07. At the same time area vacated from food crop did not reduce total food production because of adoption of high-yielding improved varieties that gave 26% higher yield than local varieties.

Robust growth in livestock sector shows the priority given to it by the government through research and development (R&D) and increased infrastructure. The total factor productivity (TFP), which is the combined effect of technological change and technical efficiency, grew at an annual rate of 2.3% in 1970-71 to 2003-04, and accounted for over half of the growth in livestock sector. This clearly shows economic impacts of improved technologies. TFP-led growth in livestock would sustain agricultural growth, reduce rural poverty and relieve pressure of number-led growth on natural resources.

Pen culture of fish has potential in improving livelihood of farmers. This technology in the mauns (floodplain lakes) in Bihar augmented fish production and created opportunities for employment and income generation. The maximum fish harvest was 5,047 kg/ha with a total input cost of Rs 164,080. The gross and net returns were estimated at Rs 227,510/ha and Rs 63,430/ha, respectively. The average B:C ratio was 1.39.

These are quick estimates and further work on this and other important technologies is in progress.

**P.K. Joshi,** NCAP, New Delhi
e-mail: pkjoshi@ncap.nic.in



Published by Dr T.P. Trivedi, Project Director, Directorate of Information and Publications of Agriculture, Indian Council of Agricultural Research, New Delhi 110 012. Lasertypeset by M/s Print-O-World, Shadipur, New Delhi 110 008, and printed in India at M/s Royal Offset Printers, A-89/1, Naraina Industrial Area, Phase I, New Delhi 110 028.

**Editing: Dr R.P. Sharma and Shashi A. Verma** **Production: V.K. Bharti and Punit Bhasin**

# THE LAST PAGE

The whole universe is the manifestation of energy. Whether this universe has a beginning and an end, continue to challenge human mind; the immediate concern, however, is about the availability of the energy to sustain growth of the society in its totality. The twin problems of ever-increasing prices of fossil fuels and global climate change have once again demonstrated susceptibility of fossil-fuel based growth process and have put energy agenda on the centre stage.

The global estimates indicate that world-wide energy consumption is likely to be 50% higher in the next 20 years. The 4th Report of the Inter-Government Panel on Climate Change (IPCC) has warned the world about catastrophic consequences of increase in concentration of greenhouse gases in the atmosphere by fossil-fuel burning.

A number of technologies have been developed during the past 25-30 years, and at present 5% country's needs are met with renewable sources. The target is to increase this level to 20-25% by 2030. The National Policy on Biofuel targets replacement of fossil-fuels by biofuel to the extent of 5% by 2012, 10% by 2017 and above 10% beyond 2017.

Agriculture and its allied sectors are also becoming energy-intensive. And the need is for a holistic approach to redefine individual and collective energy needs for sustainable development and to find ways and means to fulfill them.

India with about 3 million tractors and 20 million pump-sets is among the largest manufacturers and users globally, requires 12 M tonnes of diesel and one-third of total electricity in the country. Based on the current usage, direct power availability is estimated at 1.5 kW/ha. This availability needs to be enhanced to 3.5 kW/ha in the next 20 years to meet agricultural production targets. Power requirement for agro-processing activities in production catchments is estimated at 15,000 MW; requiring fuel equivalent of 10 million tonnes of oil annually.

Biomass has been one of the main sources of energy for mankind ever since the dawn of the civilization. There is renewed interest in biomass as it is renewable with its wide availability and other socio-economic benefits. Of all the 800 million tonnes of biomass that is produced through agriculture, only about one-third is utilized as food, feed and fibre. A fraction of the remaining is utilized as roughage for animal feeding; some for domestic and industrial fuel. And about 150 million tonnes of surplus biomass would still be available for conversion into fuel.

Biofuels have also started getting attention due to escalating prices and diminishing natural reserves of crude oil. Although biofuels can be produced from any biological carbon source, the most common sources are products of photosynthetic carbon fixation. They can be produced by growing crops high in sugar or starch, be sugarcane, sugarbeet, sweet sorghum and corn and then fermenting them to produce ethanol. And also by growing plants that contain high amounts of vegetable oil, soybean, oil palm and rapeseed. These oils could either be used directly as fuel or processed to produce biodiesel. They are termed as first generation biofuels. Second generation biofuels are being sought from lignocellulosic biomass from non-edible plant parts and non-edible oilseeds such as that of Jatropha and karanja. Biofuel from algae is termed as the third generation biofuel. In fourth generation biofuel systems, biomass crops are seen as efficient 'carbon capturing' machines. Carbon-rich biomass is then converted into fuel and gases by second generation techniques. Biotechnologists are envisaging to genetically engineer microorganisms to produce fuel directly from carbon-dioxide or by use of sunlight to produce hydrogen from water.

Dr Mangala Rai, Secretary (DARE) and Director-General (ICAR)

The ICAR realized the need for developing clean renewable fuels more than two decades ago. Briquetting, pyrolysis, gasification, liquefaction and fermentation are being studied in the system under the All-India Co-ordinated Research Project mode.

Keeping diversity of fuels in view, development of multi-fuel prime movers may be a norm than an exception. Biofuels research is resource-intensive, time-consuming and requires a blend of human skills. It is the responsibility of the public sector institutions to carry out trustworthy life-cycle impact analyses of feed stocks for biofuel production to ensure long-term environmental sustainability.

The major solutions for energy crisis in the near future for India include efficient use of energy through conservation and technology upgradation; use of alternate and renewable energy sources and biomass-based decentralized power generation and use, specially in the rural sector. It should be possible to claim carbon credits for the clean power generation to make it more cost-effective. The R&D agenda for improving energy efficiency in agriculture and sustaining a clean environment needs to be revisited.

**(Mangala Rai)**
e-mail: mrai.icar@nic.in