



# केन्द्रीय आलू अनुसंधान संस्थान Central Potato Research Institute Newsletter

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## *From the Director's Desk*



Both food, and therefore, nutrients needs of India are expected to go up consistently in the future without a break. The net cropped area has more or less stabilized at 142 Mha. The population of 1 billion plus is expected to grow by 14-15 million each year. At present, each hectare of net sown area has to support more than 7 persons. The experts on horticulture, vegetable, plantation crops, sugarcane, cotton, oilseeds and potato have projected that by the year 2025, the demand for fertilizers for these high value crops, which also have high export potential and claim fertilizer use on priority basis, will rise to 3.0, 2.0, 3.2, 0.9, 3.1, 1.5 and 1.0 Mt, respectively.

Without doubt India is proud of its 'green' revolution, since it enabled a nearly four-fold increase in food production in the last 50 years. But this achievement has been followed by a loud protest concerning the degrading environmental effects of higher agricultural inputs that ushered in the green revolution. Further improvements, including balanced fertilization through efficient nutrient management, will help diminish environmental concerns while sustaining a strong food production capacity.

Adequate crop nutrition is a key component of improved production technology. The gap between nutrients required by the crops and to be made available from soil nutrient supplies has to be bridged through external nutrient application. This can be done through a number of organic, microbial and mineral sources, often in an integrated manner. Fertilizers are by far the most important source of plant nutrients and have made a place for themselves in intensive cropping by helping obtain and sustain high crop yields. Balanced and efficient use of fertilizers, organics and biofertilizers is the key step which results in lower unit crop production costs, higher economic returns and minimal negative environmental impact. The four watch words around which the plant nutrition needs and strategies should be built are optimum, balance, efficiency and effectiveness. This is possible by putting proven scientific findings into practices on individual farm holdings and revitalizing support services such as soil and plant testing, fertility monitoring, matching product supply with soil nutrient deficiencies and taking care of all production inputs. The article on nutrient management in this newsletter provides the basis/information for efficient nutrient management for optimum potato production.

## ISSUE HIGHLIGHTS

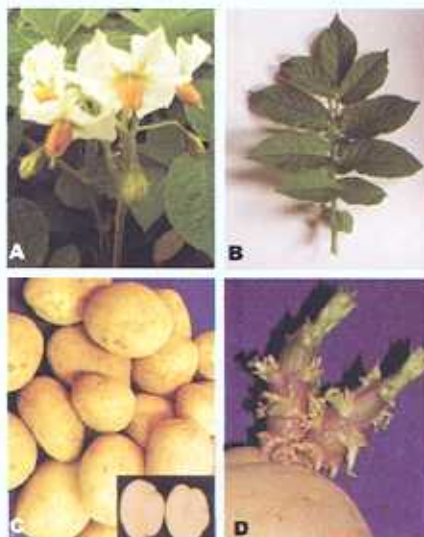
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## Research Highlights

### CPRI develops a new cyst nematode and late blight resistant hybrid OS/93-D-204 (K. Neelima) for Nilgiri hills

Potato is cultivated in about 4500 ha in Nilgiri hills of Tamil Nadu, where three crops can be grown round the year. The major limiting factor in potato cultivation in this region is the potato cyst nematodes and late blight disease. Although varieties like Kufri Swarna, Kufri Giriraj, Kufri Jyoti are popular in this region, Kufri Swarna released in 1985 is the only cyst nematode resistant variety available to farmers for cultivation. To overcome this malady, systematic breeding work continued at CPRS Ootacamund to develop high yielding cyst nematode and late blight resistant cultivars. This led to the development of a cyst nematode and late blight resistant hybrid OS/93-D-204. In initial multilocation trials, on an average the hybrid yielded higher than the best control at five locations viz., Nanjanad (14.5%); Fernhill (50.3%), Yellanahalli (50.2%); Theettikel (32.1%); Gandhipet (0.9%) out of 6 locations tested in farmer's field in Nilgiris. In on-farm trials, the hybrid yielded higher than the best control in 7 locations namely Kookalthorai (9.06%); Glen Morgan (8.46%); Aduthorai (14.79%); Fernhill (8.81%); Wellington (26.59%); Nanjanad (21.91%); Aadasholai (48.59%) out of 10 locations tested in farmer's field. The hybrid has been recommended for release by 27<sup>th</sup> Group Meeting of Potato Workers of All India Co-ordinated Research Project (Potato) held at University of Agricultural Sciences, Dharwad (Karnataka) on 10-12 August, 2009. It is a medium maturing cyst nematode and late blight resistant hybrid suitable for cultivation in Nilgiri hills of Tamil Nadu where

potato cyst nematodes (*Globodera pallida* and *Globodera rostochiensis*) and late blight disease are major plant protection problems in potato cultivation.



Flower, leaf, tubers and sprout from advanced hybrid OS/93-D-204

-TA Joseph and Group

### Potato genome sequence released by International group of Scientists

The Potato Genome Sequencing Consortium (PGSC), an international team of scientists including Central Potato Research Institute (Indian Council of Agricultural Research), Shimla, Himachal Pradesh, India, has announced the release of the first draft sequence of the potato genome. The PGSC started work on the project three years ago. The resulting 'blueprint' of how the potato works could revolutionize breeding programs.

Potato, a key member of the Solanaceae family, is a close relative of tomato, pepper, and eggplant. It is the world's third most important crop and the most important vegetable crop. Access to the potato genome sequence, the "genetic blueprint" of

how a potato plant grows and reproduces, is anticipated to assist potato scientists in improving yield, quality, nutritional value and disease resistance of potato varieties. More importantly, the potato genome sequence will permit potato breeders to reduce the 10-12 years currently needed to breed new varieties.

The PGSC was initiated in January 2006 by the Plant Breeding Department of Wageningen University & Research in the Netherlands and has developed into a global consortium of research groups from 14 countries. India is an active partner in this global effort and is contributing both in sequencing and bioinformatic analysis of the genome. This effort is being financed in India exclusively by the Indian Council of Agricultural Research (ICAR), New Delhi and is being carried out at Central Potato Research Institute, Shimla which has pioneered the technology of potato production under sub-tropical weather condition. A high throughput genome sequencing laboratory has been created at Central Potato Research Institute, Shimla for this purpose. The laboratory would facilitate application of modern genome-based research tools for development of high yielding and heat-tolerant potato varieties with built-in resistance to diseases and pests.

The potato genome has 12 chromosomes and is estimated to be 840 million base pairs. At the onset of the project, the PGSC employed an approach in which the work was allocated to each consortium member based on chromosomes and was focused on the diploid line RH89-039-16 (RH) of cultivated potato, *Solanum tuberosum*. However, in the past two years, the advent of new sequencing technologies led to a significant change of approach within the PGSC



*DNA sequencer installed at CPRI*

and in 2008, the consortium initiated sequencing of the doubled monoploid *S. phureja* (DM1-3 516R44) potato derived from a diploid landrace of potato in order to simplify and complement the RH effort. In June 2009, PGSC members came together in Carlow, Ireland to plan the final phases of the project.

Currently, the PGSC is busy with finalising the sequence data for both RH and DM with an end goal of a high quality draft sequence of both of these potato lines by the end of 2009. Currently, genome coverage is greater than 70X using a combination of data generated by using three different sequencing platforms including two of the Next Generation Sequencing Platforms. The assembly, which covers 95% of the genes in potato, was possible due to a newly developed computer program by the Beijing Genomics Institute, a member of the PGSC from China.

This first draft genome assembly is now available in the public domain at [www.potatogenome.net](http://www.potatogenome.net) and updates will be made over the next 6 months as additional data is generated including

annotation of the genes, analysis of when and where they are switched on and off, and analysis of specific suites of genes that are critical to potato production.

#### **Mega rain-water harvesting at Central Potato Research Station - Kufri (Fagu unit) farm**

Situated at an elevation of about 9000 feet above m.s.l., the Fagu farm unit under the aegis of Central Potato Research Station- Kufri (Shimla) is catering to the production of Nucleus seed potatoes. The prevailing low temperature and high wind velocity during the crop season coupled with heavy snow fall during winters does not allow the build up of aphids (virus vectors) thus making the place highly suitable for the production of basic stages of breeder's seed. The farm unit comprises of about 11.0 ha land on a singly sun-facing slope on the north-south aspect and is also free from major soil borne pathogens. Taking the advantage of such favourable conditions, the farm unit is being used successfully for the production of nucleus seed potatoes for the last more than 40 years. Recently production of seed potatoes through micro-propagation involving development of mini-tubers under the protected structures has also been started as a replacement of old system of clonal selection and multiplication in a phased manner.

Field crop of seed potatoes is grown here during April–August



*A view of water harvesting tank at Fagu*

under rain-fed conditions, whereas, the production of mini-tubers from micro-plants and micro-tubers is done twice in a year viz., March–July and August/Sep.–December/January under the poly-house conditions. Immediately after planting, the field crop faces hot and dry period of May–June during which the crop mostly suffers due to drought adversely affecting the seed yields, while simultaneously prolonging the crop period. Besides, there is always a high demand of water for the irrigation of crop inside the poly-houses during both the seasons and frequently the water requirement was being met by buying the water from outside.

Having no other source of water at Fagu farm, harvesting of rain-water was the only option to circumvent the problem of water scarcity. Hence, a new water harvesting tank has been constructed during the present rainy season at this farm, in an oval shape with the dimensions of 51.5m (length), 30.0m width, and a depth of about 3.0m. The total water storage capacity of the tank is about 4.0 lakh liters. The catchment area for water harvesting is about 2.0 ha. To prevent any loss of water due to seepage, the inner surface of the pond has been lined with a pond liner sheet called EPDM.

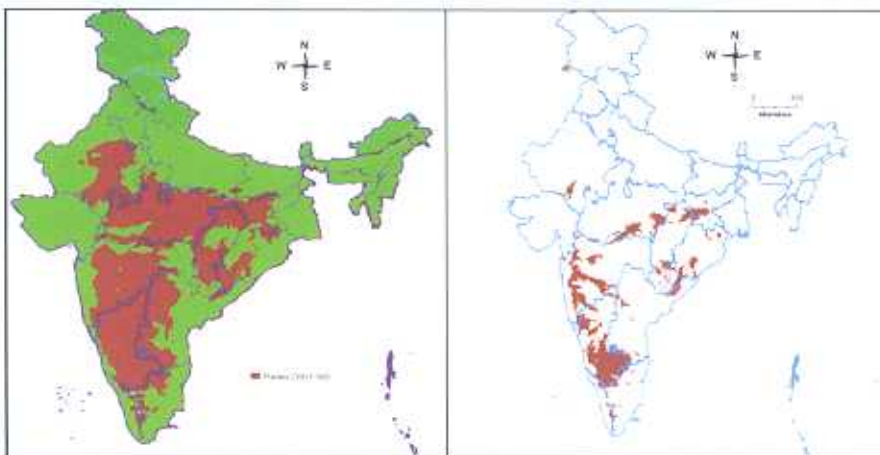
The water harvested from this tank will be used gravitationally for the irrigation of the precious crop (raised from tissue-culturally developed planting material) inside the poly-houses during both the seasons, besides providing life saving field irrigations at least to the basic stages of nucleus seed potatoes raised from either of the systems viz., mini-tubers and/or clonal multiplications. The structure will definitely prove fruitful in covering the risk related to the crop failure due to severe droughts and thus in maintaining the continuity of seed cycle involving different stages of

multiplications. This will also save a lot of money spent on buying the water for irrigation in poly-houses. Being located in the centre of the farm along the central farm road, the water harvesting tank is also improving the outlook of the surrounding area, besides serving the water needs.

### Identifying suitable areas for growing *kharif* potato through GIS

*Kharif* potato constitutes an important constituent in the potato scenario of the country. Not only that it occupies large area in the central and southern parts of India where it adds economic sustainability to the cropping systems of the area, but its role as the source of fresh potato during the lean period adds to its importance. CPRI has been making efforts not only to find ways and means to increase the area under *kharif* potato but also to improve the productivity and efficiency of production.

Characterizing the production environments is an important step for developing Best Management Practices. Hitherto, the *kharif* potato area had not been clearly demarcated which was reducing the pace of research and development. However, with the improvements in computing facilities due to the easy availability of sophisticated hardware and software and also databases this work has now become easier. Therefore, studies were taken up at CPRI to identify the plateau areas in the Central and Southern parts of the country and then delineate areas suitable for growing potato during the *kharif* season. Since plateau areas are defined as flat topped lands between 300 to 1300m altitudes, place between these altitudes were delineated from worldclim database of 2.5 minutes resolution. However, not all these areas are suitable for growing potato in the *kharif* season



Thematic map (brown shaded) showing plateau areas (left) and suitable areas for growing potato during *kharif* season (right)

since potato is sensitive to high temperature. Therefore, the thermal regime of the *kharif* season of important *kharif* potato growing locations were analysed and it was found that in areas above 600m altitude, the thermal regime during the *kharif* season was congenial for raising a potato crop. Hence, in the second step such areas lying between 600m and 1300m altitude in the plateau areas was delineated and it is expected that in these areas potato could be grown during the *kharif* season and best management practices for each of these places needs to be worked out.

- PM Govindakrishnan & Group

### Potato seed production under NAIP at CPRS Patna

A total of 38 farmers (13 under potato seed production and 25 under processing/ware production) of Chakramdas, Vaishali, Bihar were adopted under the project "Training under sustaining livelihood improvement through need based integrated farming system models in disadvantaged district of Bihar (under NAIP Component-3)". Adopted farmers were imparted training both on campus and off-campus related to

scientific know-how of potato seed production, late blight management, rouging, seed treatment, grading, storage & processing. In the variable plot size, thirty eight farmers grew the seed and processing/ware crop covering an area of 4.0 ha (two ha. each for seed & processing/ware crop). The agronomic practices were supervised at farmer's fields by scientists and technical staff at very regular intervals. The seed crop was got certified by state seed certification agency. Package of practices for seed and processing potato production were applied by the participation of farmers.

A total of 337.4q of seed was produced. Farmers' kept the seed for planting in the next season as per their requirement and sold the remaining produce @ 1000-1800/-. Similarly, under processing/ware crop 177.4q and 97.0q yield was obtained from variety Kufri Chipsona-1 and Kufri Kanchan, respectively. Twenty to thirty per cent increase in income and 200 per cent employment was generated by the implementation of potato technologies in the village. Two self help groups one each of seed producers and processing farmers were also formed under the project.

## Training & Technology Transfer

### Training programme at Jalandhar

A three day training programme on potato production, storage and utilization for horticultural officers was organized at CPRS, Jalandhar from 1st to 3rd December, 2009. Nineteen (19) participants from Punjab and J & K Departments of Horticulture, Punjab State Seed Certification Authority, Punjab Mandi Board and Central Integrated Pest Management Centre, attended this training programme. The training programme included lectures on different topics by the Scientists of this station, practicals and field visits. Er. Manjit Singh, Head of the Station, welcomed the participants and informed them about the scope of the training programme. The Chief Guest of this occasion, Dr. PS Naik, Project Co-ordinator, CPRI, Shimla delivered his inaugural address. He emphasized about the need of judicious use of water in potato production through adoption of water saving techniques, such as drip irrigation.

During the valedictory function on 3rd December, 2009, a number of questions were raised by the trainees, which were answered by the scientists to their satisfaction. The participants, in general, desired to know more about the improved potato varieties, control of late blight and other diseases of potato. The participants also requested for holding more of such training programmes. Er. Manjit Singh, in his closing remarks, hoped that the knowledge gained by the participants shall reach the ultimate beneficiaries, i.e farmers.

### Training of farmers at CPRS, Patna

One day training programme on Potato seed production; Scientific potato cultivation and Late blight



*Trainees and faculty of the training programme*

management was organized at CPRS, Patna on 25-09-09, 14-10-09, 28-10-09, 10-11-09 and 18-11-09. A total of 240 farmers of Vaishali, East Champaran, Madhepura, Katihar, Gaya and Jahanabad participated in these programmes. Different aspects of potato like land preparation; use of improved seed, fertilizer management, weed management, insect pest and disease management and potato processing were also explained to the farmers through live demonstrations.

### Training under *Krisbi Vikas Shivir* organized by Govt. of Bihar

Drs. S.K. Singh and Barsati Lal participated in the training programme organized by ATMA, Patna and Nalanda and imparted training to farmers on various aspects of potato production and marketing in Bikaram and Sardar Bigha blocks of Patna and Nalanda districts of Bihar on 19-09-09 and 12-10-09.

### Participation in kisan mela-cum exhibition

CPRS, Patna participated in "Krishi Utpadan-cum Kisan Mela" jointly organized by Agricultural Technology Management Agency (ATMA), Patna and Dept. of Agriculture, Govt. of Bihar on 1<sup>st</sup> and 2<sup>nd</sup> November, 2009 at Sachidanand Sinha Library compound, Patna. Potato exhibit displayed by CPRS, Patna was judged best stall and bagged first prize in the Kisan Mela. Dr Barsati Lal, Dr. T.K. Sinha and Sh Yogesh participated and displayed the exhibits in the above fair.

### Training of Group D staff at Institute

Training of group D (Non-matric/Non-ITI) staff was conducted at CPRI, Shimla and all its regional stations located at Modipuram, Jalandhar, Patna, Gwalior, Kufri-Fagu, Ooty and Shillong during June, 2009. All the group D staff of Institute successfully completed this training.



*Group D (Non-matric/Non-ITI) staff training at Shillong*

### Live phone-in programmes at Shimla and Patna

Drs. JS Minhas, Principal Scientist and Brajesh Singh, Senior Scientist participated in Live-Phone-in-Programme on "Potato storage and value added products". Drs. Vinod Kumar and Ashwani Kumar, Senior Scientists from CPRS Kufri also participated in Live-Phone in Programme on "Precautions before planting of potato in mid hills of Himachal Pradesh" at Doordarshan Kendra, Shimla. Drs NK Pandey and MC Sood participated in Live Phone-in-Programme on "Fertilizer Management and Marketing of Potato" on All India Radio, Shimla.

A Television programme "Aloo phasal sangoshthi" was arranged jointly by Doordarshan Kendra and CPRS, Patna at CPRS campus on 18-11-2009. In this interactive programme farmers and scientists sat together and queries of farmers

related to potato crop cultivation, seed production and processing, etc were answered by the scientists through on-spot replies. Drs. R.P. Rai, Head, Gulab Ram, Shambhu Kumar, S.K. Singh and Barsati Lal of CPRS, Patna and Sh. S.V. Verma and his team from Doordarshan participated in this programme.

### **Programme of DST-GMW-CP on rural energy organised at Shimla**

A programme on rural energy project implementation was organized at CPRI Shimla during 23-24<sup>th</sup> November 2009. The programme was hosted by Himalayan Research Group, Shimla at CPRI campus. During this programme, it was emphasized that 21<sup>st</sup> century is the century of knowledge. In every sphere of life we are always working for new innovations and developing technologies which make life comfortable and sustainable. There is large number of institutes, organisation and individuals involved in pursuit to develop process and products to suit the requirements of the mankind. It is always felt that technologies developed in laboratories do not reach the remote and rural people. Department of Science and Technology has the division which looks for extension of technologies from lab to land through a dedicated network of community based scientific groups and institutes to achieve the desired level of technology extension for equity, empowerment and development of people residing in rural areas of the country.

During this two days workshop, projects ranging from rural energy needs under DST sponsored coordinated programme and other projects in different fields such as processing of wild edible plants, irrigation technologies for cold

deserts, earthquake disaster mitigation through innovative income opportunities in J&K, monitoring of pesticide residues in Kashmir apple and rural housing technologies were assessed for their progress. Implementations of these activities from diverse fields are able to generate employment and entrepreneurship at grass root level in remote areas and helps in managing the different socio-economic and environmental problems. It is clear that implementation of energy initiatives in rural areas are likely to contribute by reducing the impact of much talked about climate change and make people aware about new options and clean technologies in the time to come at local level to live their life in a sustainable manner.

Free exchange of views and suggestions during the workshop is expected to help the investigators in achieving the useful results.

## **Important Meetings**

### **Workshop on IT application in horticulture**

A Workshop on "Information Technology Applications in Horticultural Crops" was held at Central Potato Research Institute, Shimla during August 24-25, 2009. The workshop was attended by about 80 participants including ADG (Hort.-II), ICAR, 12 directors of different Institutes/Directorates/NRCs of Horticulture Division of Indian Council of Agricultural Research, Heads of regional stations of ICAR Institute's located at Shimla and representatives from National Informatics Centre, New Delhi. While welcoming the participants during Inaugural Session, Dr SK Pandey, Director, Central Potato Research

Institute, Shimla mentioned that Information Technology is a *Mantra* for success in 21<sup>st</sup> century. He also thanked Dr. HP Singh, DDG (Horticulture), ICAR for giving opportunity to Central Potato Research Institute, Shimla to organize the workshop which is of great importance in present context. Chairman of the Inaugural session Dr RK Sood, Secretary (EC), State Council of Science, Technology and Environment, Govt. of Himachal Pradesh, Shimla, in his remarks stated that this is a challenging period after industrial revolution, things are changing drastically and as a consequence, new challenges are emerging. This requires change in thinking and planning and thus information technology has an important role to play in present scenario as we are not alone. We are interdependent in the system so any planning we do must be sustainable. For this, very important ingredient is information. Information technology is helpful in to collecting, managing and integrating the available information for sustainable planning.



*Release of publication during the workshop*

Dr. HP Singh, DDG (Horticulture), ICAR in his Inaugural Address mentioned that information technology is very important to take challenges of change, which continue to happen and how we take challenges determine our success. We can meet

the challenges of 21<sup>st</sup> century only if we are prepared. The research in agricultural sciences leading to Green Revolution has disproved the Malthusian Theory. Many other revolutions are also taking place. Science has made a lot of progress and a lot of information is generated in different fields. However, any science has got a cost factor. Therefore, the information generated should be utilized properly. Information technology plays an important role in bringing all the knowledge together. Like in some other branches of science, in communication also revolution has taken place and it has enhanced the efficiency of the uses of Information Technology (IT) to properly utilize the knowledge generated. Till the end of last century, IT knowledge was not managed properly and its proper use was lacking. Use of IT in ICAR system is rather new thus, this workshop was organized so that the scientists working on IT to get an opportunity to learn from the experiences of each other and explore the ways and means to augment the use of IT in agriculture and particularly horticulture.



*DDG (H) addressing the workshop participants*

There were in all 38 presentations by scientists of different Institutes/Directorates/NRCs of Horticulture Division of ICAR covering the topics on crop modeling, remote sensing and GIS, decision support systems and databases, E-

books and other IT initiatives. Besides, there were three more presentations in the Special Session on ARISoft solution developed at IISR, Calicut, initiatives of NIC in ICT dissemination for horticulture and on bio-informatics for genome analysis of plants.

DDG (Horticulture), ICAR advised that all the Institutes/NRCs/Project Directorate of Horticulture Division of ICAR will start office automation in phased manner. In the initial stages, few aspects are to be covered and later on slowly and slowly all the administrative and financial aspects have to be integrated for office automation. In the workshop, six working groups on GIS; Decision Support Systems, Precision Farming & Expert Systems; Office Automation; Bioinformatics; Germplasm Management and Disease Forecasting have been identified to prepare the road maps for implementing/integrating various programmes of Information Technology on Horticultural Crops.

#### **CAC and CIC meeting of NAIP held at CPRI**

The third consortium advisory committee (CAC) and consortium implementation committee (CIC) meeting of NAIP sub-project "Value Chain on Potato and Potato Products" was held on 24<sup>th</sup> July 2009 at CPRI, Shimla. The meeting was held to review the progress of the project and



*Participants of the CAC and CIC meeting*

address the issues related to implementation of the project. In all 26 participants attended this meeting. The presentations of all the partenering institutions were given by their respective associates. From CPRI, Dr. BP Singh, CPI of the project gave detailed presentation of overall activities being taken up in this project. Dr. SK Pandey, Director, CPRI congratulated the associated scientists for their good work and expressed his confidence in completion of project targets within the stipulated time frame.

### **Invited Lectures & Visitors**

#### **Potato genome laboratory inaugurated by DDG (H)**

Dr. HP Singh, Deputy Director General (Horticulture), Indian Council of Agricultural Research, inaugurated the Potato Genome Laboratory at Central Potato Research Institute, Shimla on 25.08.09. An ultra-high throughput DNA sequencer (GS FLX Titanium) has been installed in the laboratory which is unique in the ICAR system and placed Shimla in the world map of high throughput DNA sequencing. The GS FLX Titanium is the 'Gold Standard' for the next generation sequencing (NGS) technologies and has the ability to generate about 400-500 million base pair high quality sequence data in a single run and can be used for *de novo* sequencing, re-sequencing, transcriptomics, metagenomics, deep sequencing of amplicons, etc. This ultra-high throughput sequencer will expedite the potato genome sequencing project being financed in India exclusively by the Indian Council of Agricultural Research as a partner of a multinational consortium (Potato

Genome Sequencing Consortium), which aims at sequencing the entire ~840,000,000 nucleotide long potato genome by 2010. This multinational project on exploratory basic research is a brain-child of the Hon'ble Minister of Agricultural, Shri Sharad Pawar and the Director, General of ICAR, Dr. Mangala Rai who recommended its implementation at CPRI, Shimla in the year 2005. The laboratory would facilitate application of modern genome-based research tools for development of high yielding potato varieties with in-built resistance to diseases and pests. The laboratory would also extend the facility of ultra-high throughput genome sequencing to other ICAR institutes particularly to those under the Horticulture Division.



*DDG (H) inaugurating the potato genome laboratory*

The potato, a non-cereal food crop domesticated in the highland tropics of Andean Mountains (South America), has been declared as the 'Food for Future' by the United Nation's Food & Agriculture Organization, which celebrated the year 2008 as the "International Year of the Potato". This wonder crop was introduced in this country during 17<sup>th</sup> century by the Portuguese traders. Realizing the immense potential of this crop, The Government of India established the Central Potato Research Institute (CPRI) immediately after independence. Pioneering Research & Development

activities undertaken by the institute triggered a revolution in potato cultivation in the country. As a consequence of which the country has emerged as the third largest potato producer in the world. To compensate the imminent gap in cereal production, India has set an ambitious target of 50 million metric tons of potato production annually by the year 2020 compared to about 25 million metric tons now. To achieve this target we have to develop varieties that can produce 35-40 metric tons/ha within 65-70 days in a sustainable manner under relatively warmer climatic condition. This can only be achieved by using the modern genome-based research tools being created in the facility.

For critical investigation of complex biological processes like tuberization, yield, disease resistance etc. and to enable rapid, genome-based breeding strategies, having access to a genome sequence, at least a draft genome sequence, is imperative. With access to the potato genome, researchers would have access to the full gene complement of potato. Furthermore, map-based approach of potato genome sequencing would enable rapid conversion of the sequence data into genetic markers. The sequence data generated in this project would be used for gene discovery, marker development, evolutionary and plant diversity studies, improved breeding, and engineering of new phenotypes. Several scientific communities will utilize this sequence as the importance of potato spans agriculture, basic plant biology, biochemistry, and comparative genomics. The primary users will be universities, public sector institutes as well as government and industrial

potato biologists/breeders that are involved in research in understanding biological and agronomic processes in potato. The genome sequence will be high value resource for gene discovery, positional cloning, and marker/genotype development.

The institute would take up functional genomics work for the targeted traits, i.e. tuberization and late blight durable resistance as follow up action of potato genome sequencing. Though, few of the genes involved in tuberization process of potato have been identified, much is still left, to completely understand the process and its environmental control. The project aims at identifying genes involved in sensing temperature signal during tuberization. Once such genes are identified, attempts will be made to generate thermoinsensitive potato varieties so that its cultivation can be extended to warmer areas. Similarly, late blight resistance is a complex process that requires continuous refining to keep one step ahead of the pathogen. It is proposed that genes involved in late blight resistance and their interaction will be studied to work out novel resistance strategy. This can only be done, once the draft genome sequence is available.

#### **ASRB Chairman visits CPRI**

Dr. C.D. Mayee, Chairman, A.S.R.B., New Delhi visited CPRI during August 2009. He interacted



*Inauguration of Fagu complex by ASRB Chairman*



with various scientists during his visit to CPRI laboratories and also visited the potato farm at Kufri and Fagu. On 16<sup>th</sup> August, 2009, he inaugurated the Fagu complex and the water harvesting tank. Besides, he gave a general view of the activities of ASRB being taken up in the present scenario during his address to the scientific staff of the Institute.

#### Scientist meet at CPRI, Shimla

Scientist meet is a regular activity of the Institute, where on Fridays, scientists, technical workers and research associates meet to discuss & deliberate on latest & emerging R & D issues. Following lectures were delivered & discussed during the last 6 months:

#### Demise of Dr. RS Marwaha, Head, CPRS, Jalandhar



Dr. R.S. Marwaha

Dr. R S Marwaha, a very renowned Biochemist of CPRI, passed away on 1<sup>st</sup> September, 2009. He was born on

1-9-1949 and had done his doctorate degree from IARI, New Delhi in the year 1975. He joined CPRI in October 1977 and contributed to potato R&D activities in various ways. He was well decorated scientist with awards like Hari Om Ashram, ICAR Team, Kaushalya Sikka, S Ramanujam Awards, besides having good number of international publications of repute. He was selected as Head of CPRS, Jalandhar w.e.f. 22-08-09. The entire CPRI family prays for the departed soul.

Date	Speaker	Topic of scientist meet
31.7.2009	Sudhakar Mathur, Eppendorf	Liquid handling automation and micro-array applications
16.8.2009	Dr CD Mayee, Chairman ASRB	Address to scientists
18.9.2009	Vivek Thakur, Axis Bank	Salary accounts and saving options
20.11.2009	Dr R. Ezekiel	Potato production in North Korea
20.11.2009	Dr SK Kaushik	Environmental risk assessment of GM crops
4.12.2009	Dr ML Sharma, Icon Analytical	Application of electron microscopy in biological sciences
4.12.2009	Mr Sourabh Narang	Application of electron microscopy in biological sciences
9.12.2009	Dr Nelles Wayne, CIP	Learning resources for potato systems

## Human Resource

### Appointments

Name	Post	Joined on
Dr. Vinay Sagar,	Sr. Scientist, Plant Pathology	28-07-09
Dr. RS Marwaha	Head, CPRS, Jalandhar	22-08-09
Dr. (Ms.) Jeevalatha A.	Scientist, Plant Pathology	29-08-09
Dr. Prem Chand Meena	Scientist, Agricultural Economics	31-10-09

### Promotions

Name	Promoted as	On
<b>Administration</b>		
Sh. Santosh Kumar, LDC, CPRIC, Modipuram	Sr. Clerk	16-07-09
Sh. Deep Ram, L.D.C., CPRI, Shimla	Sr. Clerk	17-08-09
Sh. Chanda Ram, Sr. Clerk, CPRI, Shimla	Assistant	15-07-09
Smt. Shashi Bala Thakur, Stenographer	Personal Assistant	24-11-09
<b>Supporting</b>		
All the Group "D" staff including Matric/Non-Matric/Non-ITI were re-designated as Skilled Support Staff in the upgraded Gropu-C revised Pay Band -I of Rs. 5200-20200+ Grade Pay of Rs. 1800 w.e.f. 01.01.2006.		

### Transfers

Name	From	To
Dr. Med Ram Verma, Sci. Sr. Scale	ICAR Research Complex for NEH Region, Umiam	CPRI, Shimla On 05-08-2009

Contd....

Contd...

### Transfers

Name	From	To
Dr. Med Ram Verma, Sci. Sr. Scale	CPRI, Shimla	IIVR, Bareilly on selection as Senior Scientist
Sh. Kulwinder Singh, T-2	CPRI, Shimla	CPRS, Jalandhar
Sh. Vijay Kumar Rai, T-2 Tractor Driver	CPRS, Patna	CPRS, Jalandhar
Smt. Bindra Gupta, Asstt.	CPRIC, Modipuram	CPRI, Shimla
Sh. Sandeep Verma, Sr. Clerk	CPRI, Shimla	CPRIC, Modipuram
Smt. Daishey Tuli, LDC	CPRS, Gwalior	CPRS, Jalandhar
Sh. Bijender Singh, Skilled Supporting Staff	CPRS, Jalandhar	CPRS, Gwalior

### Retirements

Name	Post	Retired on
Sh. Sarju	SS GR. III (SSS)	30.06.2009
Dr. VS Khushwah	Head, CPRS, Gwalior	31.07.2009
Sh. Des Rah	T-5, Tractor Driver, CPRS, Jalandhar	31.08.2009
Sh. Albert Nagasia	T-4, CPRS, Patna, Voluntary Retirement	30.09.2009
Dr. PH Singh	Acting Head, Seed Technology	31.11.2009

### Demises

Name	Post	Expired on
RS Marwaha,	Head, CPRS, Jalandhar	01-09-09

## Honours, Awards & Foreign visits

### Shivashakthi Life Time Achievement Award

Dr. Suman Kumar Pandey, Director, Central Potato Research Institute, Shimla was awarded the prestigious Shivashakthi Life Time Achievement Award of the



Dr. S.K. Pandey

Horticulture Society of India for his outstanding work on potato research in the country. Dr. Pandey has more

than thirty-seven years of experience in potato research and development, especially in the field of potato breeding, biotechnology, cell and molecular biology and genomics. His leadership in the field of breeding for processing grade varieties resulted in quick development of a number of suitable varieties like Kufri Chipsona 1, Kufri Chipsona 2, Kufri Chipsona 3, Kufri Himsona, Kufri Frysona and suitable technologies for production and storage of processing grade potatoes under sub-tropical condition that revolutionized potato processing sector in India. He also developed specialized varieties like Kufri Giriraj, Kufri Sutlej, Kufri Jawahar, Kufri Pukhraj, Kufri Shailja, Kufri Pushkar, Kufri Arun, Kufri Himalini and the

first ever heat tolerant variety Kufri Surya that has the potential to mitigate the ill effects of global warming on potato cultivation. The TPS progeny 92-PT-27 developed by his group is gaining popularity in India and abroad. He identified and registered thirteen elite potato germplasm and patented a technology for micro-tuber production. He also contributed immensely in the development of transgenic potato suitable for cold chipping, and for late blight field resistance. He has more than, 250 publications in various national and international journals in addition to nine books to his credit. Dr. Pandey has visited several foreign countries including USA, Russia, Thailand, Tajikistan, Afghanistan and Peru. He is the recipient of several prestigious awards including ICAR Outstanding Multi-disciplinary Team Research Award (1997-99), JC Anand Gold Medal (2005) from Horticultural Society of India, Indian Potato Association-Kaushalya Sikka Award (2005), IPFDC Award (2005), Shri LC Sikka Endowment Award from National Academy of Agricultural Sciences, Dr. S. Ramanujam Award (2007) from Central Potato Research Institute (ICAR) and the coveted Rafi Ahmed Kidwai Award (2006) from ICAR. He is the Fellow of Indian Potato Association, Horticultural Society of India, National Academy of Agricultural Sciences and National Academy of Sciences, India, Allahabad.

### Kaushalya Sikka Award

The Kaushalya Sikka Award of Indian Potato Association, Shimla for the block year 2005-2009 was bestowed upon Dr. Dinesh Kumar and his colleagues for their research contribution in developing information capsule on processing quality parameters of potatoes grown



Dr. Dinesh Kumar

under sub-tropical climatic conditions of India. They have generated information on biochemical factors governing potato processing

quality right from developing stage to the storage. This information is of immense help to researchers to develop better varieties and technologies for potato processing; to growers for getting more profit and to the industry in getting quality raw material from different parts of the country on sustainable basis. The research work is expected to provide boost to the development of potato processing sector in the country. His team included Drs. SK Pandey, R Ezekiel, SV Singh, RS Marwaha, BP Singh, Brajesh Singh and Parveen Kumar of CPRI.

#### Associateship of NAAS

Dr. Brajesh Singh Senior Scientist (Pl. Physiology), Division of Crop Physiology and PHT, Central Potato Research Institute, Shimla,



Dr. Brajesh Singh

Himachal Pradesh has been selected as associate of the National Academy of Agricultural Sciences w.e.f. January 1, 2010.

#### Foreign visit of CPRI Scientists

- Dr. BP Singh, Joint Director, Central Potato Research Institute Campus, Modipuram was deputed for executive development programme on "Food and Agri Business Management Programme" held at Cornell University, Ithaca, NY, U.S.A.,

during June 24 to July 2, 2009.

- Dr. SK Luthra, Sr. Sci. CPRI Campus, Modipuram attended training on "Germplasm evaluation for biotic and abiotic stress" at CIP-Lima Peru during August 24- Sept.18, 2009.
- Drs. SK Pandey, Director, CPRI, Shimla, PM Govindakrishnan, Principal Scientist, Rajesh Rana, Sr. Sci. CPRI, Shimla and SV Singh, Principal Scientist, CPRI Campus, Modipuram attended "Enhanced food and income security in SWCA through potato varieties with improved tolerance to abiotic stress" project meeting in Tashkent, Uzbekistan during Sept. 17-19, 2009.
- Dr. Vinay Singh, Sr. Sci. & Er. Sukhwinder Singh, Sr. Scientist, CPRI Campus, Modipuram participated in Training/study visit on aeroponic technology for Seed Production at Chinese Academy of Agricultural Sciences (CAAS) in Beijing, China, which was organized by International Potato Center (CIP). The training was held during Sept. 26-30, 2009.
- Dr. R Ezekiel, Head, Division of Crop Physiology, Biochemistry & Post Harvest Technology, Central Potato Research Institute, Shimla visited DPR Korea, as Consultant in the area of potato storage under FAO sponsored consultancy programme held in DPR Korea, from October 13-20, 2009.
- Dr. SK Kaushik, Sr. Scientist, Central Potato Research Institute Shimla attended a short-term exchange programme (STE) on the topic "Environmental Risk Management" involving broader regulatory and policy topics of

interest in agricultural biotechnology at ST. Louis, Missouri and Washington, DC, USA during October 26-30, 2009.

- Dr. SK Pandey, Director, CPRI, Shimla was invited to present a paper in the 15th triennial symposium of the International Society for Tropical Root Crops (ISRTC) at CIP, Lima Peru during November, 2-6, 2009.
- Dr. BP Singh, Joint Director, CPRI, Modipuram participated in the follow-up Beijing meeting at Bellagio, Italy from November 16-20, 2009.
- Dr. S Ramani attended start up planning workshop for Austrian Development Agency Project "Development and application of ecological approaches in pest management to enhance sustainable potato production of resource poor farmers in the Hindu-Kush Himalayan region of Bhutan, Nepal, Pakistan and India (Sikkim)" at Kathmandu, Nepal from 24-26 November, 2009.

#### Inter-Zonal Sports meet

After winning ICAR Zonal Sport Tournament in Table Tennis, Badminton & Volleyball Shooting at IISR, Lucknow, CPRI contingent participated in ICAR Inter-Zonal Sports Meet at NDRI, Karnal and brought pride for CPRI by winning



Winners of the inter-zonal sports team of CPRI

Gold in Badminton (Sh. Surinder Pal, Sh. Sachin Kanwar & Dr. Shashi Rawat), Silver in Volleyball Shooting (Dr. Shashi Rawat, Sh. NK Sharma, Sh. Om Pal Singh, Sh. Sheesh Ram, Sh. Yogesh Gupta, Sh. Hoshier Singh, Sh. Pradeep Upadhayay, Sh. Som Dutt, Sh. JS Jassal) and Bronze in Table Tennis (Sh. Chander Mohan Bist, Dr. Vinay Bhardwaj, Sh. Roshan Lehri).

## Future Activities

### Training Courses

- A two days training for field functionary/federation members from Uttarakhand on "Production technology of potato/association mechanism of CPRI" is planned to be held at CPRI, Shimla in the month of February, 2010.
- A 10 days training programme for field functionaries of ITC on "Potato crop improvement and technologies" is planned during February, 2010.

## Potato Facts

### High potato output in India expected

India's potato output is likely to rise by 5.1 percent to a record 32.7 million tonnes in 2009/10 as higher prices prompted farmers to cultivate the tuber crop on more area, a senior official said on Friday. "Because of scanty rains in some areas they (farmers) have not cultivated paddy crop. They covered this area with potato. Market prices are also high," R.P. Gupta, Director, National Horticultural Research and Development Foundation (NHRDF), told Reuters in an interview.

In an other estimate, India's potato output could rise by six per cent

to eight per cent in 2009-2010, according to traders and analysts. In 2008-09, the output was placed at 260 lakh tonnes, down from the high of 305 lakh tonnes in 2007-08. "With potato fetching a better price this year compared to the previous years a number of farmers who had either left their land barren or gone for sowing of other crop will come back," said Mr Sachid Madan, director at Technico Agri Sciences, a subsidiary of the cigarette to hotel major ITC Limited. Increased production would mean that prices which have already risen year on year by over 100 per cent should begin to moderate. Mr Madan for one is confident that prices could possibly touch as low as Rs 5 per kg by the end of the current month even as arrivals from key producers like Punjab, Madhya Pradesh and Himachal Pradesh begin to firm up. Potato prices were ruling as recently as October/November at Rs 14-15 per kg in the wholesale markets. Part of the optimism of a higher crop stems from the fact that sowing operations is still on in key producing states like West Bengal and Bihar besides Karnataka. Potato acreage in India stood at 16 lakh hectares in 2008-09, which is also expected to rise by another five to six per cent. However despite the optimism, traders like Mr Sukhjit Singh Bhatti, president of the Jalandhar based Confederation of Potato Seed Farmers have a word of caution. "We could get a bumper crop which will largely depend on the weather conditions in December and January," he adds.

*Source: Internet*

### All-Indian menu key to McDonalds success

McDonald's has lost its 'global' flavour in India. The largest quick service restaurant chain of the US has

finally got its menu right here in India – a collection of dishes that hardly bears any resemblance to its international menu. The top officials at McDonald's India told Financial Chronicle that around 75 per cent of the menu is 'purely' Indian. McDonald's India has undergone a lot of trials and errors to set the business right. For instance, the company had to write off investments – around \$10 million – for its potato processing facility in Nainital because the produce was not good enough to make authentic French fries. It had to set up another facility for producing potatoes at Baroda in Gujarat with an additional investment of \$25 million.

*Source: Internet*

### From potato peel to biogas

Once destined for the landfill, potato waste from Cavendish Farms' potato processing facilities is now being used to power the company's boilers in their processing plant at New Annan, Prince Edward Island in Canada. The biogas facility takes the solid waste material, and through anaerobic digestion, converts it into energy for the Cavendish Farms processing plants.

*Source: Internet*

### Canada adds acrylamide to toxic substance list

Health Canada has added acrylamide, a substance found in French fries and potato chips, to the government's list of toxic substances. Acrylamide first came onto the health and safety agenda in 2002 when scientists at the Swedish Food Administration reported unexpectedly high levels of acrylamide in carbohydrate-rich foods and published evidence linking the chemical to cancer in laboratory rats. Food manufacturers have come under consumer pressure to come up with

ways to cut levels of acrylamide in these foods, but now in Canada, the pressure is coming from government.

*Source: Internet*

### Belarusian scientists create unique GM potato plants



MINSK - The website yarmarka.net reports that genetically modified potato plants resistant to Colorado potato beetle were created by a group of Belarusian scientists, according to head of the Laboratory of Molecular Genetics of Belarus Nikolai Cartel. "The unique transgenic potato resistant to Colorado beetle as well as potato with chitinase gene, providing resistance to fungal pathogens, are the most promising developments of our scientists", said Cartel. According to the head of the laboratory, currently these transgenic plants are tested under laboratory conditions. "Unfortunately, the reason for the slow introduction of transgenic potatoes in industrial farming is the lack of special conditions for the active analysis and testing of these plants in an industrial environment", said Kartel. He also added that in 2010 Belarus will create two sites for testing GM-potatoes.

*Source: Internet*

### Article on Potato

#### Efficient Nutrient Management in Potato Crop Production

The capacity to produce usable

potato plant biomass depends upon the adequacy and balance of macro and micro-nutrients in the plant. Potato is one of the most sensitive crops to low nutrients supply of soils, i.e. potato is a plant of lower nutrient efficiency than cereals like wheat, rice etc. Potato being a shallow rooted crop the fertilizer use efficiency for N is 40-50% and for K it ranges between 50-60% while it is only 10-15% for P.

The basic philosophy of nutrient management should be to apply fertilizers at rates to ensure high fertilizer use efficiency so that the cost of cultivation of potato is reduced as well as the amount of unutilized fertilizers is also reduced to environmentally acceptable levels. Following information on role of nutrients/deficiency symptoms; and on suitable source, dose, time and method of fertilizer/manure application can be of help to efficiently manage nutrient requirement of potato crop.

#### Role of nutrients in potato

Fertilizer nutrients NPK and micronutrients promote root and shoot growth and tuber yield. Nitrogen increases plant height, number and size of leaves, leaf area duration, thickness of stem, tuber initiation, number and size of tubers. Phosphorus promotes early growth, plant height, number of shoots, leaf area index (LAI), leaf area duration, size and number of tubers particularly small size tubers. Potassium increases leaf expansion particularly at early stages of growth, extends leaf area duration by delaying leaf shedding near maturity. It aids in translocation of photosynthates from leaf to tuber. It increases both the rate and duration of tuber bulking. Potassium increases the size of tubers and not the number. It provides resistance against frost and diseases. Micro-nutrients play a specific role in the growth and

development of a plant. Even though these elements are needed in only minute quantities, many soils do not supply them in sufficient quantity for healthy growth and optimum yield of potato. Potato plants produce specific deficiency symptoms under nutrient stress conditions (Plates 1 to 5).

#### Vital aspects of nutrient management in potato

##### Optimum rate of fertilization

**General recommendations:** The optimum rate of NPK fertilization in different zones based on tuber yield response in trials conducted in different potato growing agro-climatic zones in India is given in Table 1. The mean response to optimum doses of N, P and K fertilizers was 116, 46, and 51 q/ha, respectively (Table 1). Processing varieties of potato Kufri Chipsona 1 and Kufri Chipsona 3 and the likes grown specifically to produce large processing grade tubers require higher rate of fertilization for by 33 to 50% than recommended.

##### Soil test for nutrient management:

Fertilizer management of potato crop is usually based on averages on regional basis known as package of practices. Such an approach results in suboptimal or excessive application of inputs resulting in inefficient utilization of costly fertilizers on one hand and risks environmental degradation on the other. Moderation in rate of fertilization is possible on the basis of soil test value (STV). Soil test based fertilizer recommendation results in fertilizer economy through balanced application and enhances tuber yield. Soil tests are more reliable, convenient and efficient as they are performed before planting the crop to decide on rate of fertilization precluding nutrient imbalances in the crop. Therefore, to save on fertilizer input, apply fertilizer based on soil test values after getting soil tested from soil testing laboratories. Some of the



Plate 1. Phosphorus deficiency symptoms in potato.



Plate 2. Potassium deficiency symptoms in potato.

potato growing soils have already accumulated medium to high available phosphorus and do not need full dose of phosphorus application each year. Use/Grow nutrient efficient potato cultivars like Kufri Pukhraj.

#### Sources of nutrients

##### Nitrogen:

- Urea the cheapest and most available (80%) source of N in India is 10-15% less efficient than ammonium sulphate (AS) and calcium ammonium nitrate (CAN).
- Urea is equally efficient, when broadcast and ploughed under during land preparation at least 48 hrs before planting potato.
- Top dressing of urea between

rows at earthing up is equally efficient to other sources of N.

- Urea alone at planting in excess of 60 kg N/ha is harmful for emergence of potato.

##### Phosphorus:

- Readily soluble sources of P viz., single super phosphate (SSP), triple super phosphate (TSP) and DAP are more suitable for potato.

##### Potassium:

- Although potassium sulphate has been found to be best in term of its beneficial effect on tuber quality viz., dry matter, ascorbic acid and sugar content but due to its high cost, it has not found much use in potato crop. However, in sulphur deficient soils, it can be more effective because of S present in it.
- The potassium chloride (MOP) is commonly used in potato crop and constitutes 97% of K fertilizers consumption in potato.

##### Micronutrients:

- If soil is deficient in any of the micronutrients, it can be applied through soil, foliar spray or seed tuber treatment (Table 2), but for iron and boron, foliar spray method should be preferred. The foliage spray should be avoided between 11 am to 3 pm. The micronutrients could be sprayed mixed with fungicides for spray purpose.

##### Method and time of fertilizer application

- Split application of N (1/2 at planting + 1/2 at earthing) is essential for maximizing efficiency. Spraying 2% urea solution 40-50 days after planting corrects mild visual deficiency symptoms of N, if any.
- Split application of K is advantageous only in light

textured loamy sand soils.

- No benefit from split dose of P is reported, because it is required mostly for early root and shoots growth.
- Only small benefits of foliar application of P and K are reported in case of visual deficiency of these nutrients in crop.
- Band placement of P fertilizers invariably is better than broadcast, because of fixation of P in most soils. However, methods, of placement of K fertilizers in band at sides or above or below seed tubers or broadcast were equally efficient.

##### Organic farming in potato:

There is a resurgence of interest in organic farming globally, which holds sustainability of natural resources and environment supreme along with nutritional quality of produce. The profitability of organic farming depends, on the higher prices that its products command in the market place. Much severe mean tuber yield loss of 35.3% in organic farming compared to 100% mineral fertilizers treatment was recorded in initial 3 years result of a long term experiment



Plate 3. Iron deficiency symptoms in potato.

on organic farming at Modipuram, India.

### Sustainable integrated nutrient management

It recommends conjoint application of chemical fertilizer, organic manures and bio-fertilizer, in addition to inclusion of legumes in cropping systems and incorporation of on and off-farm generated crop residues to constitute an efficient integrated nutrient management strategy. Integrated nutrient management through green manuring before potato once in 2-3 years, manuring with farmyard manure and incorporation of crop residue into the soil maintains soil fertility and help sustain productivity. Application of 15 t/ha of FYM takes care of the half of

fertilizer phosphorus and potassium requirement of the crop, whereas 30 t/ha of FYM can take care of whole of fertilizer P and K needs of the crop. Therefore, adjust the dose of P and K fertilizers according to the dose of FYM applied. Role of green manuring in INM is to supplement nutrients in combination with chemical fertilizers and to improve physical condition of the soil. Green manuring usually does not help save or reduce N fertilizer needs of potato, yet for fixed yield targets, some saving in nitrogen is possible, because tuber yield level is raised by green manuring. Green manuring helps achieve 30-50% higher produce of tubers of uniform shape and size, and superior quality.

Organic farming usually results in lower tuber yield compared to cropping with mineral fertilizers. It is despite the fact that application of

organics in integrated nutrient management results in improved crop yield and quality of tubers than mineral fertilizers alone. Potato tuber quality, taste and flavour improve mainly through increased dry matter, starch, vitamin C, protein content and quality, and decreased free nitrates in tuber and storage losses.

It is concluded that monitoring nutrient imbalances in soil through soil test is essential for moderation in rate of fertilization of potato crop in the long term for sustained productivity and economy. Incorporation of crop residues/green manure into the soil should be an integral part of nutrient management to maintain soil fertility and sustain productivity.

-SP Trehan & SK Pandey



Plate 4. Zinc deficiency symptoms in potato



Plate 5. Manganese deficiency symptoms in potato

Table 1. Optimum fertilizer requirement of potato crop in different potato growing zones of India

Potato growing zones	Nitrogen		Phosphorus (P <sub>2</sub> O <sub>5</sub> )		Potassium (K <sub>2</sub> O)	
	Rate (kg/ha)	Response (q/ha)	Rate (kg/ha)	Response (q/ha)	Rate (kg/ha)	Response (q/ha)
North-western plains	180	110	80	26	120	57
West-central plains	190	127	80	29	120	34
North-eastern plains	200	166	80	25	160	67
Plateau region	115	85	50	21	110	36
North-western hills	130	148	120	112	100	64
North-eastern hills	100	85	160	66	130	64
SWB* hills	100	85	150	52	110	52
Southern hills	115	120	150	35	110	38
Mean	141	116	109	46	120	51

\* Sikkim and West Bengal hills

Table 2. Doses of micronutrient application for correction of their deficiency in potato

Micronutrient	Soil application (kg/ha)	Spray application (g/100 lit. water)	Tuber soaking treatment (g/100 lit. water)
Zinc sulphate	25	200	50
Ferrous sulphate	50	300	75
Manganese sulphate	25	300	50
Copper sulphate	25	200	50
Ammonium molybdate	2	100	20
Sodium borate	2	100	20

## हिन्दी समाचार

### संस्थान ने मनाया हिन्दी चेतना मास

संस्थान के मुख्यालय में हर वर्ष की भांति इस वर्ष भी सितम्बर-अक्तूबर माह में हिन्दी चेतना मास का आयोजन किया गया। 14 सितम्बर, 2009 को 'हिन्दी दिवस' के अवसर पर हिमाचल प्रदेश भाषा एवं संस्कृति विभाग के निदेशक डा. प्रेम शर्मा बतौर मुख्य अतिथि और मुख्य वक्ता के रूप में उपस्थित थे। अपने वक्तव्य में डा. प्रेम शर्मा ने भाषा और भूषा को भारत की पहचान बताया। उनका कहना था कि राष्ट्रीय ध्वज, राष्ट्रीय गान के समान हमें अपनी भाषा को भी पूरा मान-सम्मान देना चाहिए। उन्होंने इस बात पर दुःख व्यक्त किया कि कार्यालयों को हिन्दी की याद केवल सितम्बर माह में ही आती है और साल भर कर्मचारी अंग्रेजी में ही काम करते हैं। उन्होंने चीन, जापान, जर्मनी व रूस का उदाहरण देते हुए अपनी भाषा में सरकारी काम करने पर बल दिया।

संस्थान में राजभाषा के प्रचार और प्रसार का हवाला देते हुए सहायक निदेशक (राजभाषा) श्री प्रवीन चांदला ने भारत सरकार की राजभाषा नीति और उसके कार्यान्वयन पर प्रकाश डाला। उन्होंने कहा कि वैसे तो संस्थान में पहले की तुलना में हिन्दी का प्रयोग बढ़ा है किन्तु इसके लिए सभी कर्मियों को मिलकर कार्य करना होगा। अपने संबोधन में संस्थान के निदेशक डा. सुमन कुमार पाण्डेय ने कर्मचारियों का आह्वान किया कि वह संस्थान के कामकाज में हिन्दी का प्रयोग करने में बिल्कुल भी संकोच न करें और नियमित तौर पर पुस्तकालय में उपलब्ध पुस्तकों का लाभ उठाएं।

एक माह तक चलने वाले इस कार्यक्रम के दौरान हिन्दी निबन्ध, नोटिंग एवं ड्राफ्टिंग, हिन्दी टाइपिंग, प्रश्नमंच, स्मरण शक्ति, चित्र कहानी और वैज्ञानिक लेख-लेखन जैसी प्रतियोगिताओं का आयोजन किया गया।



हिन्दी चेतना मास का समापन समारोह

समापन समारोह संस्थान के प्रेक्षागृह में 24 अक्तूबर, 2009 को आयोजित किया गया। इस अवसर पर सतलुज जल विद्युत निगम के वरिष्ठ प्रबन्धक (राजभाषा), डा. रजनी कांत पाण्डेय ने बतौर मुख्य अतिथियों को पुरस्कार वितरण किया। सरकारी कामकाज में हिन्दी का अधिकतम प्रयोग करने पर संस्थान के स्थापना-1, स्थापना-2 व भण्डार अनुभाग को स्मृति चिन्ह प्रदान किए गए।

### संसदीय राजभाषा समिति का दौरा

माननीय संसदीय राजभाषा समिति ने 30 अक्तूबर, 2009 को संस्थान के मुख्यालय में राजभाषा कार्यों का निरीक्षण किया। उन्होंने संस्थान के क्रिया-कलापों और आलू के प्रति विशेष रूचि दिखाई। स्थानीय रेडीसन होटल में आयोजित इस निरीक्षण कार्यक्रम के संयोजक थे सांसद डा. प्रसन्न कुमार पाटसाणी तथा श्री किशन वी. पटेल सांसद (लोकसभा)। उन्होंने जहां संस्थान के कार्यों की सराहना की वहीं हिन्दी



पुरस्कार वितरण समारोह

पत्राचार, कम्प्यूटर पर हिन्दी कार्यों को बढ़ाने का सुझाव भी दिया। इस अवसर पर संस्थान के हिन्दी प्रकाशनों, आलू उत्पाद, व आलू की नवीन किस्मों की प्रदर्शनी भी लगाई गई।

### मोदीपुरम परिसर में हिन्दी पखवाड़ा

संस्थान के मोदीपुरम परिसर में हिन्दी पखवाड़ा का उत्साह देखते ही बना। हर वर्ग के अधिकारियों और कर्मचारियों की भागीदारी इस आयोजन को सफल बनाने में अहम भूमिका रही। परिसर के संयुक्त निदेशक महोदय ने 14 सितम्बर, 2009 को हिन्दी पखवाड़ा का शुभारंभ किया। पन्द्रह दिन चलने वाले इस कार्यक्रम में अलग-अलग दिन अलग-अलग हिन्दी प्रतियोगिताओं का आयोजन किया गया।



मोदीपुरम परिसर में हिन्दी पखवाड़ा



'पर्यावरण संरक्षण: आवश्यकता, संकट एवं समाधान' विषय पर आधारित आशुभाषण प्रतियोगिता में 14 प्रतिभागियों ने अपने विचार प्रकट किए। निबन्ध, कम्प्यूटर पर हिन्दी टाइपिंग, सामान्य ज्ञान, हिन्दी नोटिंग एवं ड्राफ्टिंग जैसी प्रतियोगिताओं में संबंधित वर्ग के अधिकारियों/कर्मचारियों की भागीदारी ने पन्द्रह दिनों तक परिसर का माहौल हिन्दीमय बनाने में कोई कोर-कसर नहीं छोड़ी।

समापन समारोह के अवसर पर हिन्दी के साहित्यकार श्री मनोज कुमार 'मनोज' बतौर मुख्य अतिथि उपस्थित थे जबकि परिसर के संयुक्त निदेशक डा. बीर पाल सिंह ने कार्यक्रम की अध्यक्षता करते हुए सभी से कार्यालय का सरकारी कामकाज हिन्दी में करने का आह्वान किया। कार्यक्रम का संचालन परिसर की हिन्दी अनुवादक श्रीमती कुसुम सिंह ने किया।



पुरस्कार वितरण समारोह

## शिलांग केन्द्र में हिन्दी दिवस

संस्थान का पूर्वोत्तर राज्य स्थित केन्द्र भी 'हिन्दी दिवस' मनाने में पीछे नहीं है। इस केन्द्र में 12 अक्टूबर, 2009 को बड़ी धूम-धाम के साथ हिन्दी दिवस का आयोजन किया गया। मुख्य अतिथि के रूप में उपस्थित डा. फिल्मिका मार्बेनियन, प्रवक्ता ने अपने संबोधन में केन्द्र के कर्मचारियों को हिन्दी का प्रयोग करने के लिए उत्साहित किया। केन्द्र के अध्यक्ष डा.

एस.रमणी ने केन्द्र की उपलब्धियों की जानकारी देते हुए कहा कि यह केन्द्र जहां तक सम्भव होता है अपना सरकारी कामकाज हिन्दी में करने का प्रयास करता है। इस अवसर पर श्री राम इकबाल राय, श्री शाहिद अली एवं संचिता राय को पुरस्कृत किया गया।



शिलांग केन्द्र में हिन्दी दिवस

## ऊटी में हिन्दी कार्यशाला

संस्थान के ऊटी केन्द्र में 'राजभाषा हिन्दी का प्रगामी प्रयोग' विषय पर एक दिवसीय हिन्दी कार्यशाला का आयोजन किया गया। कार्यक्रम का शुभारम्भ डा. के. मनोरमा के स्वागत संबोधन के साथ हुआ। केन्द्र के अध्यक्ष डा. टी.ए. जोसफ ने कार्यशाला की रूपरेखा और इसके आयोजन पर प्रकाश डाला। इस अवसर पर न्यू इण्डिया इन्श्योरेंस के मण्डलीय प्रबन्धक श्री ईश्वर चन्द्र झा बतौर मुख्य अतिथि व विशेष वक्ता के रूप में उपस्थित थे। उन्होंने भारत सरकार की राजभाषा नीति और हिन्दी के प्रयोग की आवश्यकता पर बल दिया।



ऊटी में हिन्दी कार्यशाला

इस अवसर पर वेतन और लेखा कार्यालय के हिन्दी अनुवादक श्री वीरेन्द्र शाह तथा हिन्दी विभाग के अधिकारी श्री अनन्त पद्मनाभन ने हिन्दी के प्रयोग, हिन्दी सीखने की सुविधाएं, प्रेरणा और सद्भाव द्वारा हिन्दी के प्रचार-प्रसार पर बल दिया। इस अवसर पर हिन्दी के प्रयोग में आने वाली कठिनाइयों और प्रशिक्षण सुविधा पर भी चर्चा की गई।

## नगर राजभाषा कार्यान्वयन समिति

शिमला स्थित केन्द्रीय सरकार के कार्यालयों, उपक्रमां, निगमों एवं बैंकों की नगर राजभाषा कार्यान्वयन समिति, शिमला के तत्वाधान में आयोजित हिन्दी प्रतियोगिताओं में जहां संस्थान की श्रीमती पूनम सूद चित्र कहानी प्रतियोगिता में द्वितीय रहीं वहीं प्रश्नमंच में श्री चन्द्र मोहन सिंह बिष्ट एवं श्री जितेन्द्र कुमार की जोड़ी ने तृतीय तथा कविता पाठ में कुमारी गरिमा तोंमर को प्रोत्साहन पुरस्कार के लिए चुना गया। ज्ञात रहे इन प्रतियोगिताओं में शिमला स्थित विभिन्न कार्यालयों के प्रतिभागी भाग लेते हैं।

## दीपावली मेला

संस्थान के परिसर में 12 अक्टूबर, 2009 को आयोजित 'दीपावली मेला' कर्मचारियों के आकर्षण का केन्द्र रहा। ज्ञात रहे कि इस मेले का आयोजन संस्थान की स्टाफ वेलफेयर एसोसिएशन के तत्वाधान में हर वर्ष किया जाता है। नई व युवा कार्यकारिणी के आने से इस बार के मेले में नया उत्साह देखने को मिला। यह मेला संस्थान के स्टाफ और उनके परिवारजनों व ईष्ट मित्रों के मेल-जोल का सुनहरा अवसर रहता है। विभिन्न खेलकूद और बच्चों की फैंसी ड्रेस जैसी प्रतियोगिताओं के साथ-साथ मेले का आकर्षण तम्बोला, खान-पान, लक्की सेवन

के कई स्टाल रहे। पुरुषों के लिए आयोजित दोपहिया वाहन प्रतियोगिता ने विशेष रूप से आकर्षित किया।



संस्थान में दीपावली मेले का आयोजन

मुख्य अतिथि के रूप में उपस्थित श्रीमती नीरजा पाण्डेय ने सभी विजेताओं को पुरस्कार वितरित किए और इस मेले के सफल आयोजन पर बधाई दी। आयोजन में सर्वश्री नरेश कुमार शर्मा, सचिन कंवर व नरेन्द्र कुमार आदि की प्रमुख भूमिका रही।



मुख्य अतिथि का संबोधन

### साम्प्रदायिक सद्भावना अभियान

राष्ट्रीय साम्प्रदायिक सद्भावना प्रतिष्ठान के आह्वान पर माननीय कृषि, उपभोक्ता मामले, खाद्य और सार्वजनिक वितरण मंत्री श्री शरद पवार के निर्देश पर संस्थान के मुख्यालय में 19-25 नवम्बर, 2009 के दौरान कौमी एकता सप्ताह का आयोजन किया गया। इस अवसर पर संस्थान के मुख्यालय में राष्ट्रीय एकता की शपथ ग्रहण की गई। इसके साथ ही साम्प्रदायिक, जातीय व आतंकी हमलों में

शारीरिक और मानसिक रूप से प्रभावित बच्चों के पुनर्वास के लिए चन्दा एकत्रित किया गया।

### मॉडल प्रशिक्षण पाठ्यक्रम

केन्द्रीय आलू अनुसंधान संस्थान, शिमला में 18-25 अगस्त, 2009 के दौरान 'सुधरी तकनीक द्वारा बीज आलू उत्पादन' पर 8 दिवसीय मॉडल प्रशिक्षण पाठ्यक्रम का आयोजन किया गया। यह पाठ्यक्रम विशेष रूप से हिमाचल प्रदेश में कार्यरत बागवानी विकास अधिकारियों व आलू विकास से संबंधित अधिकारियों के लिए आयोजित किया जाता है। इस प्रशिक्षण पाठ्यक्रम में उत्तरांचल, पश्चिम-बंगाल, उत्तर प्रदेश, मणिपुर, हरियाणा, मेघालय व हिमाचल प्रदेश जैसे 7 प्रदेशों के 14 अधिकारियों ने भाग लिया। इस प्रशिक्षण में बंगलादेश के दो वैज्ञानिकों ने भी भाग लिया। प्रशिक्षण के दौरान 16 लैक्चर व 8 प्रैक्टिकल के जरिए प्रतिभागियों को आलू से संबंधित हर विषय की जानकारी दी गई। इसके साथ इन अधिकारियों को खेत-भ्रमण द्वारा भी प्रत्यक्ष रूप से आलू खेती कार्यों व रोग एवं उनके उपचार संबंधी विषयों की जानकारी भी दी गई। इस अवसर पर प्रतिभागियों को संस्थान द्वारा प्रकाशित विभिन्न तकनीकी पुस्तकें भी उपलब्ध करवाई गईं। पाठ्यक्रम से पहले व बाद में प्रश्नोत्तरी द्वारा अधिकारियों का मूल्यांकन किया गया। इस प्रकार जांचने



मॉडल प्रशिक्षण पाठ्यक्रम का आयोजन

पर कुल मिलाकर आलू से संबंधित उनके ज्ञान में ग्लगभग 21 प्रतिशत की बढ़ोत्तरी दर्ज की गई।

### पेप्सिको-प्रगतिशील किसानों के लिए प्रशिक्षण

संस्थान में जुलाई व अगस्त माह में पश्चिम बंगाल के 56 प्रगतिशील किसानों के लिए दो-दो दिवसीय प्रशिक्षण शिविर का आयोजन किया गया। यह प्रशिक्षण 28-28 किसानों के दो समूहों में किया गया। यह प्रशिक्षण शिविर विशेषकर आलू के विधायन से जुड़ी जानकारियों पर केन्द्रित था। इस दौरान किसानों को संस्थान में कार्यरत



प्रशिक्षण में किसान

संबंधित विशेषज्ञों ने व्याख्यान व व्यावहारिक जानकारी दी इसके साथ संस्थान के कुफरी व फागू स्थित फार्मों का दौरा भी करवाया गया। यहां किसानों को प्रत्यक्ष रूप से आलू की खड़ी फसल व इसमें होने वाली क्रियाओं की जानकारी दी गई। इस प्रशिक्षण में किसानों ने बहुत रुचि व उत्साह दिखाया। इस प्रशिक्षण की सार्थकता यह रही कि किसानों की जिज्ञासाओं और समस्याओं का निवारण मौके पर ही संबंधित वैज्ञानिकों द्वारा किया गया।

### भारत के हृदय स्थल – मध्य प्रदेश में आलू के बढ़ते कदम

आलू की फसल के उच्च गुणवत्ता स्वस्थ एवम् रोग रहित प्रजनक आलू बीज

उत्पादन के लिए केंद्रीय आलू अनुसंधान केंद्र, ग्वालियर ने मध्य प्रदेश ही नहीं, अपितु भारत के 13 से भी अधिक केंद्र शासित राज्यों एवं प्रदेशों में अलग ही पहचान बनाई है। इस केंद्र पर उत्पादित प्रजनक बीज ग्वालियर से उत्पादित आलू प्रजनक बीज के रूप में पहचान स्थापित कर रहा है। इस केंद्र पर 4000 से 6000 कुंतल प्रजनक बीज प्रति वर्ष उत्पादित होता है, जिसमें से 900 से 1700 कुंतल बीज अकेले मध्य प्रदेश के कृषि उद्यान विभाग को तथा 100 से 800 कुंतल बीज मध्य प्रदेश की विभिन्न संस्थाओं एवं कृषकों को प्रदाय किया जाता रहा है। मध्य प्रदेश उद्यान विभाग इस प्रजनक बीज से कुछ सीधा किसानों को वितरित कर देता है बाकी से आधार प्रथम, आधार द्वितीय व प्रमाणित बीज बनाकर किसानों को वितरित करता है। मध्य प्रदेश उद्यान विभाग आधार प्रथम व द्वितीय बीज में से भी किसानों को प्रदाय करता है जिसकी बजह से सम्पूर्ण प्रजनक बीज से काफी मात्रा में प्रमाणित बीज नहीं बन पाता है।

मध्य प्रदेश के कृषक विशेष कर मालवा क्षेत्र के, आलू की खेती को एक नगदी फसल के रूप में ले रहे हैं एवं प्रति

वर्ष यह अपेक्षा करते हैं कि यह केंद्र उनको अधिक मात्रा में प्रजनक बीज प्रदाय करें जिससे बीज उत्पादन का कार्य मध्य प्रदेश शासन के अलावा कृषक भी कर सके। वर्ष 2003 - 04 में मध्य प्रदेश में कुल 46,578 हेक्टेयर क्षेत्र में आलू की खेती की गई जिसमें 66.8 लाख कुंतल आलू पैदा किया गया जिसकी औसत उपज लगभग 143.5 कुंतल प्रति हेक्टेयर रही।

मध्य प्रदेश के इंदौर संभाग में सबसे अधिक आलू का उत्पादन होता है, यहाँ 13,000 हेक्टेयर अधिक क्षेत्र में आलू की फसल ली जाती है। इसके अलावा मध्य प्रदेश के देवास, शाजापुर, छिंदवाडा, सागर व उजैन जिले आलू उत्पादन में अग्रणी है। मालवा क्षेत्र में आलू से संबंधित प्रसंस्करण की कई इकाइयाँ हैं। मालवा क्षेत्र में आलू की कुफरी लवकार किस्म अत्यन्त लोकप्रिय है एवं कृषकों की पहली पसंद है। इसका आलू सफेद गोल आकार का होता है तथा गूदा सफेद होता है। इसकी उपज 200 से 250 कुंतल प्रति हेक्टेयर रहती है। इसके अलावा कुफरी ज्योति, कुफरी चिप्सोना -1 भी पसंद की जाती है। मालवा क्षेत्र से उत्पादित आलू मुख्य रूप से प्रसंस्करण के लिए बेचा

जाता है। जिससे अच्छा मूल्य मिलता है। इस केंद्र पर उत्पादित कुल प्रजनक बीज का 20 से 60 प्रतिशत हिस्सा, मध्य प्रदेश को प्रदाय किया जाता है। वर्ष 2006 - 07 में इस केंद्र के द्वारा 1500 कुंतल से अधिक प्रजनक बीज मध्य प्रदेश के उद्यान विभाग को दिया गया, जबकि मध्य प्रदेश के उद्यान विभाग के द्वारा 3489 कुंतल प्रमाणित बीज किसानों को वितरित किया गया।

भारतीय कृषि अनुसंधान परिषद, नई दिल्ली के द्वारा इस केंद्र की स्थापना वर्ष 1981 में की गई थी। स्थापना के समय से ही इस केंद्र के द्वारा यह प्रयास किया जा रहा है कि ग्वालियर चम्बल संभाग में आलू बीज बनाने के लिए भी कृषक आगे आए। परंतु इस क्षेत्र में वर्ष 2003-04 में मात्र 2,764 हेक्टेयर क्षेत्र में आलू की फसल की गई। इस केंद्र पर कुफरी चंद्रमुखी, कुफरी सिंदूरी, कुफरी लवकार, कुफरी ज्योति, कुफरी चिप्सोना -1, कुफरी चिप्सोना - 2 एवं कुफरी अरुण किस्मों का बीज उत्पादन लिया जा रहा है। विगत 20 वर्षों में, केंद्र के बीज में आलू की बीमारियों से संबंधित कोई भी शिकायत नहीं मिली है। जो कि इस केंद्र

सूची वर्ष 2001-2002 से 2008-2009 तक, केंद्रीय आलू अनुसंधान केंद्र, ग्वालियर में आलू प्रजनक बीज का उत्पादन, मध्य प्रदेश में वितरण एवं विभिन्न चरणों में मध्य प्रदेश में आलू बीज उत्पादन

वर्ष	आलू प्रजनक बीज का कुल उत्पादन (कुन्तल)	आलू बीज का कुल वितरण (कुन्तल)		मध्य प्रदेश को वितरित प्रजनक बीज की मात्रा (कुन्तल)			मध्य प्रदेश सरकार द्वारा उत्पादित आलू बीज की मात्रा (कुन्तल)		
		राज्य सरकार को	सोसायटी/ कृषकों को	राज्य सरकार को	सोसायटी/ कृषकों को	कुल मात्रा	आधार प्रथम	आधार द्वितीय	प्रमाणित बीज
2001-02	4011	1747	171	230	97	327	4476	-	295
2002-03	4365	2958	410	1659	302	1950	3831	5006	12448
2003-04	5674	3016	504	1212	179	1391	12314	6092	1847
2004-05	4456	2620	808	1450	374	1824	4862	2829	1172
2005-06	4343	2458	761	1292	168	1460	5344	4402	4007
2006-07	4837	1546	1221	920	805	1725	6830	8114	3489
2007-08	4362	1989	634	1289	139	1428	-	-	-
2008-09	4867	2370	933	1326	521	1847	-	-	-

के द्वारा उत्पादित आलू बीज की गुणवत्ता को प्रकट करता है।

जिस तेजी से आलू की फसल का मध्य प्रदेश के मालवा क्षेत्र व अन्य भागों में प्रसार हो रहा है, वह इस केंद्र की प्रमाणिकता एवं उपस्थिति का ज्ञान कराता है। आगामी कुछ वर्षों में आलू की खेती में मध्य प्रदेश अग्रणी प्रदेश होगा जिसमें इस केंद्र की, मध्य प्रदेश के उद्यान विभाग एवं उन्नतशील कृषकों की सहभागिता आवश्यक है।

*अनुज भटनागर व अशोक कुमार  
सोमानी*

## कृषि प्रसार गतिविधियाँ

- 28-31 मई, 2009 को लेफ्टिनेंट अमित सिंह मेमोरियल फाउन्डेशन, नई दिल्ली द्वारा समस्तीपुर, बिहार में आयोजित 'स्वदेश प्रेम जागृति संगोष्ठी' के अवसर पर राष्ट्रीय कृषि प्रदर्शनी में संस्थान के डा. टी.के. सिन्हा ने

संस्थान का स्टाल लगाया। इस अवसर पर संस्थान के निदेशक डा. एस. के. पाण्डेय एवं संयुक्त निदेशक डा. बीर पाल सिंह भी उपस्थित थे।

- उदय प्रताप कॉलेज, वाराणसी (उत्तर प्रदेश) के स्वर्ण जयन्ती समारोह के अवसर पर आयोजित अखिल भारतीय किसान मेला एवं कृषि उद्योग प्रदर्शनी 15-16 अक्टूबर, 2009 को केन्द्रीय आलू अनुसंधान संस्थान के स्टाल को भारतीय कृषि अनुसंधान परिषद् के ग्रुप में प्रथम स्थान प्राप्त हुआ। पुरस्कार वितरण समारोह के मुख्य अतिथि डा. एन.वी. सिंह, कृषि आयुक्त, भारतीय सरकार के कमलों द्वारा प्रदान किया गया। मेले का उद्घाटन परिषद् के महानिदेशक डा. मंगला राय द्वारा किया गया।

- सरदार वल्लभ भाई पटेल कृषि एवं प्रौद्योगिकी विश्वविद्यालय, मोदीपुरम, मेरठ द्वारा आयोजित अखिल भारतीय किसान मेला एवं कृषि उद्योग प्रदर्शनी का आयोजन किया गया। इस अवसर पर केन्द्रीय आलू अनुसंधान संस्थान परिसर, मोदीपुरम ने संस्थान द्वारा विकसित तकनीकों का प्रदर्शन किया गया तथा संस्थान के स्टाल को भारतीय कृषि अनुसंधान परिषद् ग्रुप में प्रथम स्थान प्राप्त हुआ।

**प्रशिक्षण कार्यक्रम में भागीदारी:** कृषि सूचना एवं प्रकाशन निदेशालय (DIPA) भारतीय कृषि अनुसंधान परिषद्, नई दिल्ली के तत्वाधान में 3-7 नवम्बर, 2009 के दौरान कृषि आधारित रचनात्मक लेखन विषय पर आयोजित प्रशिक्षण कार्यक्रम में मोदीपुरम परिसर के तकनीकी अधिकारी श्री अशोक कुमार ने भाग लिया।

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