Climate change has now become a reality and no more a speculation. The main agents causing climate change viz., greenhouse gases are increasing tremendously. According to the Intergovernmental Panel on Climate Change (IPCC), the three main causes to the increase in greenhouse gases observed over the past 250 years have been fossil fuels, land use, and agriculture. Agriculture contributes to climate change both directly through agricultural practices such as production of various crops releasing greenhouse gases at different rates, raising of livestock etc. but also indirectly being a significant user of land and consumer of fossil fuels. The impact of climate change may be on productivity, in terms of quantity and quality of crops, agrotechniques necessitating changes in irrigation practices and also the use of agricultural inputs such as herbicides, insecticides and fertilizers or environmental effects. Since the consequences of climate change are likely to be very serious, there is need to assess the likely impact of climate change and develop mitigation strategies so that we are prepared to face the challenges of climate change.

Potato is a cool climate loving crop. Dedicated efforts of potato scientists and the ingenuity of our farmers has made potato adapted to the subtropical plains and tropical highlands of the country. There is a very short climatically suitable window in which potato has been fitted and appreciable yields are being realised even in 80 to 90 days. Thus, there may not be much scope for further reducing the crop duration and any decrease may lead to significant drop in crop yields. Moreover, the crop quality especially dry matter content is adversely affected when the temperatures are high. There are also a host of other issues with regard to changes in pest and disease complex which are likely to change as the potato season gets warmer. Diseases like brown rot, early blight etc. may become more serious in places where hitherto they were not a major problem. Disease free seed production may also be affected due to changes in the life cycles of aphids. Pest such as cutworms may become more serious. It is against this backdrop that CPRI initiated work on climate change. There is need to scientifically assess the impact of climate change on the production scenario as well as on the pest and disease aspects. The article on climate change in this newsletter is the first in this series and gives the results of preliminary analysis with regard to likely changes in potato productivity in different parts of the country.

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हिन्दी समाचार
Research Highlights

CPRI Develops a Variety for French Fry

Frozen French fries are the most popular processed product of potato throughout the world. India has the potential for growth of frozen potato products where economic boom is likely to generate strong demand of convenience foods. The present requirement of French fries in the country is around 2500 MT per annum (2005-06). The indigenous production is only 1200 MT, while rest of frozen French fries are imported. Processing of potatoes into French fries requires certain quality attributes and mainly include oblong to long-oval tubers of preferably more than 85mm size with shallow eyes to yield desirable long sticks of international standard with minimum peeling losses. The tubers need to have 20% or more dry matter with reducing sugars content below 200 mg/100 g. fresh tuber weight so as to yield crisp and light colored French fries. Non-availability of desired raw material is the major bottleneck impeding the growth of French fry industry in the country. The available varieties either do not have desired size or have poor processing quality. Therefore, development of a French fry variety is essential for the growth and sustenance of French fry industry in the country. Central Potato Research Institute has developed a new variety christened 'Kufri Frysona' having all desirable traits for making international standard French fries, this was bred as hybrid MP/98-71. The variety produces oblong tubers of attractive shape with shallow eyes and white flesh colour. The tubers are free from most of the external and internal defects. The average total tuber yield is 39.8 tons/hectare and average French fry grade tuber yield is 25.8 tons/hectare. The tubers contain on an average 22% dry matter content and have very low reducing sugar content (< 100 mg/100 g fresh tuber weight) with very low or negligible enzymatic browning. The variety is suitable for planting in the main season in the Indo-Gangetic plains and matures in 100-110 days after planting. The variety requires planting at spacing of 67.5 x 26.5 cm (plant population of around 55500/ha), and fertilization at 270: 80: 150 NPK kg/ha with 50% N at the time of planting and 50% at earthing-up. The variety is expected to provide much sought after relief to the existing French fry industries which are working below capacity and could also lead to the establishment of more units in the coming time.

SV Singh, SK Pandey, Dinesh Kumar, RS Marwada, P Manivel, Parveen Kumar, BP Singh & Vinay Bhardwaj

CPRI Started National Project on Organic Farming

Intensive agriculture with use of high doses of chemical fertilizers and pesticides has polluted the entire ecosystem. The food produced through such practices have great amount of residues of fertilizers and pesticides posing threat to the human health. Use of non-renewable energy sources is depleting the natural resources due to absence of recycling process. In the context of these threats to environment and human beings, the National Project on Organic Farming is being implemented throughout the country by the National Centre of Organic Farming, Ministry of Agriculture, Govt. of India. CPRI has also started implementing one such project from 2009 in Himachal Pradesh with Drs. MC Sood, VK Chandla, Manoj Kumar and Anil Kumar as team.
All hill States including Himachal Pradesh have special significance for organic farming as the agriculture in these states is by and large organic by default. Livestock rearing is still an important component of farming system and use of chemicals is minimal. The National Project on organic farming envisages setting up of model organic farm and vermiculture hatchery, laying out field demonstrations and conduct of training for farmers, extension personnel and entrepreneurs. The model organic farm and vermiculture hatchery are being established at the CPRI lower laboratory farm in Shimla. The effects of various organic inputs are being ascertained through systematic experiments. Besides, enrichment of vermicompost with locally efficient biofertilizers is also being done in the model organic farm.

For the conduct of field demonstrations, 2 village clusters representing different agro-ecosystem have been identified. The first village cluster is near Fagu (Kufri) at an altitude of about 2500m and the second one is near Shoghi at an altitude of about 1500m. Five farmers from each of these clusters have been selected for conducting 10 demonstrations on organic farming. For each of the selected farmers, organic cropping system has been identified and demonstrations on organic potato and ginger production have been started. These farmers have been guided to construct their own vermi-compost unit.

The project also envisages training for 200 farmers, 80 extension personnel and 80 entrepreneurs of the State. For this purpose, the beneficiaries at different levels are being identified and linkages have been established with the Directorate of Agriculture, HP and CSK HPKV, Palampur for technical and input support.

- MC Sood, VK Chandra, Manoj Kumar & Anil Kumar

**CPRI Developed PVY Resistant Triplex Parental Line Using MAS**

The potato crop is affected by a number of viruses that drastically reduce its yield. The virus inoculum in the potato seed stock gradually increases due to vegetative mode of propagation, a problem popularly known as seed degeneration. An elaborate but expensive 'Seed indexing procedure' is commonly being followed throughout the world to maintain and multiply virus free seed stock. However, effective management of virus infection in the standing potato crop is virtually impossible primarily because no chemical/physical agent is, so far, available that specifically retards virus multiplication without damaging the plant growth. The most effective way to reduce field damage from viral diseases would be deployment of resistant genes in potato varieties. The PVY resistant gene (Ryadg) present in *Solanum tuberosum* ssp. andigenum is one such gene that confers race non-specific resistance to PVY. However, introgression of this gene in the breeding material is a difficult task because cultivated potato is highly heterozygous and tetraploid, while this gene is usually present in simplex state in most of the parental lines. To avoid these problems, molecular marker was used to bring the *Ryadg* alleles to near homozygous (triplex/quadruplex) state in the selected breeding line. The major objective was to develop parental line that will carry at least three out of four dominant *Ryadg* alleles. Crossing of such triplex/quadruplex parental line with any other parent would ensure introgression of at least one dominant *Ryadg* allele in 96-100% of F₁ progeny. It will practically eliminate the cumbersome and error-prone method of evaluating virus resistance in the progeny by challenge inoculation and ELISA. The institute has successfully validated a Sequence Characterized Amplified Region (SCAR) marker RYSC3 for the detection of *Ryadg* and used it to identify a parental line (YY-6/3 C11) carrying the gene in tripex state. The tripex status of the line was confirmed by studying segregation ratio of the marker in its test cross progeny and PVY resistance of this line was also confirmed by challenge
inoculation followed by ELISA and Immuno Electron Microscopy to check virus multiplication. This is the first instance where MAS has been used as a tool in prebreeding of potato.

Trolleys: Eighty kg and 200 kg capacity trolleys have been developed at CPRI. A small trolley can handle 2-3 tray loads or an eighty kg potato bag. In a large trolley 8-12 tray loads or 2-3 bags can easily be moved from one place to another. In both these trolleys, a worker can move double or triple the load usually moved on the head. Further, these are easy to operate, low in cost and do not cause drudgery.

These new handling tools are expected to be useful to all stakeholders who are involved in potato production, marketing and processing, as labour availability is decreasing and its cost is increasing every day.

Potato Handling Made Easy

Potato is a voluminous crop. About 250-300 q/ha of produce requires a lot of energy/manpower for timely post-harvest handling. This involves an unbearable humane drudgery. From farm till it reaches the home bucket, potatoes change hands 10-12 times in supply chain. At many levels, viz., farm, cold storage, market, industry, etc. the produce is handled manually either on the head in tokras/trays or on the human back in bags. Besides being a laborious job, this is also dangerous. To address this problem, CPRI has developed some handling aids and tools suitable for farmers, cold storage and industry workers.

Fork lift pallets: Different designs of pallets for stacking potato trays/bags have been developed. With the help of these, fork lift assisted potato handling has been introduced at Institute farms. In this system of handling at one time, 40-60 tray loads are moved from one place to another for seed treatment, loading/unloading of trucks and for other on-farm activities. Labour is required only for filling or emptying of potato trays. With fork lift assisted handling, work speed is enhanced, while labour requirement is reduced by 20-25 times.
And French beans (bush type) are grown at a spacing of 30 x 15 cm. Different combinations of populations of these two crops were tried with an objective to find out the most advantageous spacing. An intercrop combination where 75% of potato and 50% of French bean of their respective sole stands has performed reasonably good in three years of experimentation.

In this combination, every alternate row of potato is replaced by two rows of French beans as shown in the figure. The inter-row spacing of potato remains unchanged but intra-row spacing of potato changes from 20 to 13.3 cm to accommodate 25% more plants. The inter and intra-row spacings of French beans have been maintained at 30 x 15 cm only.

**Yield performance:** The yield for three years (2003 to 2005) indicated that intercropping is better in terms of total yield (i.e., potato + French beans yield combined together) in comparison with sole crop of potato. The potato equivalent yield (PEY) was 22.47 t/ha when planted alone and was increased to 27.11 t/ha in combination with French beans. The yield of French beans is converted into potato yield by considering the sale price of both the crops. Potato sale price is assumed as Rs.5 per kg and for French beans as Rs.12 per kg. Potato equivalent yield (PEY) of French beans = Yield of French beans x (Sale price of French beans/sale price of potato).

**Benefits:**

1. 50 proportions in the pattern mentioned above had improved the potato equivalent yield of the system by 20 per cent over sole potato, on an average.

2. This has resulted in a significant increase in net profit of the intercropping system which was higher by more than 50 per cent than that of sole crop of potato.

3. The organic carbon content of the soil also has improved by adopting this intercropping system, as French beans have got the capacity to fix atmospheric nitrogen.

4. There was a substantial reduction in nematode population also by growing French beans as intercrop in potato.

- K Manorama, SS Lal & TA Joseph

**A New Pest of True Potato Seed (TPS)**

*Tribolium castaneum* Herb. has been identified as a new pest of untreated one year old true potato seed stored in cloth bag. This pest belongs to the family *Tenebrionidae* of the order Coleoptera and is known as *Rust red flour beetle*. It does not harm healthy grains. It attacks damaged grains and powdered grains like flour, *atta*, *suji* etc., when the grains are severely infested, they emit a pungent smell. This pest is a known enemy of wheat in India but damage on TPS has only been observed this year. The infected TPS could not germinate in the field, resulting in severe loss in seedling establishment in nursery beds. The beetle is of tapering form, very tiny, flat, reddish brown with antennae ending in abrupt clubs. As per literature, an adult female lays about 400-500 clear white sticky eggs scattering them in the flour or foodstuffs. The eggs hatch in about 4-12 days into small brownish-white larvae, which are fully grown in 27-90 days under favourable condition and then pupate. The pupae are white in colour and pupal period ranges from 1-2 weeks. The pupae hatch into adults, which normally live for about six weeks.

- Shambhu Kumar & Kopil Dey

**A New Germplasm JX-90 Registered**

JX 90, a new parental line has been registered with NBPGR with INGR No. 09069. It is a late blight and early blight resistant and high yielding potato parental line with high yields.
under early and medium crop duration. JX 90 is a selection from the progeny of the cross CP 1346 (Krirrinee) x MS/78-62. It possess high general combining ability for horizontal resistance to late blight and resistance to early blight. Generally early bulking varieties are susceptible to late blight. However, JX 90 combines high horizontal resistance to late blight with early bulking. This line performs well for yield under early (75 days) and medium (90 days) harvest in Indian plains and plateau region. Under early (75 days) harvest, it gives yield of 25-30 tonnes/ha, which is at par with early maturing variety Kufri Ashoka. Under medium (90 days) harvest, it gives 33-38 tonnes/ha yield, which is at par with cultivar Kufri Pukhraj.

-Raj Kumar, GS Kang, SK Pandey & J Gopal

**Training & Technology Transfer**

**Master Trainers Training to KVK**

Division of Social Sciences organized a 3-days training course on 'Seed Potato Production' to the Master Trainers of Krishi Vigyan Kendra (KVK) during 26-28 May, 2009 at CPRI, Shimla. This training course was attended by 10 officers from different KVKs affiliated to UHF, Nauni & CSK HPKV, Palampur, HP. Master Trainers of KVKs represented from district Una, Mandi, Sirmaur, Kangra, Lahaul & Spiti, Chamba & Shimla. During this training course, the participants were exposed to a series of theory lectures comprising of disease & pest management, integrated nutrient management, quality seed production, organic farming, soil & water conservation, post-harvest handling and economics and marketing of potato. Besides this, field visit to Kufri & Fagu farms was also organized.

### On-Farm Varietal Demonstration

12 demonstrations were conducted at CPRIC, Modipuram from Meerut during 2008-2009. The varieties included K. Bahar, K. Pukhraj, K. Surya, K. Badshah, K. Jyoti, K. Sutlej, K. Arun as ware crop and K. Chipsona-1, K.Chipsona-2, K.Chipsona-3 as processing crop. The variety wise yield per plot showed that the highest yield was obtained

<table>
<thead>
<tr>
<th>Varieties</th>
<th>Small</th>
<th>Medium</th>
<th>Small</th>
<th>in 24 sqm</th>
<th>q/ha</th>
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<tbody>
<tr>
<td>K. Bahar</td>
<td>18.5</td>
<td>56.2</td>
<td>6.5</td>
<td>81.2</td>
<td>338.33</td>
</tr>
<tr>
<td>K. Pukhraj</td>
<td>36.3</td>
<td>50.6</td>
<td>14.9</td>
<td>101.8</td>
<td>424.17</td>
</tr>
<tr>
<td>K. Surya</td>
<td>15.6</td>
<td>55.0</td>
<td>13.9</td>
<td>84.5</td>
<td>352.08</td>
</tr>
<tr>
<td>K. Badshah</td>
<td>20.5</td>
<td>59.7</td>
<td>13.2</td>
<td>93.4</td>
<td>389.17</td>
</tr>
<tr>
<td>K. Jyoti</td>
<td>17.7</td>
<td>46.1</td>
<td>12.1</td>
<td>75.9</td>
<td>316.25</td>
</tr>
<tr>
<td>K. Sutlej</td>
<td>36.6</td>
<td>51.2</td>
<td>10.3</td>
<td>98.1</td>
<td>410.83</td>
</tr>
<tr>
<td>K. Arun</td>
<td>40.8</td>
<td>52.2</td>
<td>8.1</td>
<td>101.1</td>
<td>421.25</td>
</tr>
<tr>
<td>K. Chip-1</td>
<td>8.5</td>
<td>61.5</td>
<td>16.0</td>
<td>86.0</td>
<td>358.33</td>
</tr>
<tr>
<td>K. Chip-2</td>
<td>12.0</td>
<td>53.0</td>
<td>9.2</td>
<td>74.2</td>
<td>309.17</td>
</tr>
<tr>
<td>K. Chip-3</td>
<td>12.6</td>
<td>37.2</td>
<td>15.0</td>
<td>64.8</td>
<td>270.00</td>
</tr>
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</table>
from K. Pukhraj followed by K. Arun, K. Sutlej and K. Badshah. The processing varieties were having comparatively lower yield levels but higher percentage of medium sized tubers.

**Winter School Organised at Modipuram**

A winter school on “Modern Techniques of Research & Development of Potato” was organized at CPRIC, Modipuram, Meerut from 2-22 January, 2009. Seven Assistant Professors, 2 Lecturers, 2 Senior Scientists, 2 Scientists (SS), 2 Scientists, 2 Training Associate, and 1 Junior Agronomist participated in this 21 days winter school. The valedictory function was organized on 22-01-2009 where Director, CPRI, Dr. SK Pandey distributed certificates to the participants of this winter school.

**Field visit of trainees**

**Training of Farmers at CPRS Patna**

As a celebration programme of the “International Potato Year-2008”, a one day training programme on Potato seed production; Scientific potato cultivation and Late blight management was organized at CPRS, Patna on 17-11-08, 20-11-08, 01-12-2008, 20-12-08, 30-12-08, 16-02-09 and 28-02-09. A total of 301 farmers from Patna, Katihar, Rohtas, Bhagalpur, Nawada, Buxur, Bhojpur, Purnea, Nalanda, Begusarai, Gaya, E & W. Champaran, Vaishali, Jahanabad and Samastipur districts participated in these programmes.

**Farmers training at Patna**

A training programme of one day duration was organized on “Potato seed production, late blight management and harvesting/grading & storage of potato” on 21-03-09 at CPRS, Patna. A total of 96 potato farmers participated in the programme organized under Sustaining livelihood improvement through need based integrated farming system models in disadvantaged district of Bihar NAIP (Component-3). Thirty farmers were also trained by lecture cum field visit at CPRS, Patna and village- Bania in Muzaffarpur district from the Institute project.

Under the training 'Kisan Gaon ki oar' Drs. G Ram, SK Singh, Shambhu Kumar and Barsati Lal of CPRS, Patna participated. The training programme was organized by ATMA, Patna on farmer’s field. The training was imparted to farmers on various aspects of potato production and marketing in different blocks of Bhojpur & Patna districts namely, Manthan, Danapur, Bihta, Bikram, Maner and Paliganj.

**CPRS stall at Kushinagar**

CPRS Patna also participated by way of putting up stalls in several 'Kisan Melas' e.g. at KVK, Kushinagar on 01-03-2009, at IIVR, Varanasi, U.P. on 28-01-2009 and at Swadesh Prem Jagriti Sangosti, 2009 Mohamda, Pusa, Samastipur, Bihar on 28-05-09.

**Live Phone-in Programmes at Shimla and Patna**

Doordarshan and All India Radio organize live phone-in programme on Agriculture and allied subjects in collaboration with various organizations concerned with agricultural development, including CPRI. In this programme, the issues are discussed by the studio invited experts and the viewers/listeners can put their queries to the experts by phone calls. Drs. PH Singh, VK Chandla, MC Sood, VK Dua, Manoj Kumar, Anil Kumar, NK Pandey, RK Rana and Brajesh Singh from CPRI, Shimla participated in these
programmes as experts during January to June, 2009 to discuss various aspects of potato production. Besides, field recording on demonstration of organic potato production was also done at Talai village near Fagu (Kufri) by Shimla Doordarshan team in the month of March and was subsequently telecasted in April, 2009.

Live phone-in programmes on Aloo phasal ki dekhhbal, Satya beej aloo ki dekhhbal, aloo ki dekhhbal and Late blight management were telecasted on 06-01-09, 05-02-09 and 25-03-2009 from Doordarshan Kendra, Patna. Drs. RP Rai, Shambhu Kumar, SK Singh and Barsati Lal from CPRS, Patna participated in these programmes to discuss various aspects of potato production. Dr. SK Singh also participated in the Programme “ANNADATA” telecasted by ETV, Bihar during the crop season.

**Important Meetings**

**Golden Jubilee Celebration at CPRS, Shillong**

Central Potato Research Station, Shillong celebrated its Golden Jubilee on 8th and 9th May 2009, marking 50 years of its establishment. The honourable Governor of Meghalaya Shri RS Mooshahary inaugurated the Golden Jubilee celebration and gave a scintillating inaugural address on Potato Research in India-Challenges and opportunities. Dr. HP Singh, Deputy Director General (Horticulture), Indian Council of Agricultural Research, New Delhi presided over the function and in his presidential address highlighted the importance of potato in the overall development of horticulture in the region. Dr. SK Pandey, Director, CPRI, Shimla at the outset welcomed the gathering. Dr. Dindo M Campilan, Regional Leader, International Potato Centre, South West and Central Asia was the Guest of Honour and spoke on the role of CIP in the development of potato in NE. Dr. S Ramani, Head, CPRS, Shillong proposed a vote of thanks. Dr. Ngachan, Director, ICAR Research Complex for NEH Region, Dr. RP Medhi, Director, NRC Orchids, Mr. Ronnie V Lyngdoh, MLA of Mylliem constituency, officials from the state departments of Agriculture and Horticulture of several NE states and other dignitaries were present during the occasion. The honourable Governor gave away awards to six progressive potato farmers from different NE states. Shri Kevihokel Kin from Nagaland, Shri Ipswell Kurkalang from Meghalaya, Shri Obow Lohrii from Manipur, Shri Dhirendra Sarkar from Tripura, Shri R. Biaktuangh from Mizoram and Shri Mingma Norbu Sherpa from Sikkim were the awardees. The honourable Governor also released a souvenir brought out to mark the occasion as well as three other publications from CPRI.

![Inauguration of the programme](image1)

A seminar on “Potato in the North East” was organized as part of the Golden Jubilee celebration. Speakers from different institutions deliberated on various aspects of potato cultivation with special emphasis on the north eastern conditions. The topics included History and development of potato cultivation in the North-East, Potato

![Cultural programme during Golden Jubilee](image2)
varieties popular in the NE region, Seed Potato Production in NEH Regions: Challenges and Opportunities, TPS technology and its relevance to the NE region, Agro-Techniques for Ware Potato Production in NEH Region, Diseases and pests of potato in the NE region, Post harvest and storage practices in the NE region, Marketing, processing and utilization of potatoes in the NE region, Role of women in potato development in NE region, Possibilities of potato development in the NE region, Remote sensing based acreage estimation of multiple crops in north eastern hilly region- scope and challenges and Constraints and agronomic strategies for sustaining potato productivity in NE region.

Status papers on Potato Cultivation in different NE states were presented by the Directors of Agriculture/Horticulture of different NE states. The speakers presented the efforts made by their state in improving potato cultivation in their respective states. The states urged CPRI to provide them more quantity of breeders' seed of potato and requested CPRI to develop a web portal on potato for the NE region. The Director, CPRI clarified that the Institute has developed adequate package of practices for potato cultivation in the NE states and the information is available in its website. He informed that CPRI, Shimla and CPRS, Shillong can provide only a portion of the quality seed demanded by the NE states and emphasized that multiplication of the quality seeds has to be done by the concerned state department and the institution will provide all technical guidelines and help to the state departments for increasing their seed production.

including Central Potato Research Station, ICAR Research Complex for NEH Region, Bio-Resource Development Centre, Apex Bank, India Post - GPO and different self help groups. There was a good response at the stalls and the farmers showed keen interest in the technologies.

**Brain Storming Session on Potato Mechanization**

A brain storming session on “Present status and future research needs for mechanization of potato production” was organized at CPRS, Jalandhar. Er. Manjit Singh, the programme co-ordinator while welcoming the participants, gave an introduction to the topic, stating about the importance of the mechanization in potato production. Dr. GS Kang, Former-Head, CPRS, Jalandhar in his address lauded the role of the Agricultural Engineering section for the contribution towards mechanization of potato cultivation. He also highlighted the use of potato machinery in seed production at the station. He further maintained that research work still needs to be done for various aspects viz; perfection in size grading of potatoes and collection of harvested tubers etc. Dr. SS Lal, Head, Crop Production, CPRI, Shimla, in his remarks emphasized the need to develop multi-purpose and multi-crop implements. He further added that development of the low energy requiring implements should also be on the priority list. He also called
upon the farmers and manufacturers attending the meeting to give their valuable suggestions and also highlight the difficulties encountered by them in the operation of potato machinery, so that further development work could take place.

The Technical Session was chaired by Prof. IS Dhaliwal, Head, Deptt. of Farm Power & Machinery, PAU, Ludhiana. Er. Sukhwinder Singh made his presentation on “Present status and future research needs for mechanization of pre-harvest operations in potato”. He explained the machinery/tools used for seedbed preparation, fertilizer application, planting, spraying and haulm cutting etc. Er. Sunil Gulati delivered his presentation on “Present status and future research needs for mechanization of harvest and post harvest operations in potato”. The presentation included the machinery used for haulm cutting, digging, windrowing, grading, seed treatment and processing”. All the participants were taken to the exhibition ground where potato machinery including all the implements right from the seedbed preparation up to grading and seed treatment operations were displayed. Use and principle of working of all the implements were explained to the participants.

The experts from PAU, Ludhiana and IARI, New Delhi, farmers and manufacturers, gave several useful suggestions. Recommendations based on the suggestions from Technical Session were presented by Er. Sunil Gulati. Er. Manjit Singh, Head, CPRS, Jalandhar proposed a vote of thanks to all the participants. The main recommendations of the session include:

1. Emphasis should be given for the development of low cost and low maintenance tools for small farmers.
2. Use of alternate materials like plastics, fiberglass, etc. In various potato machines should be explored for prolonging the life of these machines.
3. Tractor operated mechanical potato pickers should be developed for fast picking/ collection of dug tubers.
4. Work on the development of low cost potato processing tools/ machines for village level processing should be carried out.
5. Small handling aid for reducing human drudgery should be developed.
6. Work on perfection of size graders for grading before the pre-cold storage of potatoes should be carried out.
7. Efforts should be made to create awareness among the potato machinery users for the new developments made in potato mechanization.
8. Engineers should work in collaboration with the private manufacturers for fast development of the new machines/implements.
Inauguration of Library- cum-Laboratory Building at CPRS, Patna

The newly constructed Library- cum- Laboratory building was inaugurated by Dr. HP Singh, Hon'ble DDG (Hort.), ICAR, New Delhi on 08-03-2009 in the presence of Dr. SK Pandey, Director, CPRSI, Shimla. Other dignitaries namely, Dr. MA Khan, Director, ICAR-RCER, Patna; Dr. Manjeet Singh, Director NRC on Mushroom, Solan; Dr. KK Kumar, Director, NRC on Litchi, Muzaffarpur, Bihar; Dr. Bangali Baboo, Director, Indian Lac Research Institute, Ranchi and several other scientists from ICAR institutes participated in the inaugural programme.

Address of Chief guest at Patna

Dr. HP Singh gave a call to the scientists community for achieving better growth of horticulture in Bihar, which has a great potential for generating higher income and employment for the farm men, women and rural youth. The inauguration programme was also graced by Mrs. Vimala Singh, Chief Trustee, Amit Trust, New Delhi. Programme was concluded with the vote of thanks presented by Dr. Barsati Lal of CPRS, Patna.

Inauguration of the new building at Patna

Programme started with lightening of lamp by Dr. HP Singh and other dignitaries. On the occasion, Dr. RP Rai, Head, CPRS, Patna, welcomed all the dignitaries and the welcome address was given by Dr. SK Pandey. In his address, Dr. Pandey enumerated the achievements of CPRI like development of high yielding short duration potato varieties for the region and development of TPS technology. He also said that tissue culture laboratory will be developed in the new building for the scaling up of absolute disease free seed production programme of the station.

DUS Meeting at Shimla

The “National Debate on DUS Procedures and National Test Guideline for Temperate Crop Species” sponsored by Protection of Plant Variety and Farmers Rights Authority, New Delhi was held at Central Potato Research Institute on 1st July 2009. The meeting was presided over by Dr. S Nagarajan, Chairman, PPV&R, New Delhi. Dr. SK Pandey, Director, CPRI was the Co-ordinator of the meeting. It was attended by 25 scientists from universities and institutes like Dr. YS Parmar University of Horticulture and Forestry, Sher-e-Kashmir University of Agricultural Science and Technology, Indian Agricultural Research Institute, Central Institute of Temperate Horticulture, Central Institute of Subtropical Horticulture, Forest Research Institute, Dehradun, Rain Forest Research Institute, Jorhat, Himalayan Forest Research Institute, Shimla, and Central Potato Research Institute, Shimla. In depth discussion and deliberations were held on various issues of the matter and a draft guidelines were prepared for further refinement.

Discussion during DUS meeting at CPRI

RAC and IRC Meetings Held

The research advisory committee meeting of the Institute was held on 3rd and 4th June 2009 at CPRI, Shimla. The advisory committee headed by Dr. M Mahadevappa and other members was welcomed by the director, Dr. SK Pandey. The committee was informed about the Institute’s achievements for the previous year, like getting the potato genome sequencing project, setting up of tissue culture labs at all
the stations for multiplication of disease free seed material, development of computer aided advisory system for potato scheduling, etc. The chairman expressed his happiness regarding the achievements of CPRI and congratulated the Director and the staff of the Institute for doing good work.

The action taken report on the recommendations of the RAC was presented by the member secretary, Dr. R Ezekiel and was approved by the committee. Review of research programmes was done, where all the programme leaders presented the progress report for the year 2008-09 and the work plan for the year 2009-10. In his concluding remarks, Dr. Mahadevappa appreciated all the programme leaders for their excellent presentations. He expressed his concern about the dwindling scientific strength of the Institute and got his recommendation recorded for requesting ICAR for posting new scientists to CPRI. The vote of thanks was proposed by the Director, CPRI, wherein he expressed his gratitude towards the chairman and members of outgoing RAC for their support and guidance during last three years.

The Institute Research Council (IRC) Meeting, 2009 was held at CPRI, Shimla on 5th-7th June, 2009. It was attended by 52 scientists from the CPRI Headquarters and its Stations. The basic objective of this meeting was to review the achievements of 2008-09 and formulate future plan of work for 2009-10 of different research programmes. After the welcome by Dr. SS Lal, Secretary, IRC, Dr. SK Pandey, Chairman of the IRC and Director, CPRI gave his opening remarks. It was followed by the discipline wise meeting of the scientists. In the IRC meeting, the action taken report on the recommendations of last IRC was presented by different Heads of Divisions. Progress reports of various research projects/programmes for the year 2008-09 and work plan for 2009-10 were presented by the scientists of the Institute. All the on-going research programmes of the Institute were extended for one year. The proceedings of the meeting were brought out, which summarizes the important decisions and action to be taken on the various research projects/programmes by the scientists of the Institute.

SWA Meeting at CPRI

The first General House of Staff Welfare Association of Central Potato Research Institute met on 9-7-2009 in presence of the new executive members elected in the month of June 2009. The house was chaired by Dr. SK Pandey, Director and Chairman, Staff Welfare Association. All staff members of CPRI were present in the General House. There were various agenda items which were discussed and approved by the Chairman, SWA. It was decided to increase the monthly contribution towards staff welfare association.
fund in all the categories from the month of July, 2009 onwards. This was also decided that a common room facility for women staff shall be created in the Institute.

IJSC Meeting Held at CPRI

The first meeting of the 8th IJSC of the Institute was held on 10.02.2009 under the chairmanship of Dr. SK Pandey, Director, CPRI, Shimla. Dr. Pandey informed the new executive that lot of research and development activities are going on at the Institute and his first objective is to increase the production of more varieties of seed potato for catering to the needs of the farmers in the country. The development work done at the Institute has given new look to the Institute. Sh. HN Sharma, Secretary office side informed that Sh. DD Kashyap and Shri Naresh Chand Sharma have been elected as the Secretary, IJSC (from staff side) and Member CJSC, respectively.

Dr. Tyagi visits Modipuram

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:

<table>
<thead>
<tr>
<th>Date</th>
<th>Speaker</th>
<th>Topic of scientist meet</th>
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<tbody>
<tr>
<td>9.1.2009</td>
<td>Dr OP Khanduri, Scientist SG, IASRI, New Delhi</td>
<td>Agricultural field experiments information system</td>
</tr>
<tr>
<td>23.1.2009</td>
<td>Mr SS Pathania, Bajaj Allianz Insurance Company</td>
<td>Insurance and investment for saving</td>
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<tr>
<td>16.2.2009</td>
<td>Mr Rajiv Anand, IDBI Bank</td>
<td>Banking services and tax saving investment options</td>
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<tr>
<td>30.5.2009</td>
<td>Dr Raksh Tuli, Director, NBRI Lucknow</td>
<td>Biotechnological approaches for disease and pest management</td>
</tr>
<tr>
<td>4.6.2009</td>
<td>Mr Prakash Lohia, MD, Merino Industries, Hapur</td>
<td>Relevance of professional ethics in civil society</td>
</tr>
</tbody>
</table>

Invited Lectures & Visitors

Director General Visits CPRI

The Director General (ICAR) Dr. Mangala Rai, visited CPRI Shimla on 23rd May 2009. During his address to the Scientists and other staff members of the Institute, he emphasised on the need for more concerted research to cater the ever increasing food requirement of the country, reframing of the research programmes and on the new vistas of research. He deliberated on the issues of non-scientific staff, made clarifications on the new promotional and other policies of ICAR and on the sharing of additional responsibilities by all the staff members due to shrinking strength in every category of staff in the system. Dr. SK Pandey, Director of the Institute informed him on the latest research developments and on achievements of the Institute and thanked him to visit CPRI and giving altogether new directions to the staff. He was also accompanied by Mr. Sanjay Gupta, Deputy Secretary, ICAR, who addressed the administrative staff of the Institute in a separate meeting.

Director General's address to CPRI staff

ASRB Member Visits Modipuram

Dr. NK Tyagi, Member Agricultural Scientist recruitment Board, Krishi Anusandhan Bhavan, New Delhi visited CPRIC, Modipuram on 13-01-2009. He was explained about the various research and development activities being taken up by the campus. He also visited different laboratories and potato farm at Modipuram.
**Appointments**

<table>
<thead>
<tr>
<th>Name</th>
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<tbody>
<tr>
<td>Mehi Lal</td>
<td>Scientist, Plant Pathology</td>
<td>19-06-2009</td>
</tr>
<tr>
<td>VU Patil</td>
<td>Scientist, Biotechnology</td>
<td>20-06-2009</td>
</tr>
<tr>
<td>Sanjeev Sharma</td>
<td>Sr. Scientist, Plant Pathology</td>
<td>02-07-2009</td>
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**Promotions**

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<tr>
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<td></td>
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</tr>
<tr>
<td>NK Pandey</td>
<td>Pr. Scientist</td>
<td>Hd. Social Sciences</td>
</tr>
<tr>
<td>SK Chakrabarti</td>
<td>Pr. Scientist</td>
<td>Hd. Plant Protection</td>
</tr>
<tr>
<td>J Gopal</td>
<td>Pr. Scientist</td>
<td>Hd. Crop Improvement</td>
</tr>
<tr>
<td>SS Lal</td>
<td>Pr. Scientist</td>
<td>Hd. Crop Production</td>
</tr>
<tr>
<td>Vinod Kumar</td>
<td>Scientist, SS</td>
<td>Sr. Scientist</td>
</tr>
<tr>
<td>R Muthuraj</td>
<td>Scientist, SS</td>
<td>Sr. Scientist</td>
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<tr>
<td>Vinay Bhardwaj</td>
<td>Scientist, SS</td>
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<td>VK Gupta</td>
<td>Scientist, SS</td>
<td>Sr. Scientist</td>
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<tr>
<td>Barsati Lal</td>
<td>Scientist, SS</td>
<td>Sr. Scientist</td>
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<tr>
<td>Shashi Rawat</td>
<td>Scientist, SS</td>
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<td>Ashwani Kumar</td>
<td>Scientist, SS</td>
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</tr>
<tr>
<td>Roop Lal</td>
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<td>T-2</td>
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<tr>
<td>Supporting</td>
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<tr>
<td>Neem Chand</td>
<td>SSG III</td>
<td>T-1</td>
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<td>Kamal Singh</td>
<td>SSG III</td>
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<tr>
<td>Bijendra Singh</td>
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<tr>
<td>Mangtey</td>
<td>SSG II</td>
<td>SSG III</td>
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<tr>
<td>Dharamvir Singh</td>
<td>SSG II</td>
<td>SSG III</td>
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<tr>
<td>Suraj Singh</td>
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<tr>
<td>Shiv Narayan</td>
<td>SSG I</td>
<td>SSG II</td>
</tr>
<tr>
<td>Ashok Kumar</td>
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<td>SSG II</td>
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**Transfers**

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<tbody>
<tr>
<td>M Narayan Bhatt, Sr. Scientist</td>
<td>CPRIC, Modipuram</td>
<td>NCIPM, New Delhi</td>
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<tr>
<td>Vinod Kumar, Scientist, SS</td>
<td>CPRS, Gwalior</td>
<td>IGFRI, Dharwad station</td>
</tr>
<tr>
<td>Udaivir Singh, T-4</td>
<td>CPRIC, Modipuram</td>
<td>CPRS, Jalandhar</td>
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**Retirements**

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<tr>
<td>V Sunaina</td>
<td>Principal Scientist</td>
<td>31.01.2009</td>
</tr>
<tr>
<td>Guljar Singh</td>
<td>T-5 (Driver)</td>
<td>31.01.2009</td>
</tr>
<tr>
<td>Munna</td>
<td>SSG III</td>
<td>31.01.2009</td>
</tr>
<tr>
<td>PC Verma</td>
<td>Sr. Stenographer</td>
<td>28.02.2009</td>
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<tr>
<td>GS Kang</td>
<td>Head, CPRS, Jalandhar</td>
<td>31.03.2009</td>
</tr>
<tr>
<td>Sham Sunder</td>
<td>T-5 (Artist)</td>
<td>30.04.2009</td>
</tr>
<tr>
<td>Sheesh Chand</td>
<td>T-1</td>
<td>30.04.2009</td>
</tr>
<tr>
<td>ID Garg</td>
<td>Principal Scientist</td>
<td>31.05.2009</td>
</tr>
<tr>
<td>Kamlesh Sharma</td>
<td>FAO</td>
<td>31.05.2009</td>
</tr>
<tr>
<td>Birmo Devi</td>
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**Demises**

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<tr>
<td>Uttam Singh</td>
<td>Assistant</td>
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<tr>
<td>Munshi Lal</td>
<td>SSG III</td>
<td>12.02.2009</td>
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<tr>
<td>Kamaljit Singh</td>
<td>Sr Clerk</td>
<td>22.04.2009</td>
</tr>
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**Honours, Awards & Foreign Visits**

**Hari Om Ashram Trust Award Bagged by CPRI**

Drs. RS Marwaha, Dinesh Kumar and SK Pandey bagged the ICAR’s prestigious “Hari Om Ashram Trust Award – 2007-08”. The team got the award for developing pre & post harvest strategies involving development of national potato map depicting high dry matter and low reducing sugar producing locations in the country, staggered planting of right varieties for different crop seasons as well as different agro-climatic zones identified through this map along with potato storage technologies for uninterrupted operation of industrial processing units. Kufri Chipsona varieties grown and stored using these technologies produce high quality processed products containing low fats and can be consumed even by

**Awarded by CPRI**

Dr. RS Marwaha

Dr. Dinesh Kumar

Dr. SK Pandey
calories conscious people, thus benefiting processors, cold storage owners, consumers and above all the farmers.

**CPRI Scientists Attended World Potato Congress**

The World Potato Congress, Inc (WPC) is an International Forum with headquarters in Canada. It is a non-profit organization supported by a group of International Directors representing potato jurisdiction around the world. WPC is dedicated to support the global growth and development of the potato. It brings together researchers and industry representatives from developing and developed world and creates links of interaction and information sharing. To do so the WPC organizes International Conferences on potato triennially. The 7th World Potato Congress was held from 22-25 March, 2009 at Christchurch, New Zealand. The theme of the congress was 'Nourishing our future'. It was attended by around 540 delegates from 47 countries all around the world. The CPRI was represented by Drs. Jai Gopal, Head, Crop Improvement, Dinesh Kumar, Senior Scientist and Parveen Kumar, Senior Scientist. Dr. Jai Gopal and Dr. Dinesh Kumar were sponsored by the Canadian International Development Agency (CIDA), while Dr. Parveen Kumar's visit was sponsored by International Potato Center (CIP). Dr. Jai Gopal presented a paper on “Slow-growth in vitro conservation of potato germplasm”, and Dr. Parveen Kumar presented a paper on “Evaluation of advanced and early generation germplasm from CIP and CPRI for abiotic stress tolerance”. There were a number of other presentations by renowned scientists covering various aspects of potato research and development from genomics to mechanization. These were spread over five plenary sessions and eight concurrent sessions. The theme of the Congress was well covered by several lectures emphasizing the role of potato in feeding the burgeoning world population and its role in fighting hunger and malnutrition especially in the developing countries. Changing climatic conditions and its impact on potato cultivation was another hot topic of discussion. A half day visit to 'Field Day' celebration at Lincoln University and a visit to 'Wyma' engineering industry were also organized. An exhibition with around 24 exhibitors was also held at the same venue. The congress was very well organized, and provided a lot of information and opportunities for interaction that can be used by the delegates in their future endeavor to promote potato research and development. The Congress ended with the note to make every year an International Year of Potato.

* Jai Gopal, Dinesh Kumar & Parveen Kumar

**Future Activities**

**Model Training Course**

8-days Model Training Course sponsored by the Directorate of Extension, Ministry of Agriculture, Govt. of India, New Delhi is going to be organized at Shimla during 18-25 August, 2009. The training will be imparted to the officers from state departments of Agriculture/Horticulture of the country. About 25 participants from the different parts of the country are expected to participate in this training course. During this course, theory lectures on all the aspects of scientific potato cultivation and recent advancement in potato production technology would be delivered. Besides this, practical/field visit will also be covered during this training course.

**IT workshop at CPRI**

IT is extending to agricultural sector since quite sometime. Horticultural crops being high value crops are using IT in a big way and many programmes on different aspects of its cultivation, processing the various programmes developed and to identify future strategies a two days Workshop on Information Technology Applications in Horticultural Crops is being held at CPRI, Shimla from 24th to 25th August, 2009. Directors of all the Institutes/NRCs under the horticultural division of ICAR are expected to attend the workshop in addition to scientists working on IT related aspects.

**Announcement for IPA Award**

Applications are invited for the IPA-Kaushalya Sikka Memorial Award for outstanding contribution to potato. The award consists of a sum of Rs. 20,000 in cash and a citation. The application can be made for individual or team work. For team
award, there can be a maximum of eight members including the team leader. The team leader will get 50% of the total prize money and the rest 50% will be shared equally by the remaining team workers. Each team member will receive a separate citation.

The evaluation criteria will be as follows:

- Conceptual clarity and originality of the work conducted over the last 5 years, preceding the year of award.
- Quality of methodology adopted and innovative approaches used to carry out the research.
- Major results, their scientific, technological and socio-economic relevance.
- Quality of publications arising from the research work.

Application should be made as per the enclosed format. The last date for receipt of the applications is 15th August 2009.

Frito-Lay India Launched Aliva - New Baked Savory Cracker

Frito-Lay India, the food division of PepsiCo India, launched a new brand - Aliva, a product range developed in India especially for the Indian consumer. After Kurkure’s enormous success, Aliva marks Frito-Lay India’s creation of a new baked savory cracker category—borrowing ingredients & textures from biscuits & flavorful experiences from namkeens. Aliva is a significant step in the company’s journey of portfolio transformation towards providing healthier and tasty snacking options in line with the local consumers’ needs.

Aliva is a significantly differentiated product that has many firsts: four authentic Indian flavors, good ingredients like wheat & lentils, iconic shape and premium packaging. With the launch of Aliva the company aims to create a new sub-segment of great tasting savory crackers in the greater than 1500M ton biscuit category. Speaking at the launch CEO, Frito-Lay India and President, PepsiCo, India Region informed that they will manufacture Aliva at their Ranjangaon plant where they have deployed a new state of the art baking line with Frito-Lay’s flavor technology.

Source: Internet

Potato Facts

New Potato Technology Saves Growers Thousands of Dollars

Potato growers in North America, Australia and New Zealand are saving hundreds of thousands of dollars in fertiliser and irrigation costs thanks to new technology developed by scientists at Plant & Food Research. They have developed the potato calculator, a decision-support web-site that enables growers to optimise nitrogen and water use as well as predict yield and maturity dates. The calculator considers application schedules for nitrogen and water, highlighting deficits or unnecessary surpluses as well as resulting yield and is helping to take the guess work out of crop management, Peter Robergh told potato industry members attending the 7th World Potato Congress in Christchurch, New Zealand.

The calculator has been extensively trialled and is now being marketed by Plant & Food Research business unit, CropLogic. Peter Robergh is CropLogic’s General Manager and says the calculator has received an excellent response from growers and processors alike. Mr Robergh says the calculator helps to satisfy mounting consumer expectations that their food is grown in an environmentally accountable and sustainable way. Its accuracy in optimising production significantly reduces the potential for over-use of water and fertiliser.

The software underlying the calculator contains a simulation model that is based on a day by day understanding of how a potato crop grows and uses up soil supplies of water and nitrogen in response to daily local weather and other unique local factors. It guides the application of nitrogen and water to meet the optimal requirements of the crop while reducing the risk of nitrogen leaching.

Source: Internet

Karnataka Farmers Shy Away from Potatoes in Fear of Blight

Owing to the fear of blight, many farmers are shying away from cultivating potato. Last year, potato was grown on 50,000 hectares of land
in the district, but the crop on 35,000 hectares was affected by blight, and farmers lost Rs. 300 crore as a result. Between May 2008 and March 2009, 42 farmers committed suicide in the district because they were unable to repay their loan. This year, the sale of seed potato began on May 12. Traders at the APMC Yard fixed the price at Rs. 1,200 for a 60-kg bag. There were no buyers till the price came down to Rs. 800 a bag, Javare Gowda, a farmer in Hassan who grows potato every year, told The Hindu that this year he had cultivated potato on five acres of land instead of 10 acres, and on the remaining portion he had cultivated jowar. Some farmers said they had decided to stop cultivating potato and had switched over to maize and jowar. Owing to the lack of demand for seed potato, the sale of complex fertilizer has also been affected.

Source: Internet

Pakistanis Farmers Keen to Adopt Tissue Culture Technology from India

Impressed with the scientific agriculture practices in Punjab, a delegation of farmers from Pakistan in June said they were keen to adopt tissue culture technology for better crops in their country. "We are very much impressed with the agriculture practices being adopted in India and have decided to adopt the tissue culture technology to develop potato and banana crops in Pakistan also," Rana Shafiq-Ur-Rehman, who led a team of farmers and intellectuals visiting the country under a "peace initiative" post 26/11 attacks, told reporters.

Source: Internet

Quote on Potato

"We've got to refocus on the long term. Otherwise we'll be badly placed when we come out of the recession. We've spent 20 years turning the potato from a simple commodity into something that is noble and versatile. If we start becoming obsessed with its cheap price, this would be a backwards step."

Dr Rob Clayton, head of communications at the Potato Council in the UK, on the possibility that consumers buying potatoes as a cheap food might associate the potato with poverty and deprivation, rather than seeing it as a premium product - the danger being that when people start to feel more prosperous, they will abandon the potato in favour of more luxurious alternatives.

Source: Internet

Global Warming

Human activities like rapid industrialization, intensive agriculture, indiscriminate use of fertilizers, deforestation and increasing use of fossil fuels during past 150 years are the major contributing factors for climate change. These activities resulted in increasing emission of CO₂ and other green house gases (GHG) leading to global warming as a green house effect due to entrapment of back radiation of heat from earth by these gases.

The rate of global warming in last 50 years is double than that for the last century. As many as 11 of the past 12 years were warmest since 1850, when records began. The threshold value of temperature rise is 2°C for devastating, dangerous and irreversible consequences of warming to manifest world over. Global warming is witnessing shifting pattern of rainfall and increasing incidence of extreme weather events like floods, droughts and frostening along with increasing soil salinity and impaired quality of irrigation water.

The current level of CO₂ (369 ppm) in the atmosphere the main GHG is 35.4% more than the pre-industrial level and is rising. The CO₂ level is predicted to be 393, 543 and 789 ppm in year 2020, 2050 and 2080, respectively. The corresponding rise in temperature would be 1, 3 and 5°C approximately during main potato growing winter season in India.

Article on Potato

Effect of Climate Change on Potato Production in India

Climate change and global warming is now an acknowledged fact and reality. Global warming will have a profound effect on production and productivity of heat sensitive potato crop in near future in India.
Potato in India

The heat sensitive potato crop is mostly confined to Indo-Gangetic plains under irrigated conditions due to climatic constraints. Small scattered areas as rainfed crop is grown in hills during summers and rainy (khariff) season in plateau region, whereas winter seasons crop in the plateau region is irrigated. The availability of suitable growing period in India is likely to be affected seriously by the climate change and global warming.

India produces about 24 million tonnes of potato from 1.32 million hectares. The Northern plains contribute about 84% of the total produce. The bulk of the produce comes from states of Uttar Pradesh (UP), West Bengal (WB), Bihar and Punjab contributing 40, 32, 6 and 6%, respectively. The area, total production and mean tuber yield at the national level increased during the period 1980 to 2007 by 92, 200 and 55 %, respectively.

Potato and global warming

The climate change and global warming will have a profound effect on potato growth story in India affecting not only production and profitability, but seed multiplication, storage, marketing and processing of this perishable vegetatively propagated crop. Under the impact of future scenarios of climate change and global warming the growth projections of potato in India might be arrested or even reversed, unless effective adaptation measures are evolved for timely intervention.

Effect on potato production

Simulations of potato tuber yield by a computer model INFOCROP-POTATO developed at Central Potato Research Institute (CPRI), Shimla were done by imposing future scenarios of climate change and global warming for major potato producing states of India.

Potato productivity is likely to increase in Punjab, Haryana and Western UP by 7 and 4 % in the year 2020 and 2050, respectively. In other states productivity is likely to decrease by 2 to 19% and 9 to 55 % in the year 2020 and 2050, respectively (Table). All India estimates of production based on current relative contribution of different states in total production, showed decline in production from the current levels by 3.16 and 13.72 % in year 2020 and 2050, respectively (Fig).

Future challenges

Sustaining the growth of potato in India in future is a challenging task, requiring urgent research and development efforts. Adaptation measures to global warming may include:

- Breeding new heat, drought and salinity tolerant short duration varieties.
- Drip and sprinkler irrigation in place of furrow and basin methods.
- Relocation and identification of new areas for cultivation.
- Strengthening education, research and development in warm weather production technology for ware and seed potato crop.
- Alteration in cultural management in potato based cropping systems.
- Augmentation of cold storage and development of cold chain facilities.
- Subsidizing additional cost of pest and water management.
- Crop insurance against weather for the cash crop of potato.

*JP Singh, SS Lal & SK Pandey*
राजमार्ग बौद्धक

संस्थान की राजमार्ग की प्रगति की समीक्षा तथा भावी लक्ष्यों के मूल्यांकन के लिए संस्थान की राजमार्ग कार्यान्वयन समिति का बैठक का आयोजन किया गया। संस्थान के निदेशक डा. सुमन कुमार पाण्डेय ने बैठक की अध्यक्षता करते हुए संस्थान में हिन्दी पत्राचार को बढ़ाने पर बत दिया। उनका कहना था कि नगर राजमार्ग कार्यान्वयन समिति तथा संस्थान की ओर से आयोजित होने वाले कार्यक्रमों व प्रतियोगिताओं में हर वर्ष के कर्मचारियों की भागीदारी सुनिश्चित होनी चाहिए। इससे संस्थान में राजमार्ग के कार्यान्वयन को एक नई दिशा और प्रोत्साहन मिलेगा।

नराकास का वार्षिक समारोह

शिमला राज्य केंद्रीय सरकार के कार्यालयों, उपकंडों, कार्यालयों, बैंकों आदि की नगर राजमार्ग कार्यान्वयन समिति का वर्ष का समारोह एवं पुरस्कार वितरण कार्यक्रम का आयोजन संस्थान के ऑडिटोरियम में किया गया। इस अवसर पर समिति के अध्यक्ष श्री अर्जुण रंजन, आयकर आयकर, शिमला विधानसभा निर्वाचन क्षेत्र सिरिशा सिउरिया के साथ-साथ अन्य भागीदारों की भागीदारी हुई। इस अवसर पर शिमला राज्य के विभिन्न कार्यालयों के विभागाधिकारी अन्य सेवानिवृत्त आवर्जिक व्यक्तियों ने कार्यक्रम की शोभा बढ़ाई। सांस्कृतिक कार्यक्रम, पुरस्कार वितरण, नाराकास का वार्षिक राजमार्ग पत्रिका का विमोचन इस कार्यक्रम के विशेष आरोपण रहे।

हिन्दी दृष्टिकोण परीक्षा

श्री हंस राज, कविता सिंह के नेतृत्व में पत्राचार पाठयक्रम के माध्यम से हिन्दी टॉपिक परीक्षा 90 प्रतिशत से भी अधिक अंक लेकर उत्तीर्ण की। जिसके लिए उन्हें नकद पुरस्कार सहित एक वर्ष के लिए एक वेतनवृद्धि प्रदान की।

नाटकों का मंचन

संस्थान की रिसर्च एडवाइजरी कार्यालय के सम्मेलन के मौके पर जहां वेलिंगटन फोर ने आयुर्विज्ञान के विस्मय पहलुओं और उपलब्धियों पर दिनभर मंचन किया, वहीं दुसरी ओर से इस बार विशेष रूप से इस अवसर पर संस्थान के ऑडिटोरियम में इनके मनोरंजन के लिए दो नाट्य प्रस्तुतियां देखने को मिली। पहली प्रस्तुति अभियुक्त कांबली के अन्य ज़िरोख़े थी जिसका निर्देशन संस्थान के अध्यक्ष निदेशक (राजमार्ग) श्री प्रवीण चांदला ने किया। यह नाटक दो बुजुर्ग मित्रों के एकाकी जीवन पर आधारित था, जो अपने नृत्यकला के यादों को भूमाकर भविष्य के अंधे ज़िरोख़ों में ज्ञान कर काल्पनिक पत्रों का निर्माण करते हुए नई आशा के साथ जीना चाहते हैं और आश्चर्यका जीवन की चच्चाइयों का अनुभव करते हैं। अनुभवी बुजुर्गों के किरदारों में जहां एक ओर प्रवीण चांदला और दा. कमल मनोहर शर्मा की अदाकारी और संवादों ने प्रेक्षागृह में बैठे दर्शकों को आत्मविश्वास कर दिया। वहीं संस्थान के दो उपरकर हुए कलाकार श्री सचिन कंजवर और कुमारी गरिमा तोमर ने अपने-अपने पत्रों को जीवंत रूप में प्रस्तुत किया।

नाट्य प्रस्तुति
इस अवसर पर कलाकारों को ग्लोबल स्पूमन राइट्स कमिशन के अध्यक्ष श्री अरविंद ठाकुर ने स्मृति चिन्ह देकर समापित किया। कार्यक्रम के अवसर पर कृषि वैज्ञानिक चयन बोर्ड के पूर्व अध्यक्ष व धारवाड़ (कर्नाटक) विश्वविद्यालय के पूर्व कुलपति तथा रिसर्च एडवाइजरी कमेटी के अध्यक्ष डा. एम. महादेवप्राया और संस्थान के निदेशक डा. सुमन कुमार पाण्डेय तथा अन्य अतिथि गणों ने नाटक की भूरि-भूरि प्रशंसा की।

एक अन्य अवसर पर संस्थान के श्री प्रवेश जासुल के निदेशन में मुंशी प्रेम चन्द की कहानी 'बड़े भाई साहब' के सफल मंचन ने दर्शकों की वाह-वाही लूटी।

स्टाफ वेलफेयर एसोसिएशन

संस्थान की वेलफेयर एसोसिएशन के चुनाव में इस बार श्री नरेन्द्र कुर्मा सांस ने सचिव पद का चुनाव भारी मतों से जीता। कार्यकारिणी के अन्य सदस्य श्री राम चन्द (कोषाध्यक्ष), डा. अनिल कुमार सर्वेश्व चन्द्र वंदर, श्रीराम राम, नरेन्द्र कुर्मा को निर्विरोध चुना गया। कार्यालय पक्ष की ओर से श्रीमती शिशि ठाकुर व श्री देव राज को इस एसोसिएशन के लिए मनोनीत किया गया।

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