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From the Director's Desk



Although potato is a wholesome food crop, it is unfortunate that it is a fool some commodity in terms of storage. As it represents a bulky perishable commodity, the potato production in a sub-tropical climatic conditions as in India is essentially conditioned by storage options. Consequently, the potato scientists working in any discipline are practically obsessed by storage-mania. There are distinct storage requirements for ware, processing and seed potatoes. In contrast to potato harvest followed by cold winter in temperate countries, it is followed by hot and humid summer in sub-tropical Indian conditions. And that was why the potato storage at high tempera-

tures constituted one of the major research agenda during the formative period of potato research and development in the country just after independence. No doubt we have been successful in establishing a cold chain for refrigerated potato storage over the past few decades. But in a vast country like India, where the farming community essentially comprises millions of poor and marginal farmers, non-refrigerated storage can truly be the only viable option for sustaining the potato production and its emerging processing sector. In non-refrigerated storage, CIPC (isopropyl-N-3-chlorophenyl carbamate) is the most effective sprout inhibitor, although other suppressants like methyl ester of α -naphthalene acetic acid (MENA), maleic hydrazide (MH), Tetra chloro-nitro benzene (TCNB) and Tixit-C are also reported for their varying efficacies. The Institute has developed effective technologies for potato storage at high temperatures with CIPC treatment over the past few years. In this issue, the thematic article is on this aspect with information of technology, its economics and requirements for sustaining this storage option in the country. But we have to look beyond CIPC. In this era of sustainable crop production and management, there is an urgent need to develop effective bio-formulations to attain potato storage at high temperatures with much ease and alacrity. This necessarily calls for more basic and strategic research in this front.

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Minister of State Visits CPRI

Hon'ble Minister of State of Agriculture, Consumer Affair and Public Distribution, Govt. of India, New Delhi visited CPRI Campus, Modipuram on 13th July 2005. He was received by Dr. BP Singh, Jt. Director, CPRIC, Modipuram, Dr. SK Sharma, Project Director-Project Directorate for Cropping Systems Research, Modipuram and Dr. Kripal Singh, Project Director-Project Directorate on Cattle, Meerut Cantt. Besides formal welcome, the Hon'ble Minister of

State was informed about the ongoing research programmes at the campus and the progress made so far especially in the field of breeders seed production and varietal improvement.

Hon'ble minister addressed the scientific staff of all the three ICAR Institutes viz. Central Potato Research Institute Campus, Modipuram, Project Directorate for Cropping Systems Research and Project Directorate on Cattle. He

was of opinion that although unprecedented achievements in the field of agriculture through scientific intervention have been made but a lot more needs to be done keeping in view the changing world order especially with respect to WTO. Besides providing self-sufficiency in food, we have to provide balanced nutrition as well as enhance the income of the farming community. Our research efforts should be directed towards fulfilling these objectives.



Hon'ble minister's welcome at Modipuram



Hon'ble minister addressing Scientists

Research Highlights

Potato Apical Leaf Curl Virus Disease: An Emerging Threat to Potato Cultivation in India

Potato apical leaf curl caused by potato apical leaf curl begomovirus is an emerging major disease, limiting potato production in the country. Sporadic incidence of this disease was noticed first time in December, 1996 at Hisar in

Haryana. Later on, it was reported from Punjab and Western UP. The virus is spread by white flies (*Bemisia tabaci*) and the progress of the disease has positive correlation with white fly population and infestation period. In potatoes, apical leaf curl is a highly polycyclic disease because viruliferous white flies are very active fliers and feeders causing

primary and secondary infections quickly within a single crop season.

Being a tuber borne disease, its incidences have been reported from several parts of the country. The disease causes severe yield losses (up to 30-40%) in early sown (1st week of October) susceptible potato cultivars in north Indian plains. The disease incidence varies from year to year depending on

weather conditions, vector population and cropping patterns of the area. White flies are highly polyphagous and have been reported to feed on more than 500 plant species in India. High incidence of apical leaf curl prevails in Hisar, Sirsa, Ambala and Kurukshetra districts (adjoining areas of cotton belt) as cotton crop harbours white flies that migrate to potato crop in October (after harvesting of cotton). In central, eastern and southern parts of the country, the white fly population remains high through out the potato season due to congenial higher temperatures. Recently, large population of white flies and apical leaf curl virus like symptoms in potato plants have been observed at Chhindwara (MP), Raipur (Chhattisgarh) and Bhubaneswar (Orissa). Disease incidence remains low, where large areas are planted with variety Kufri Bahar, having a good degree of resistance/tolerance against the disease.

Management

Following management strategies are essential to control apical leaf curl virus (ALCV) menace in potato.

1. Use of disease-free seed of resistant/tolerant varieties (Few Indian varieties have resistance/tolerance to ALCV, Kufri Bahar is the most resistant/tolerant variety).
2. Delayed planting (last week of October/1st week of November in north Indian plains) in susceptible varieties to skip white flies. However, delayed planting can lead to yield reduction, exposure to late blight in later part of the season and also disturb cropping sequence.
3. White flies can effectively be controlled by potato seed tuber treatment with imidacloprid @ 0.004% a.i. conc. (10 minutes dip) followed by need based sprays of imidacloprid @ 0.002% a.i. conc. at complete crop emergence and later on. Efficacy of imidacloprid can further be improved by its application with summer oil (1%).
4. Use of trap crops like Oat and fennel sown and transplanted, respectively, 10-15 days earlier than potato can offer better protection against white flies.

Future strategies

1. National Survey on population dynamics of white flies and ALCV incidence in major potato growing areas to identify relatively white fly free potato growing periods.
2. Identification of ALCV resistant parental lines and their use in breeding programmes.
3. Development of ELISA kit for detection of ALCV and its integration in potato seed production programme.
4. Presently only one insecticide (imidacloprid) is used to control white flies. Resistance development may pose a problem in future. Therefore, few more insecticides need to be identified for control of this vector.
5. The natural parasitoids like *Encarsia spp.*, insecticidal fungus

Verticillium lecanii and plant products like neem extract have considerable potential for eco-friendly control of white flies.

-BS Lakra (CCSHAU, Hisar), RS Chandel (CPRS, Kufri) KC Thakur and PS Naik (AICRP, Shimla).

Training & Technology Transfer

DUS Testing of potato varieties

A three-day training course on 'DUS Testing of potato varieties-principles and procedures' was organized at Central Potato Research Institute Campus, Modipuram from 13 to 15 December, 2005 which was attended by 13 participants drawn from different ICAR Institutes and State Agricultural Universities.

The training course was inaugurated by Dr. RK Chaudhary, Project Director, Seed Research Directorate, New Delhi. Dr. SK Pandey, Director, Central Potato Research Institute, Shimla also had a detailed discussion with the participants on the utility of DUS testing of Indian potato varieties for checking biopiracy of the indigenous potato varieties and hybrids. He informed the participants that CPRI has developed 41 indigenous potato varieties which possess very important attributes required to



DUS training at Modipuram



DUS demonstration at Modipuram



TPS training at Modipuram

meet the current challenges related to potato production- be it resistance to late blight, tolerance to viruses and abiotic stresses like heat stress, immunity to potato wart etc. These are valuable material especially in the context of Asian region and need to be protected for posterity. Dr. RK Chaudhary highlighted the IPR issues and responsibility of the scientific institutions, which cannot be taken care of unless an awareness campaign is carried out among the scientific community. This training course is a part of the awareness programme.

The highlight of the training course included lectures by invited speakers, hands on training on identification of markers and their application for DUS testing in potato varieties and other related issues. The concluding function was presided over by Dr. S. Mauria, Actg. ADG (IPR), ICAR, who gave away the certificates to the participants.

International Training Course on TPS

A three-day International Training Course on True Potato Seed

production was organized at Central Potato Research Institute Campus, Modipuram from 28-30 Nov, 2005 in collaboration with International Potato Center (CIP), South, West & Central Asia, New Delhi.

The training course was attended by eight participants drawn from Armenia, Tajikistan, Kyrgyzstan, Azarbaijan, Uzbekistan, Turkmenistan and Georgia. At the inauguration, the International Potato Center was represented by Dr. Sarath Illangantileke, Regional Director, South, West & Central Asia and Dr. Carlo Carli, CIP scientist based at Uzbekistan. Dr. SK Pandey, Director, CPRI and course Director, inaugurated the training course. Central Asia and the Caucasus region are deficient in quality potato seed. They need to explore/develop alternative methods of quality seed production in their respective countries to reduce the expenditure on seed imports and enhance potato productivity. This

training course was designed to help achieve the above objective by imparting training to the participants on raising potato crop through TPS.

The highlight of this training included lectures, hands on training on selection and raising of parental lines under artificially extended photo period, crossing, selection of TPS, seed treatment, its germination and agro techniques related to raising of TPS crop for tuberlet production and for transplanting crop. The trainees were also familiarized with potato seed production through conventional methods and tissue culture. The impact of quality seed produced at Central Potato Research Institute



TPS field training at Modipuram

Campus, Modipuram was shown to them at farmers' fields.

Model Training Course on Potato

The Institute organized 8 days Model Training Course on "Seed Potato Production, Handling and Marketing" during August 17-24, 2005 at Shimla which was sponsored by the Directorate of Extension, Ministry of Agriculture, Govt. of India. A total of 23 participants from 11 states attended the training course. Out of these 23 participants, 18 were from State departments of agriculture/horticulture and 5 were from NGOs. Pre- and post-training evaluation of the trainees was conducted to assess the effectiveness of the training course. It revealed that after the training, on an average the knowledge of the participants was improved by 30 per cent.



Participants of model training at Shimla

Training to Frito-lay Workers

The Institute organised 4-days training course on "Potato Production, Storage and Utilization" during September 3-6, 2005 at Shimla which was sponsored by Fritolay Division of Pepsico India Holdings Pvt. Ltd. The training was meant for the staff of Fritolay and a total of 9 extension officers of the company from Punjab, Haryana, Madhya

Pradesh, Maharashtra and West Bengal attended the training course. The course included aspects of potato cultivation, disease management, quality requirements for processing and storage.

Training for NEH Region Officers

The Institute organized 5 days training course on "Potato Production, Protection and Storage" during November 21-25, 2005 at Shimla under the project Mini Mission -1 of Horticulture Technology Mission. The training course was organized for the extension officers of the north-eastern hill states and it was attended by 6 participants from Arunachal Pradesh, Sikkim and Tripura.



NEH region officers at Shimla

Live Phone-in programme on AIR & Doordarshan

An innovative live phone-in programme in agriculture was initiated on All India Radio and Doordarshan during 2005. Several scientists of the Institute participated in the programme. Dr. NK Pandey and Dr. RS Chandel participated in the live phone-in programme of AIR held on 24.6.2005 on the topic "Potato Cultivation". Dr. KR Dhiman participated in the live phone-in

programme of Doordarshan held on 3.10.2005 on the topic "Cultivation of Potato". Dr. V.K. Dua and Dr. Anil Kumar participated in the live phone-in programme of Doordarshan held on 21.11.2005 on the topic "Planting of Potato".

Exhibition in Kisan Mela at Nauni

The Institute put up an exhibition stall of potato technologies in the Kisan Mela organised by Dr. Y.S. Parmar University of Horticulture & Forestry, Nauni (Solan) on December 1, 2005. The exhibition stall of CPRI was attended by more than 200 farmers from different parts of Himachal Pradesh. These farmers were briefed about the potato technologies by Dr. Anil Kumar. This endeavour proved worthy in getting first hand information from the farmers and transferring the potato technologies to them. Besides, a number of priced publications of the Institute were sold to the farmers and scientists from the stall.



CPRI stall at Kisan Mela

Training to Farmer's and Officer's of North-East

A total of six farmer's and one officer's training was organized by the Institute in the North eastern states under the MM-1 project of Horticulture Technology Mission.



Participants of Farmers training at Jorhat



Field training on TPS at Shillong

A team of four scientists from different disciplines viz., Dr. PH Singh, PS, Plant Pathology and Nodal Officer, Dr. KR Dhiman, Head, Crop Improvement, Dr. VK Chandla, PS, Entomology and Dr. Brajesh Singh, Crop Physiology and PHT were the resource persons for these training programs.

The first training programme was organized at ICAR Research Complex, Lembuchera, Tripura on 30th Nov and 1st Dec 2005 and 22 farmers from different districts of the state were nominated by the state horticulture department to attend the training. The second training was organized at Assam Agriculture University, Jorhat, Assam on 3rd and 4th Dec 2005, where 16 farmers participated from various districts of the state. The AICRP (Potato) Centre scientists of AAU also interacted with the trainees at Jorhat.

The third training was organized at ICAR Research Complex, Jharnapani, Nagaland on 6th and 7th Dec and 25 farmers attended this training programme. Here the complex staff helped the resource persons in translating the lectures in the local language. The next training was organized at Imphal, Manipur

where 25 farmers were trained on 9th and 10th Dec.

The fifth training was organized at CPRS, Shillong on 12th and 13th December. Twenty-two farmers from east and west Khasi district participated in the programme and a visit of farmers to the station was also organized, where farmers were demonstrated with the potato cultivation technology.



Officers training at Shillong

The Extension Officers training was also organized at CPRS, Shillong where 14 state government officers (7 from Meghalaya, 2 each from Manipur and Sikkim and 1 each from Assam, Arunachal Pradesh and Nagaland) were given training on 14th and 15th December. The officers were trained by the resource persons from Shimla and also by Dr. Shantanu Kumar of the Station.

The last farmer training was organized at Gangtok, Sikkim on 19th and 20th December. A total of 40 farmers of the state attended this training and were given lectures and field demonstration on potato cultivation practices, disease and pest control and storage of potatoes. All these trainings were aimed at doubling the potato productivity in the region, which at present is much below the National average productivity.



Farmers training at Gangtok

Farmers' Day at Hassan (Karnataka)

A "Field Day and Seminar on Potato" was organized at Agril. Research Station, Madenur – Hassan on 26th August, 2005, which was attended by nearly 900 farmers to acquire knowledge about the improved technologies of potato production.

Variety evaluation trials in tribal belts of Rajasthan

Demonstrations-cum-evaluation trials consisting four improved potato varieties viz., Kufri Pukhraj, Kufri Bahar, Kufri Badshah and Kufri Pushkar have been initiated for the first time in the four tribal belts in Udaipur, Chittorgarh, Banswara and Dungarpur of Rajasthan under the supervision of AICRP – Potato Centre located at Kota (Rajasthan).

Important Meetings

IPR Seminar organized in Delhi

Indian Council of Agricultural Research and Indian Potato Association jointly organized national conference on IPR and management of Agricultural Research. The conference was held from 27-29 August, 2005 at Symposium Hall, NASC Complex, Dev Prakash Shastri Marg, New Delhi 110 012. The conference was attended by more than 150 delegates from various ICAR Institutes, Universities and Industry. Twenty-four eminent speakers from ICAR, ICMR, CSIR, NRDC, NIC, DST and distinguished lawyers specialized in IPR issues delivered the talks. The conference was divided into eight technical sessions covering; i) IPRs in Indian perspective, ii) SWOT analysis for protection of intellectual property rights in India iii) patenting in the Indian context, iv) protection of plant varieties and farmers' rights (2 sessions) and v) facilitated access to genetic resources and associated knowledge. All the lectures were very informative and the delegates cleared many of their doubts about the IPR issues.

In total 32 recommendations of this conference were approved in presence of Dr. G. Kalloo, DDG (Hort. and Crop Science) and have been printed separately in form of recommendations.

CPRI organizes Potato Symposium

Central Potato Research Institute, Shimla in association with Indian Potato Association successfully organized a one-day symposium on "Current Perspectives on Potato Research" at Maharana Pratap University of Agriculture and Technology, Udaipur on 11th Sept, 2005.

The symposium followed three-day workshop of AICRP and was attended by more than 150 delegates from all over the country. A special issue of Potato Journal containing the papers presented in the Symposium was released on the occasion. Dr. SL Mehta, Vice-Chancellor of MPUAT inaugurated the symposium and during his remarks praised the work done by the fraternity of potato scientists and workers. Dr. SM Paul Khurana, President of the Association and Vice Chancellor of Rani Durgavati University, Jabalpur gave the presidential address. This was followed by enlightening talks from eminent scientists like Dr. SL Mehta, VC, MPUAT, Dr. PC Gaur, Retd. Head, Div. of Crop Improvement, CPRI, Dr. RK Jain, PS, IARI, Dr. MS Kadian, International Potato Center office,

New Delhi, Dr. BP Singh, Jt. Director, CPRIC, Modipuram and Dr. SK Pandey, Director, CPRI, Shimla.

In the afternoon session, potato workers presented about 100 papers in the form of posters in the poster session. This was followed by the General Body meeting and Award ceremony of Indian Potato Association.



Potato Symposium at Udaipur

AICRP (Potato) organized its 25th Group meeting

25th Group meeting of the all India Coordinated Research Project on Potato was organized at Maharana Pratap University of Agriculture and Technology, Udaipur during Sept. 8-10, 2005.

AICRP (Potato) was instrumental in releasing 20 improved varieties and bringing out several recommendations for efficient potato production and protection in the country during last 35 years, since its inception in 1970. Presently the AICRP-Potato operates with 21 centres located in distinct agro-ecological regions of the country. Fourteen of these centers are located in State



Participants of Potato Workshop

Agriculture Universities (SAUs), six at CPRI regional research stations and one voluntary center at Ranichauri in Uttaranchal. Besides, there are two seed preparatory units located at Kufri for hills and Modipuram for the plains. There are 7 breeders, 8 horticulturists, 10 agronomists, 10 pathologists and 2 entomologists positioned under the project at 14 SAU based centers.

The meeting was inaugurated by Dr. SL Mehta, Vice Chancellor, MPUA&T, Udaipur and attended by dignitaries from ICAR, CPRI, MPUA&T, AICRP delegates, farmers and representatives from potato based industries. In addition to 3 technical sessions on potato improvement, potato production and potato protection, there were two special sessions on ICAR Adhoc projects and interface with farmers and industries.

Two improved potato hybrids viz., MP/97-583 for cultivation in Indo-gangetic plains and suitable for chipping and another SM/91-1515 possessing resistance to late blight and suitable for cultivation in hills were recommended for commercial release. Besides several cultural practices and plant

protection measures were recommended for efficient potato production in different parts of the country.

RAC Meeting held at Shimla

The twelfth meeting of the

Research Advisory Committee (RAC) was held at Central Potato Research Institute, Shimla on 25th and 26th July, 2005 under the chairmanship of Dr. Kirti Singh, Ex-Chairman, ASRB, New Delhi. The following RAC members were present – Dr. MN Khare, Prof. PK Gupta, Dr. Brajesh Rai, Sh. Kedar Singh Chauhan, Sh. Ram Krishna Singh Patel, Dr. SK Pandey and Dr. R. Ezekiel. Dr. Kirti Singh, Chairman, RAC in his opening remarks said that CPRI has done very good work in all areas of potato research but research is a continuous process and as problems continue to increase, they need to be addressed and solutions found. Dr. R. Ezekiel, Member Secretary, RAC presented the action taken report on the recommendations of the previous RAC meeting held last year. Programme leaders of the 22 ongoing research programmes presented progress report for the year 2004-2005 and the plan of work

for the next year. The chairman in his closing remarks appreciated the presentations of programme leaders and the quality of work being done in the Institute.

Staff Research Council Meeting at Shimla

The staff research council meeting, 2005 was held at CPRI, Shimla during 28-30 July, 2005. Seventy six scientists attended it from the headquarters and stations. The basic objective of this meeting was to review the achievements of 2004-2005 and formulate future plan of work for 2005-2006 of different research programmes.

Dr. SK Pandey, Chairman, SRC and Director, CPRI, Shimla in his opening remarks emphasized that DG, ICAR is very particular regarding performance-scoring of scientists, randomly going through six-monthly reports and monitoring it carefully. This requires sincere experimentation and data recording by all the scientists. He expressed his concern about involvement of scientists in non-scientific duties / work. Besides, he said that as recommended by RAC, some of the programmes that require



Members of the RAC meeting



Participants of the SRC Meeting

recasting are: (i) True Potato Seed technology, (ii) Biotechnology, (iii) Programmes in Social Sciences. During three-day meeting lot of suggestions were obtained by the chairman and the senior scientists of the Institute for making improvements in the ongoing research programmes.

Meeting on National Seed Production programme

A meeting to streamline the National seed production programme and to finalize the seed production through tissue culture was held at CPRS, Jalandhar, on September 24, 2005 under the chairmanship of Dr. SK Pandey, Director, CPRI, Shimla. The meeting was attended by Dr. KC Garg, ADG(VC), ICAR, New Delhi, Dr. BP Singh, Joint Director, CPRIC, several heads and scientists of CPRI campus, Modipuram, CPRS, Jalandhar and other stations of CPRI. It was decided to initially start the seed production through tissue culture (micro tuber / plant) to cater to the requirement of 25 percent area in stage-IV and then expand it depending upon the availability of resources and facilities at CPRS, Jalandhar and CPRIC, Modipuram.

Deepawali Mela

Diwali Mela is organized every year by the staff welfare association, CPRI, Shimla to have get together and to promote harmony among the staff members. This year also Diwali mela was organized on October 22, 2005 by SWA, which was inaugurated by Mrs. Neerja Pandey. Nine stalls

were put up in the Institute lawn for the entertainment and refreshment of the visitors and participants. Large number of people including staff of CPRI and their family members participated in this mela. Sports and cultural competitions were held for the children. These included 100 meter and 200 meter race, needle and thread race, drawing



Inauguration of Deepawali Mela at Shimla competition, fancy dress competition etc. for different age group of children. Musical chair race for ladies and tug of war for the staff members were also held, which were the main attraction of the fair. Mrs. Tarvinder Kochhar won the musical chair race and the Division of Social Sciences group won the tug of war. The winners of all these events were honoured with prize by the chief guest.

Invited lectures & Visitors

- Dr. Madhura Swaminathan from Indian Institute of Statistics,

Kolkata visited the Institute and delivered a lecture on "Issues of Food Security in India" on 13th October 2005.

- Dr. SS Khanna from Organo-Phos APMC compost plant, New Delhi delivered a talk on "Integrated Management using city compost for enhancing production and productivity of Indian soils" during his visit to the Institute on 20th October 2005.
- Dr. SK Goel of Indian Institute of Advance Studies, Shimla gave a talk on "Know others by knowing yourself" on 9th December 2005 during his visit.

Other visitors & sale of publications

Scientists, teaching staff, students and farmers from different colleges, Institutes and universities of the country make visit to CPRI for acquaintance with potato research and for purchase of CPRI publications. A total of 33 scientists/teaching staff, 385 students of UG and PG and 305 farmers from different parts of the country visited CPRI during July- December 2005. The division of social sciences, which recently took the responsibility of sale of Institute's publications sold them for worth Rs. 4000/- during November-December, 2005 to the visitors.

Human Resource

Appointments

1. Dr. PS Naik, Principal Scientist (Genetics/ Biotechnology) appointed as Project Coordinator for five years tenure w.e.f. 01.07.2005 (FN).

2. The tenure of Dr. BP Singh as Joint Director, CPRIC, Modipuram has been renewed for a further period of five years w.e.f. 03.10.2005.
3. Dr. R. Ezekiel, appointed as Head, CP & PHT for five years tenure w.e.f. 16.09.2005 (FN).
4. Sh. Rayppan, appointed as SS Gr.I at CPRS, Ooty w.e.f. 12.09.2005.
5. Smt. Daivatha, appointed as SS Gr.I at CPRS, Ooty w.e.f. 12.09.2005.

6. Smt. Rajamma, appointed as SS Gr.I at CPRS, Ooty w.e.f. 12.09.2005.

IJSC Elections Held

IJSC elections for 2005-06 were held on 7th November 2005 in CPRI. From Technical side Sh. Naresh Chand Sharma, Sh. Munna Lal Bharati and Dr. YP Singh were elected. Sh. DD Kashyap and Sh. Roshan Lal were elected from Administration and Sh. Mansha Ram, Sh. Attar Singh and Sh. Raghbir Singh were elected amongst the Supporting Staff.

Promotions

Technical		
	From	To
3 persons	T-1	T-2
2 persons	T-3	T-4
20 persons	T-4	T-5
1 person	T-5	T-6
1 persons	T-6	T(7-8)
Administrative		
Sh. AS Keprate	Asstt	AAO
Sh. LR Verma	UDC	Asstt.
Sh. Surinder Singh	Clerk	Sr. Clerk
Sh. Rakesh	Clerk	Sr. Clerk
Sh. RS Yadav	Asstt.	AAO
Sh. SD Chaturvedi	UDC	Asstt.
Sh. RR Das	UDC	Asstt.
Sh. S Prasad	SSG-III	LDC
Sh. Chanda Ram	Jr. Clerk	Sr. Clerk
Supporting		
1 persons	SS Gr. III	SS Gr. IV
2 persons	SS Gr. II	SS Gr. III
3 persons	SS Gr. I	SS Gr. II

Transfers

Name	From	To
Dr. KK Sharma	Shimla	NRCP, Sholapur
Dr. RK Singh	Gwalior	NRCSS, Ajmer
Sh. Ishlam Ahmad	Shimla	Modipuram
Sh. Suresh Kumar	Kufri	Shimla
Sh. P Rajendran	Shimla	Patna
Smt. Kamlesh Sharma	CSWCRTI, Dehradun	CPRI, Shimla

Retirements

Name	Post	Retired on
Sh. JC Chopra	AAO	30.4.2005
Sh. Gopal Singh	T-3	31.7.2005
Sh. JP Uniyal	T (7-8)	31.8.2005
Sh. Hardev Singh	T-4	30.9.2005
Sh. Ranjit Singh	Asstt.	1.10.2005
Sh. Joginder Kumar	SS Gr. IV	30.11.2005
Sh. Sukh Ram	SS Gr. IV	30.11.2005

Awards & Honours

Best Hindi Implementation Award

- CPRS, Muthorai has been awarded with the " Best Hindi Implementation award" by the town official language implementation committee of Nilgiris held in cordite factory, Aruvankadu on 19.10.2005.
- **Dr. SK Pandey**, Director, CPRI, Shimla bagged the prestigious **Dr. JC Anand Gold medal** for his contribution and leadership in Post-harvest technology of Horticultural Crops for the year 2005. His research contribution includes the development of 12 high yielding potato varieties. He was the first to develop two indigenous potato processing varieties, viz., Kufri Chipsona-1 and Kufri Chipsona-2, which revolutionized the potato processing industry in India. Recently, he has also developed a processing variety, viz., Kufri Chipsona-3. The award was presented on 18th Nov. 2005 in

NAAS Auditorium , New Delhi.

- **Dr. SK Pandey**, Director, CPRI, Shimla was appointed as one of the members of the Advisory Committee on Agro Biodiversity Authority. The duration of the advisory committee will be for a period of three years.
- Director General, ICAR nominated **Dr. SK Pandey**, Director, CPRI, Shimla as representative of the ICAR for the board of management of Dr. YS Parmar University of Horticulture & Forestry, Nauni, Solan. This nomination is for the tenure of three years w.e.f 19.07.2005.
- His excellency Sh. VS Kokje, Governor of Himachal Pradesh nominated, **Dr. SK Pandey**, Director, CPRI, Shimla as Member of Governing body of Himachal Pradesh State Seed and Organic Produce Certification Agency for two years w.e.f 29.07.2005.
- **Dr. SK Pandey** alongwith Dr. RS Marwaha and Dr. SV Singh has been honoured by Indian Farm Forestry Development Co-operative Ltd, for his excellent contribution in developing India's first ever potato processing varieties Kufri Chipsona-1 and Kufri Chipsona-2.
- **IPA Kaushalya Sikka Memorial Award** was bagged by the research team consisting of Drs. Parveen Kumar, SV Singh, SK Pandey and Dinesh Kumar.
- **Dr. S Ramanujam Memorial Lecture Award** was given to **Dr. PC Gaur**, Retd. Head, Crop Improvement, CPRI, Shimla.

- **Best Paper Award of Potato Journal** for 2002 was bagged by Drs. Ashoo Sharma, JS Minhas, PS Basu and Jitendra Mohan. For 2003, Drs. SV Singh, Dinesh Kumar and SK Pandey bagged the Award.
- **Best Poster Award** during Symposium at Udaipur was bagged by Drs. SV Singh, Dinesh Kumar, SK Pandey, NH Patel, Parveen Kumar, P Manivel and RS Marwaha. The commendation certificate was given to Drs. KC Thakur, P Manivel, PH Singh, SK Pandey, PS Naik, Vinod Kumar, Jai Gopal and KR Dhiman.
- Indian Potato Association selected Drs. PS Naik, KC Garg, SV Singh and RB Singh as Distinguished Fellow.

Achievements in Sports

CPRI participated in ICAR Inter-zonal sports meet held at NDRI, Karnal during 27-30 September, 2005. The Institute team of Table Tennis consisting of Sh. CM Bisht, Dr. Vinay Bhardwaj, Sh. Gurjeet Singh, Sh. Roshan Lal and Dr. NK Pandey won the Inter-zonal team championship. Athlete Smt. Shyam Lata Bekta won Gold medal in Shot Put, Silver in Discus throw and



Table tennis team of CPRI

Bronze in Javelin throw. Smt. Tarvinder Kocchar won three Bronze medals in High Jump, 100 and 200 mts race.

Future Activities

Potato Workshop in Uttarkashi

The Himalayan Action Research Centre, an NGO working in Uttaranchal, is going to organize potato workshop at its annual farmers' fair on January 8-9, 2005. They have invited CPRI scientists for the workshop. Accordingly, 3 scientists of CPRI are going to attend the workshop. An exhibition stall of potato will also be put up at the fair. Two of the extension officers of HARC were trained by CPRI in the model-training course held in August 2005. After that , a linkage has been developed with HARC and this workshop is a part of the follow-up activities of training.

Potato Facts

Potato Remedy

Boiled potato peel could be an effective dressing material for burn injuries. " Wounds dressed with the peel bandages healed faster than the conventional dressing" says Dr. PV Narayanan, plastic surgeon at Thrissur's Jubilee Memorial Mission Hospital. A 2.5 m long and 11 cm wide roll of potato peel bandage costs about Rs.55, much less than conventional dressing material. The added advantage is that its removal is not painful, unlike adhesive bandages.

Source: India Today

Beer –Battered fries unite beer and chips

No one would argue that chips and beer aren't a great combination, but products manufacturer lamb Weston Meijer is taking the union a step further. They have come up with Beer-battered fries, ideal for pubs looking to extend their snack sales or add an unusual side dish to main meals such as seafood. The fries have a unique coating which seals the flavour inside a crispy exterior. Served upright in a beer mug, they can be shared with friends enjoying a beer. They can be eaten as an appetizer but are just as enjoyable at any time in the day or evening. Beer-battered fries are easy to prepare using either the oven or the deep-fat dryer.

Source: *United Advertising publications*

New research found unexpected benefit of potatoes

UK scientists have identified previously unknown compounds in the potato that are also found in a herbal used to lower blood pressure. The natural chemicals, called *kukoamines*, also selectively affect a chemotherapeutic target for trypanosomes and similar diseases such as sleeping sickness, said the team from the Institute of Food Research.

Source: *BBC News*

Articles on Potato

Storage of Potatoes at Higher Temperatures with CIPC Treatment

Introduction

Record levels of production during the last two decades has resulted

in several post-harvest problems and the major one is that of storage. About 90% of the total potato production comes from the Indo-Gangetic plains, where harvesting is done in February-March. Therefore, the arrival of potatoes in the market during this period are huge creating gluts resulting in distress sale by the farmer. Storage helps in regulating the arrival in the market and reduces transport bottlenecks at the peak period of production.

Cold storage

Potatoes stored in cold store at 2-4°C and 90-95% RH, do not sprout and loose weight. The conditions maintained in cold stores are ideal for storing seed potatoes for 6-8 months. But, for the storage of table and processing potatoes, storage at 2-4°C is not ideal since sugar accumulation takes place at this temperature and potatoes become sweet in taste. Cold stored potatoes are especially unsuitable for processing since higher sugar levels (Fig. 1) result in unacceptable, dark brown chips (Fig. 2).

Need for storage at 10-12°C

The problem of low temperature induced sweetness can be overcome

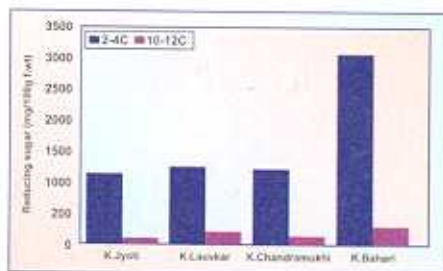


Fig. 1. Reducing sugar content in tubers of four varieties after storage (for 120 days in K. Chandramukhi and 150 days in other varieties).



Fig. 2. Colour of chips prepared from potatoes stored in cold store and at 12°C with CIPC treatment in K. Chandramukhi

by storing table and processing potatoes at higher storage temperature of 10-12°C instead of 2-4°C. However, the RH should be maintained at 85-90% to minimize weight loss during storage. When stored at 10-12°C, sugar accumulation is minimum therefore, potatoes do not taste sweet and hence are better than the cold stored potatoes for consumption. Since the sugar accumulation is minimum, they are also quite suitable for processing. However, when stored at 10-12°C, potatoes sprout and it is necessary to check sprout growth to reduce storage losses. To check sprout growth, sprout suppressants have to be used and the most commonly used sprout suppressant is CIPC (Isopropyl N-(3-chlorophenyl) carbamate).

CIPC treatment

Table potatoes can be treated with CIPC dust @ 25 mg a.i./tonne of tubers (commercial preparation of CIPC dust contains 1% active ingredient) at the time of storage. For treating small quantity of potatoes, powder form of CIPC is convenient but for treating large quantity of potatoes, powder form is not convenient due to the

practical problems in handling, since powder treatment is done manually in India. For large-scale treatment of potatoes with CIPC, liquid formulation is preferred as it can be applied in the form of a fog using a fogging machine without disturbing the stored potatoes. Chlorpropham is being marketed in India by United Phosphorus Ltd., Mumbai in the name of "Oorja". This commercial preparation contains 50% a.i. and 30-35 ml of this preparation is required for fogging one tonne of potatoes. However, this dose can vary depending upon the loss of fog during treatment due to leakage, the pore size of the bags used, the quantity of potatoes stored etc. After the CIPC treatment, the store should be kept airtight for 24-48 hours. First fogging is done at the first sign of sprout growth. Second fogging is done at about 45 days after the first fogging. The timing of first fogging is important. If it is done at the right time, CIPC is most

effective in suppressing sprout growth (Fig. 3). If the first fogging is delayed and sprout growth has progressed considerably and if the concentration of CIPC applied is inadequate, then the CIPC treatment will not be very effective and there is the risk of internal sprout growth. Fig. 4 shows a tuber showing internal sprout growth after insufficient application of CIPC. When internal sprout growth takes place, tubers become useless and have to be discarded.

Processing quality of potatoes stored at 10-12°C in commercial cold stores

Processing quality of potatoes was monitored in 16 commercial cold stores located in four states. Out of these, seven cold stores were in Uttar Pradesh (UP), six were in Madhya Pradesh (MP), two were in Gujarat and one was in West Bengal (WB). In these cold stores, well-cured potatoes were stored at 10-12°C and 85-95% RH and, CIPC was applied twice as a thermal aerosol (fog). Samples were collected randomly from each cold store periodically and were analysed for dry matter content, reducing sugar content and chip colour. Processing quality varied considerably amongst locations. At Meerut, in one cold store where the variety was Kufri Jyoti (Tubers were grown at Indore and brought to Meerut and stored), the chip colour was acceptable due to low reducing sugar content. The dry matter content was also above 20%. But in another cold store where the variety was Kufri Jyoti grown at Meerut, reducing sugar content was high and chip colour was unacceptable after 93 days of

storage (DOS). In the third cold store where the variety was Kufri Bahar, the reducing sugar content was high and chip colour was unacceptable. Two cold stores at Sambhal, one at Balna and one at Agra had stored variety Kufri Bahar and in all the four cases reducing sugar content was quite high and chip colour score was unacceptable even after 45 days of storage. The dry matter content was less than 20% except at Balna (Dry matter content of 20% and more is desirable for processing).

At Indore, all the four cold stores monitored had variety Kufri Jyoti. The reducing sugar content was within the acceptable limit (The upper acceptable limit of reducing sugar content is 150 mg/100g fresh weight (f. wt)), the chip colour score was quite acceptable (Colour score up to 4 is considered acceptable and 5 and above are unacceptable) and the dry matter content ranged from 20.6 to 26.3%. At Ujjain, the variety was Kufri Lauvkar. Here also the reducing sugar content was within the acceptable limit and the chip colour was quite acceptable. Only at later stages of storage i.e. after 133 days the reducing sugar content showed an increase. The dry matter content was quite high and ranged from 23.7 to 25.7.

At Deesa, the variety was Kufri Chandramukhi. The sugar content and chip colour were acceptable in one cold store but in the other, although the reducing sugar content was low, the chip colour was on the higher side after 175 days of storage. The dry matter content was above 20%. At Sainthian, the variety was Kufri Jyoti. The reducing sugar content was within the acceptable limit but the chip colour score was



Fig. 3. Complete sprout suppression with CIPC treatment in tubers stored at 10-12°C.



Fig. 4. Internal sprout growth caused by insufficient CIPC concentration.

on the borderline. The dry matter content ranged from 16.3 to 17.6%.

The above results indicate that potatoes (Var. Kufri Jyoti and Var. Kufri Lauvkar) grown and stored at Indore and Ujjain had acceptable processing quality. Potatoes (Var. Kufri Chandramukhi) grown and stored at Deesa also had acceptable processing quality. Potatoes (Var. Kufri Bahar) grown and stored in different cities/towns of UP had poor processing quality.

Storage at different temperatures

The above-mentioned results show that even when stored at 10-12°C, processing quality can deteriorate after a few months, especially in varieties like Kufri Bahar. Therefore, it is important that information on the storage behaviour of popular potato varieties at different storage temperatures should be collected. With this objective, an experiment was conducted at CPRI and the results are given below.

Weight loss in tubers stored at different temperatures with CIPC treatment

Twelve popular potato varieties were stored in walk-in-chambers maintained at 4,8,12,16 and 20°C. The RH was 90-95% at 4°C and around 85% at 8°C and above. After 180 days of storage (DOS), the mean weight loss was 6.1, 6.4, 9.9, 13.1 and 21.3% at 4, 8, 12, 16 and 20°C, respectively. Even after 180 DOS, weight loss was within the acceptable limit at the storage temperature of 12°C but at 16°C and 20°C, weight loss was very high. Weight loss up to 10% is considered acceptable because no visible shriveling takes place up to this

level. When the weight loss exceeds 10%, shriveling takes place which reduces the table value of potatoes. Further, peeling losses increase with increased weight loss affecting the processing value of potatoes. Among the varieties, maximum weight loss was observed in Kufri Chipsona-2 followed by Kufri Ashoka. At 12°C, Kufri Jyoti, Kufri Chandramukhi, Kufri Sindhuri, Kufri Lauvkar and Kufri Pukhraj showed less than 8% weight loss.

Rottage in tubers stored at different temperatures with CIPC treatment

After 160 days of storage, at 4°C, only two varieties viz. Kufri Chipsona-2 and Kufri Pukhraj showed slight rottage of 0.7%. At 8°C, no rottage was observed in Kufri Anand, Kufri Bahar and Kufri Lauvkar. The remaining nine varieties showed rottage, which was minimum in Kufri Lalima (0.2%) and maximum in Kufri Chipsona-2 (2.2%). At 12°C, again, minimum rottage was observed in Kufri Lalima (0.23%) and maximum rottage was observed in Kufri Chipsona-2 (2.6%). Generally, it was less than 1%. At 16°C, minimum rottage of 1.4% was observed in Kufri Chipsona-1 and a maximum of 11.6% was observed in Kufri Sindhuri. The rottage in Kufri Chipsona-2 was 6.5%. At 20°C, 100% rottage was observed in Kufri Chipsona-2. Next highest rottage of 58.8% was observed in Kufri Sindhuri. Kufri Lauvkar, which did not show any rottage at 4, 8, 12 and 16°C, showed 13.4% rottage at 20°C. Generally rottage was unacceptably high at 20°C.

Since CIPC inhibits cell division, which is necessary for the

formation of wound periderm during wound healing, rottage can be unacceptably high if immature tubers are stored or if sufficient time is not allowed for wound healing before storage. However in this case, the tubers were fully matured and sufficient time was given for wound healing before storage. Therefore, rottage was within the acceptable limit at 8 and 12°C but it was on the higher side in some varieties at 16°C and in all the varieties at 20°C.

Processing quality of potatoes grown at different locations and stored at different temperatures with CIPC treatment

Changes in dry matter, chip colour and reducing sugar were determined in tubers of different varieties grown at different locations and stored for 100 days at Shimla in walk-in-chambers maintained at 4,8,12,16 and 20°C (The RH was 90-95% at 4°C and 85-90% at other four temperatures). The number of varieties included were 9 from Modipuram, 7 from Jalandhar, 3 from Gwalior and 4 from Patna. Tubers stored at 8,12,16 and 20°C were treated with CIPC twice to check sprout growth.

Dry matter: In potatoes grown at Modipuram, the mean dry matter content was 16.7% when stored at 4°C for 100 days and it increased at higher storage temperatures. There was little difference in the dry matter content among tubers stored at 8,12,16 and 20°C. In potatoes grown at Jalandhar, the dry matter content was 18.6% when stored for 100 days at 4°C and it increased to around 20% at higher storage temperatures. Similar trend was observed also in potatoes grown at

Gwalior and Patna and stored at different temperatures. Generally, the dry matter content was higher in potatoes grown at Gwalior and Patna compared to other two locations.

Chip colour: In potatoes grown at Modipuram and stored at 4°C for 100 days, the chip colour score was 9.1 and hence highly unacceptable. The chip colour did not improve at higher storage temperatures but reached acceptable level of 4 or less in only two varieties and that too at 20°C. Out of the seven varieties grown at Jalandhar, no variety produced chips of acceptable colour after 100 days of storage at different temperatures. In potatoes grown at Gwalior, acceptable chip colour could be obtained only in case of Kufri Jyoti stored for 100 days at 20°C and the chip colour was unacceptable in all other cases. Kufri Chipsona-1 and Kufri Jyoti from Patna produced chips of acceptable colour after 100 days of storage at 16 and 20°C and the chip colour was unacceptable in other two varieties.

Reducing sugar: After 100 days of storage, the reducing sugar content of potatoes grown at Modipuram was unacceptably high at 330 mg/100 g f. wt. With the increase in storage temperature, it decreased and at 20°C, it was as low as 81-mg/100g f. wt. Similar trend was observed in potatoes grown at Jalandhar also. In potatoes grown at Gwalior and Patna, the reducing sugar content was less than 100 mg/100g f. wt in most of the varieties tried when stored at 12, 16 and 20°C for 100 days.

It was found that Kufri Jyoti, Kufri Lauvkar, Kufri

Chandramukhi, Kufri Chipsona-1 and Kufri Chipsona-2 could be used for processing up to 120 days of storage at 10-12°C with CIPC as the sugar level was within the acceptable limit. All the other varieties could be used for table purpose only. Though the sugar level in these varieties was higher than the acceptable level for processing, still they were much lower than that in potatoes stored at 2-4°C. Thus, these potatoes were not sweet in taste and therefore, better than the cold stored potatoes for table purpose.

Effect of type of storage bag on CIPC efficacy

Potatoes are stored in cold stores either in *hessian* cloth bags or leno bags. To determine the effect of type of bag in which potatoes are stored on the penetration of CIPC fog into the bag and its subsequent distribution within the bag, potatoes were stored in three types of bags differing in their pore size. The types of bags used were; Normal *hessian* cloth bag with very small pores (pore size: 1mm²), onion bags with pore size of 4mm² and leno bags with pore size of 8 mm². Observations on length of the longest sprout were recorded 45 days after CIPC treatment (at 57 days of storage) in potatoes stored at 12 and 16°C.

When stored at 12°C, sprouts were observed in jute and onion bags but not in leno bags. The length of the longest sprout was 0.3 cm in onion bags and 0.7 cm in jute bags. Leno bags with their larger pore size, allowed greater amount of CIPC fog to enter the bag and even distribution within the bag leading to better suppression of

sprout growth. Onion bags with pores of 4 mm² size allowed lesser amount of CIPC fog to enter the bag and as a result sprout suppression was incomplete with tubers showing sprouts of 0.2 to 0.6 cm length. Whereas, in jute bags, the pore size was too small (1mm²) which hindered the entry of CIPC fog.

This was also reflected in the quantity of CIPC deposited on the tubers. In normal jute bags, the CIPC concentration in the peel of potatoes, 65 days after second treatment, was 0.287 µg/g. Whereas, in potatoes stored in leno bags, the CIPC concentration in the peel of potatoes was 3.68 µg/g. When stored at 16°C, even in leno bags, 0.3 to 1.3cm long sprouts were observed indicating that although the entry of CIPC fog into the bag was better in leno bags, due to volatilization at higher temperature, CIPC was less effective in suppressing sprout growth. Even in onion and normal *hessian* cloth bags, sprouts were longer compared to those at 12°C.

CIPC residue level in potatoes treated with CIPC aerosol (fogging) during storage in commercial cold stores

Residue level of chemicals in treated foods has been a health concern. Therefore, CIPC residue levels were monitored in commercial cold stores (Two at each location) located at Indore and Ujjain in Madhya Pradesh and Meerut in Uttar Pradesh. On comparing the overall residues of CIPC in potatoes from two cold stores at Indore and two cold stores at Ujjain, it was found that the mean

CIPC residues in potato peels ranged from 8.1 to 14.7 $\mu\text{g/g}$ f. wt and in unpeeled whole tubers they ranged from 0.6 to 2.5 $\mu\text{g/g}$ f. wt. The highest concentration of residue observed at any date in peels was 14.7 $\mu\text{g/g}$ f. wt, whereas, the residues in unpeeled whole tubers and peeled tubers were much below this level at all the sampling dates.

The maximum permissible limit for CIPC residues in potato tubers for human consumption is 30 $\mu\text{g/g}$ (or 30 mg/kg) of tubers. In none of the samples, residues were above this permissible limit. Thus, the CIPC treated tubers were found to be safe for human consumption. To be on the safer side, it is recommended that CIPC treated tubers should be consumed only after 3-4 weeks of treatment.

Economics of potato storage at 10-12°C with CIPC treatment

Economics of storing potatoes at 10-12°C with CIPC treatment was worked out by collecting information from eight cold store owners from Indore, Ujjain, Agra, Hathras, Deesa and Sainthian. The normal cold store rent varied from Rs. 0.60-0.65 per kg whereas, for CIPC treated potatoes, the rent charged varied from Rs. 1.0 –1.16 per kg. The most common modifications required for using an existing cold store for storing potatoes at 10-12°C with CIPC treatment are as follows. (i) The existing chamber size is generally too big for CIPC treatment therefore, partitioning is normally required. (ii) Ducts may have to be installed to facilitate flushing out of accumulated carbon dioxide (iii) Humidifiers are needed to maintain

the R.H. around 85%. The additional expenditure incurred by the cold store owners in making these modifications ranged from Rs. 0.01 to 0.11 per kg of potatoes. The cost of CIPC treatment varied from Rs. 0.11 to 0.33 per kg of potatoes. Such large variation in the cost of treatment was observed because some cold store owners used higher dosage of CIPC to account for leakage during treatment. Farmers and traders who stored their potatoes at 10-12°C with CIPC treatment were able to increase their profit by 37 to 58% in some places but in other places they incurred losses because there was a fall in potato prices at the time of selling. As a result, the cost of storage was higher than the increase in sale price of potatoes after storage. Only those, whose potatoes were of acceptable quality to the processors were able to make profit.

CIPC fog treatment during storage in heap

Efforts are being made at CPRI to determine the commercial potential of CIPC for use as sprout inhibitor of potatoes under traditional methods of storage. Preliminary studies conducted on the efficacy of CIPC fog (Oorja) application in four potato varieties viz. Kufri Chandramukhi, Kufri Jyoti, Kufri Lauvkar and Kufri Chipsona-1 twice during storage in heaps @ 35 ml/tonne of potatoes showed promising results. CIPC fog was applied using a fogger and the heaps were kept airtight with a plastic sheet during fogging and for 48 h after the treatment. Final observations on total weight loss, rottage, sprout weight and sprouting index recorded after 100 days of storage revealed

that even single application of CIPC fog significantly reduced sprouting index and sprout weight in tubers. Double application, in addition reduced the weight loss in tubers also. It reduced weight loss by 31-49%, sprouting index by 35-72% and sprout growth in tubers by 92-98% in different cultivars as compared to control. Rottage was however, increased in single treatment. Kufri Chandramukhi and Kufri Chipsona-1 showed the best results with minimum total losses and rottage in tubers even in CIPC-I treatment.

Consumers' response towards CIPC treated potatoes

The success of any technology depends on its acceptance by the end users and therefore to know the acceptance of CIPC treated potatoes by consumers for table purpose, a study was conducted at (i) Meerut city in Uttar Pradesh, (ii) Indore & Ujjain towns in Madhya Pradesh and (iii) Deesa town in Gujarat and at Sainthian town in West Bengal. In each city, three locations were selected randomly and from each locality, households were selected at random in such a way that it incorporates all the social groups and economic class. A total of 329 households were selected for this study.

CIPC treated potatoes were perceived as less sweet in taste than the cold stored potatoes in every case. Cold stored potatoes were perceived to be better in appearance in majority of households; 90% in Deesa, 52% in Indore & Ujjain, 55% in Sainthian, 40% in Meerut and 56% on overall basis. About 37% of the households found CIPC treated potatoes better in appearance and

6% did not find any difference in appearance of the two kinds of potatoes. About 37% of consumers on overall basis found cold stored potatoes easy in peeling whereas, 31% were of the opinion that CIPC treated potatoes peel easily. The rest 31% either did not observe or could not find any difference in peeling of both kinds of potatoes. On overall basis about 44% households preferred the texture of CIPC treated potatoes whereas, 34% preferred texture of cold stored potatoes, the rest could not make out a difference. On overall basis, about 62% of sample households preferred taste of CIPC treated potatoes while 38% preferred cold stored potatoes. This indicates that the potatoes, which were perceived as better in taste, were also perceived as better in texture. CIPC treated potatoes appeared to be preferred by majority of the households in Meerut (94%), Indore & Ujjain (65%), and Sainthian (65%) whereas, cold stored potatoes were preferred by most of the sample households in Deesa (96%) and substantial proportion of sample households in Sainthian (34%) and Indore & Ujjain (35%) according to the preference of taste.

The differences in preference on regional basis may be due to the fact that Gujarati's like sweet taste and they even put *Gur/Jaggery/sugar* in most of the vegetable and curry preparations. Due to this reason they preferred cold stored potatoes over CIPC treated potatoes. Similar was the case among sampled households in MP and West Bengal, where some households preferred sweetness in potatoes. This indicates that the regional pattern of preference of CIPC treated potatoes

against cold stored potatoes is similar to that of seasonal pattern of potato consumption. The CIPC treated potatoes were preferred in the areas where potato consumption declines during summer and rainy season, whereas, cold stored potatoes were preferred in the areas where potato consumption declines during winter season.

Adoption of the technology

It is now very common to see packets of CIPC treated potatoes at vegetable shops and even with *thella wala* (hand cart) in Meerut region. People are buying it although it is being sold at higher price in comparison to cold stored potatoes. This technology has become very popular and at present it is benefiting both the farmer as well as the cold store owner. The consumer is benefited by the availability of good quality potatoes (unlike cold stored potatoes) in the market during the summer and rainy seasons at a lesser price than the *pahari-potatoes*.

Can CIPC treated potatoes be called "diet potatoes"?

There is a wrong notion prevailing in some places that potatoes stored at 10-12°C with CIPC treatment contain low level of reducing sugars therefore, they are better for diabetic patients. For this reason, some people even call these potatoes "diet potatoes" (Fig. 5).

It is wrong to call these potatoes "diet potatoes" and to claim that these potatoes are better than other potatoes for diabetic patients. The reducing sugar content in potatoes stored at 10-12°C can vary from less than 100 to 300 mg/100g f. wt,



Fig. 5. It is wrong to call CIPC treated potatoes stored at 10-12°C as diet potatoes.

whereas the reducing sugar content in cold stored (2-4°C) potatoes can vary from less than 1000 to 3000 mg/100g f. wt. Because of the difference in storage temperatures, the sugar content is lower and starch content is higher in potatoes stored at 10-12°C. For the diet of diabetic patients, not only the free sugar level but also the total carbohydrate content of the food is to be considered. Therefore, if we consider the total carbohydrate content, there is little difference between cold stored potatoes stored at 2-4°C and those stored at 10-12°C with CIPC treatment. Further, the reducing sugar content in potatoes stored at 10-12°C is comparable to freshly harvested potatoes. Therefore, they are as good as freshly harvested potatoes in taste. Nutrition wise - barring the small loss in free sugars which are used up in respiration during storage-there is not much difference in the carbohydrate level of fresh potatoes, potatoes stored at 10-12°C with CIPC treatment and cold stored (2-4°C) potatoes. However, after eating potatoes that are high in starch and low in sugar, it takes a longer time for the blood glucose to increase. The current belief is that more complex carbohydrates that require more energy and time to digest are better than simple sugars.

Diabetic patients can consume both fresh and stored potatoes provided the total carbohydrate intake does not exceed the level recommended by the physician. Several studies carried out in Europe have clearly shown that potatoes do not cause or worsen diabetes.

Conclusions

Storage of potatoes at 10-12°C with CIPC treatment is becoming popular in India. However, the storage technique being practised at present is not satisfactory. Only potatoes of varieties Kufri Jyoti and Kufri Lauvkar grown at Indore and Ujjain and to some extent Kufri Chandramukhi grown at Deesa seem to store well at 10-12°C with acceptable processing quality.

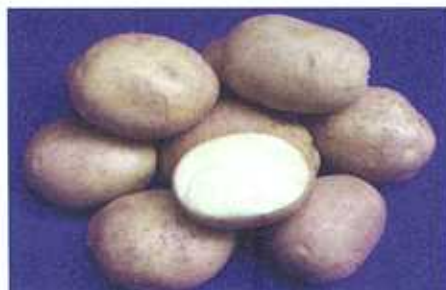
Potatoes grown and stored at other parts of the country were suitable only for table purpose and not for processing. Choice of variety is very important. For example, Kufri Bahar stored at 10-12°C is not at all suitable for processing due to higher sugar content. Greater awareness about suitability of a potato variety for storage at 10-12°C, maximum duration of storage for a given variety at this temperature without affecting the processing quality, right time of application of CIPC, maintaining high RH, proper ventilation to flush out accumulated CO₂ etc. will help in getting the maximum benefit. Farmers, traders and cold store owners can gain from this storage technology only if the processing quality of potatoes

stored is acceptable to potato processors in the country. Selling these potatoes in the market for table purpose gives only a marginal profit. Consumers prefer CIPC treated potatoes stored at 10-12°C to cold stored potatoes and are even willing to pay more for them. Processing quality of potatoes can be maintained better by storing at 16 and 20°C but excessive weight loss and higher rottage do not permit storage at these temperatures for more than 2 to 3 months. CIPC can be useful in checking sprout growth even under non-refrigerated storage conditions like heap.

-R. Ezekiel, A. Mehta, Brajesh Singh, Dinesh Kumar, N. R. Kumar

एम.पी./17-583 (कुफरी चिप्सोना-3): विधायन उद्योग के लिए उत्कृष्ट चिपिंग गुणवत्ता युक्त संकर

महाराणा प्रताप कृषि एवं प्रौद्योगिकी विश्वविद्यालय, उदयपुर में 8-10 सितम्बर, 2005 के दौरान आयोजित अखिल भारतीय समन्वित अनुसंधान परियोजना-आलू की 25 वीं ग्रुप बैठक में केन्द्रीय आलू अनुसंधान संस्थान द्वारा विकसित आलू के नए संकर एम.पी./97-583 को जारी करने की सिफारिश की गई। चिपिंग उद्देश्य के लिए तैयार इस संकर को कुफरी चिप्सोना-3 नाम दिया गया है। यह संकर वर्ष 1998 में जारी विधायनित किस्म कुफरी चिप्सोना-1 व कुफरी चिप्सोना-2 का एक सुधरा रूप है। देश में विधायन उद्योग की शुरुआत व विकास की दिशा में आलू की कुफरी चिप्सोना-1 व कुफरी चिप्सोना-2 किस्में एक आरम्भिक कदम थीं। तब देश में गुणवत्तायुक्त कच्चा माल एक मात्र आवश्यकता समझी जाती थी। इसके बाद से इसकी उपयोगिता को देखते हुए इस उद्योग में बड़ी तेजी से विकास हुआ। फिर भी, इन दोनों ही



किस्मों में कुछ बाह्य व आन्तरिक कमियाँ रही। विशेषकर कुफरी चिप्सोना-1 का आकार व गाँठ का बनना व कुफरी चिप्सोना में पोलापन (hollow heart) का होना। जिसके परिणामस्वरूप कभी-कभी विधायन उद्योग के साथ-साथ किसानों को आर्थिक नुकसान उठाना पड़ता था। दुलाई व भण्डारण परिस्थितियों का रख-रखाव सावधानी से न करने पर कुफरी चिप्सोना-2 किस्म की भण्डारण गुणवत्ता भी प्रभावित होती है। इन कमियों पर तुरन्त विजय पाकर भारत में आलू की विधायनित इकाइयों को बढ़ावा देने की तत्काल आवश्यकता है।

संकर एम.पी./97-583 का विकास संकर एम.पी. 91/-86xकुफरी चिप्सोना-2 प्रजातियों

की क्रॉसिंग द्वारा किया गया है। इसके अण्डाकार कन्द चिप्स बनाने के सभी गुण-युक्त होने के साथ-साथ सभी बाह्य व आन्तरिक दोषों से मुक्त हैं। कुफरी चिप्सोना-1 व कुफरी चिप्सोना-2 की तुलना में इस संकर से कुल व विधायनित आकार के कन्दों की उपज भी अधिक प्राप्त होती है। इसके कन्दों में शुष्क अव्यव भी 22 प्रतिशत या अधिक है, जिसके फलस्वरूप इससे कम तेल में कुरकुरे चिप्स बनते हैं। इससे बने चिप्स बाह्य व आन्तरिक दोषों से मुक्त होने के साथ-साथ सुनहरे होते हैं। मध्यस्त तापमान पर भण्डारण के दौरान भी इसके कन्द ताज़गी लिए होते हैं। छः महीने बाद तक रखने पर भी इसकी चिप्स गुणवत्ता बनी रहती है।

पश्चिम-मध्य मैदानों में भोज्य आलू की प्रचलित किस्म कुफरी बहार की अपेक्षा भी इसकी कुल उपज अधिक है। इस संकर में पिछेता झुलसा की प्रतिरोधक क्षमता काफी उच्च है, अतः कुफरी बहार की तुलना में यह खाने के लिए भी उपयुक्त है। कुफरी चिप्सोना-1 व 2 तथा कुफरी बहार की अपेक्षा इस संकर में शुष्क अव्यव अधिक होने के कारण शुष्क उत्पाद बनाने के

लिए भी यह उपयुक्त है। किसी भी विधायनित किस्म व कुफरी बहार की तुलना में इस संकर में प्रोटीन, पोटाशियम व कैल्शियम अवयव अधिक हैं। अतः आलू का यह संकर न केवल विधायन उद्योग बल्कि खाने के लिए भी पौष्टिक गुणों से परिपूर्ण है।

अधिक उपज व पिछेता झुलसा के प्रति उच्च प्रतिरोधक क्षमता के फलस्वरूप यह संकर पश्चिम-मध्य मैदानों के लिए प्रचलित आलू की कुफरी बहार किस्म का अच्छा विकल्प है। अधिक शुष्क अवयवों के फलस्वरूप किसानों के लिए यह विकल्प होगा कि वह इसकी मांग व अपने फायदे को देखते हुए अपने उत्पादन को विपिन उद्योग, फलेक उद्योग या खाने के लिए बाजार में बेच सकते हैं। आशा है कि यह संकर विधायन इकाईयों, उपभोक्ताओं के साथ-साथ किसानों के लिए भी वरदान साबित होगी।

संकर एसएम/91-1515 : पहाड़ी इलाकों के लिए आलू की नई संभावना

पिछले पन्द्रह वर्षों से फाइटोफथोरा इनफेस्टांस की जटिल प्रजातियों के विकास के परिणामस्वरूप विशेषकर देश के पहाड़ी इलाकों में आलू की फसल पर पिछेता झुलसा रोग के बार-बार आने की गति व तीव्रता में बढ़ोत्तरी हुई है। इन प्रजातियों में मेटालेक्सिल के प्रति सहनशीलता बढ़ती जा रही है। पिछले कई वर्षों से नवीन व जटिल ताइगता के परिणामस्वरूप कुफरी ज्योती तथा कुफरी गिरिराज किस्मों में भी पिछेता झुलसा की प्रतिरोधिता नष्ट हो चुकी है। यद्यपि पहाड़ी इलाकों के लिए कुफरी शैलजा किस्म विकसित कर जारी की गई है, किन्तु रोगकारकों के प्रभाव से यह किस्म लम्बी अवधि तक नहीं टिक सकी। इस समस्या पर निजात पाने के लिए पिछेता झुलसा प्रतिरोधी कई किस्मों विकसित करने की आवश्यकता हुई। इस प्रयास में केन्द्रीय आलू अनुसंधान संस्थान द्वारा आलू का एक नया संकर एसएम/91-1515 विकसित किया गया है। महाराणा प्रताप कृषि एवं प्रौद्योगिकी विश्वविद्यालय, उदयपुर में 8-10 सितम्बर, 2005 के दौरान आयोजित अखिल भारतीय समन्वित अनुसंधान



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परियोजना-आलू की पोटेटो वरकर्स की की गुप मीटिंग में वाणिज्यक खेती करने के उद्देश्य से इस संकर को जारी करने की सिफारिश की गई है।

इस संकर से उथली आंखों वाले मध्यम आकार के अण्डाकार से लम्बे आकषित कन्द पैदा होते हैं। इसके गूदे का रंग हल्का पीला होने के कारण कैरोटीन से भरपूर होता है। 110 से 120 दिनों की मध्यम परिपक्वता अवधि वाली यह संकर उपोष्ण इलाकों के लिए भी उपयुक्त है। मैदानी इलाकों में इसकी पैदावार कुफरी ज्योती व कुफरी गिरिराज से भी 10 प्रतिशत अधिक है। इसकी भण्डारण क्षमता पहाड़ी इलाकों के लिए विकसित समस्त किस्मों से बेहतर है। कमरे के सामान्य तापमान पर इस संकर की कुल हास दर 12.8 प्रतिशत रही जबकि कुफरी गिरिराज का 20.0 प्रतिशत तथा कुफरी शैलजा की हास दर 16.7 प्रतिशत है। इसके अतिरिक्त इस संकर का प्राकृतिक प्रोटीनिकता (epiphytotics) तथा प्रयोगशाला की अवस्थाओं में पिछेता झुलसा प्रतिरोधकता का काफी उचित स्तर (5.17) रहा, जबकि कुफरी ज्योती में यह (2.0), कुफरी शैलजा में (4.48) तथा कुफरी गिरिराज में यह स्तर (4.65) होता है। इसके कन्दों में शुष्क अवयव (18.61 प्रतिशत) अन्य कई किस्मों से बेहतर रहे।

पहाड़ी इलाकों में वाणिज्यक पैमाने पर इस संकर के जारी होने से पिछेता झुलसा से प्रभावित इस क्षेत्र को एक वैकल्पिक किस्म मिलेगी। इस संकर में पिछेता झुलसा प्रतिरोधकता अधिक होने के फलस्वरूप न केवल फसल नष्ट होने का जोखिम कम होगा बल्कि महंगे फफूंदनाशकों के छिड़काव पर होने वाली लागत में भी कमी आएगी।

हिन्दी कार्यशाला एवं प्रशिक्षण पाठ्यक्रम

संस्थान के मुख्यालय में हिन्दी दिवस के उपलक्ष्य में 14 सितम्बर, 2005 से चार दिवसीय हिन्दी कार्यशाला एवं प्रशिक्षण पाठ्यक्रम का आयोजन किया गया। कार्यशाला का उद्घाटन हिमाचल प्रदेश प्रशासनिक सेवा के सर्वशिक्षा अभियान के निदेशक डा. देवेन्द्र कुमार गुप्ता ने किया। इस मौके पर उन्होंने राजभाषा हिन्दी पर एक पेपर भी पढ़ा। उनका कहना था कि आजादी के समय से हमारे देश में विशेषकर तमिलनाडू में हिन्दी को लेकर ही राजनीति होती रही है और आज भी हिन्दी उससे मुक्त नहीं हो पाई है। उनका मानना था कि हिन्दी में अच्छा साहित्य होने के बावजूद वह आम लोगों तक नहीं पहुंच पाया है। हमारी मानसिकता कुछ इस प्रकार की है कि हम हिन्दी पढ़ने, बोलने व लिखने वाले व्यक्ति को अंग्रेजी बोलने वाले की तुलना में कम पढ़ा लिखा समझते हैं। सरकारी कार्यालयों में राजभाषा हिन्दी का प्रयोग एक औपचारिकता बनकर रह गई है। निश्चित तौर पर हमें अपनी मानसिकता में बदलाव लाने की आवश्यकता है। उन्होंने संस्थान के क्रिया-कलापों की सराहना करते हुए कहा कि यह संस्थान न केवल आलू शोध में अग्रणी रहा है बल्कि इस प्रकार के आयोजनों से यह पता चलता है कि यह संस्थान राजभाषा की प्रगति व प्रसार के लिए भी सराहनीय कार्य कर रहा है।

कार्यक्रम की अध्यक्षता करते हुए संस्थान के निदेशक डा. सुमन कुमार पाण्डेय ने कर्मचारियों को बताया कि हमारे संस्थान में हिन्दी पत्राचार निरन्तर बढ़ रहा है और हमारा प्रयास रहना चाहिए कि आने वाले समय में हम राजभाषा के निर्धारित लक्ष्य को पूरा करें।

इस कार्यशाला में संस्थान के मुख्यालय व मोदीपुरम, ग्वालियर, जालन्धर, पटना व कुफरी स्थित केन्द्रों के 25 प्रशासनिक कर्मचारियों ने भाग लिया। इस कार्यशाला में प्रतिभागियों को भारत सरकार की राजभाषा नीति एवं उसके प्रावधानों से संबंधित जानकारी दी गई। चार दिवसीय कार्यशाला में कर्मचारियों को नोटिंग-झापिंग का अभ्यास करवाने के साथ-साथ

उन्हें सामान्य प्रशासन, लेखा परीक्षा एवं लेखा, स्टोर, निर्माण एवं सम्पदा से जुड़े विभिन्न विषयों की जानकारी दी गई। इसके साथ उन्हें कम्प्यूटर पर हिन्दी टाइपिंग, प्रशासनिक कार्यों में अनुवाद की समस्याएं एवं समाधान जैसे विषयों से भी अवगत करवाया गया।

हिन्दी चेतना मास आयोजित

13 अक्टूबर, 2005 को संस्थान द्वारा आयोजित हिन्दी चेतना मास पारितोषिक वितरण एवं राजभाषा सम्मेलन के साथ सम्पन्न हुआ। इस अवसर पर जाने माने साहित्य एवं कहानीकार प्रो. दूधनाथ सिंह बतौर मुख्य अतिथि आमंत्रित थे। प्रो. दूधनाथ सिंह ने अपने संबोधन में कहा कि हिन्दुस्तान में केवल दो प्रतिशत लोगों द्वारा बोली जाने वाली भाषा अंग्रेजी को हमें अपनी भाषा नहीं कहना चाहिए। उन्होंने जर्मनी, फ्रांस, रूस, चीन आदि के राजनेताओं व बुद्धिजीवियों का जिक्र करते हुए कहा कि आपने इन देशों के लोगों को अंग्रेजी में बात करते या भाषण देते कभी नहीं सुना होगा। इन देशों के लोग हमेशा अपनी भाषा में ही बोलते हैं। उन्होंने कहा कि हम भारतीयों में अंग्रेजियत का हैंगओवर है जो उतरते-उतरते ही उतरेगा। हमारी मनोवृत्ति ही ऐसी है कि हम अंग्रेजी बोलने वालों को पढ़ा-लिखा समझते हैं। उन्होंने कहा कि बच्चों को अंग्रेजी स्कूलों में पढ़ाना सभ्यता की निशानी नहीं है। उन्हें अपनी भाषा और सभ्यता व संस्कृति का ज्ञान देना चाहिए। उनका मानना था कि कृषि के क्षेत्र में हो रहे शोध कार्यों का सीधा संबंध किसानों से है और हमारे अधिकांश किसान हिन्दी ही जानते हैं। अतः अपने शोध और जानकारी को

किसानों तक पहुंचाने के लिए मातृभाषा से बेहतर कोई दूसरा विकल्प नहीं है। इसके लिए हमें भारतीय भाषाओं में ही पत्रिकाएं प्रकाशित करनी चाहिए ताकि देश के अधिकांश लोगों द्वारा बोली जाने वाली भाषा में कृषि शोध का प्रसार और प्रचार हो सके। उन्होंने कहा कि संस्कृत सभी भारतीय भाषाओं की जननी है, अतः हमें अंग्रेजी के बजाए संस्कृत के शब्दों का प्रयोग करना चाहिए। उन्होंने एक पुरानी कहावत 'पढ़े फारसी बेचे तेल' का उदाहरण देते हुए कहा कि अंग्रेजी पढ़ने और बोलने मात्र से ही व्यक्ति ज्ञानी नहीं होता। उसके लिए हिन्दी और अन्य भाषाओं के ज्ञान के साथ भारतीय सभ्यता और संस्कृति की जानकारी होना भी आवश्यक है। इस अवसर पर हिन्दी प्रतियोगिता में प्रथम, द्वितीय व तृतीय स्थान पाने वाले विजेताओं को प्रो. दूधनाथ सिंह ने पुरस्कार दिए। अन्त में संस्थान के निदेशक डा. सुमन कुमार पाण्डेय ने मुख्य अतिथि का अगार व्यक्त करते हुए उन्हें स्मृति चिन्ह देकर सम्मानित किया।

नराकास, शिमला की प्रतियोगिता में पुरस्कार

संस्थान के मुख्यालय के डा. अनिल कुमार एवं श्री चन्द्र मोहन सिंह बिष्ट ने नगर राजभाषा कार्यान्वयन समिति, शिमला द्वारा आयोजित प्रश्नमंच प्रतियोगिता में प्रथम पुरस्कार प्राप्त किया। इस अवसर पर संस्थान के सहायक निदेशक (राजभाषा) श्री प्रवीण चांदला को नराकास की उत्कृष्ट सेवाओं के लिए सम्मानित किया गया। स्थानीय कालीबाड़ी हाल में आयोजित नराकास के वार्षिक समारोह में इन्हें भारतीय

उच्च अध्ययन संस्थान की निदेशक सुश्री भुवन चंदेल ने पुरस्कृत किया।

हिन्दी में कम्प्यूटर प्रशिक्षण

राजभाषा विभाग, गृह मंत्रालय के तत्वावधान में संस्थान के मुख्यालय में 14-19 नवम्बर, 2005 के दौरान हिन्दी में कम्प्यूटर प्रशिक्षण कार्यक्रम का आयोजन किया गया। इस प्रशिक्षण कार्यक्रम में संस्थान के 20 कर्मचारियों ने भाग लिया। पांच कार्य दिवस में चलने वाले इस कार्यक्रम में प्रशिक्षणार्थियों को हिन्दी में कम्प्यूटर का आधारभूत ज्ञान विषय से संबंधित जानकारी देने के साथ-साथ कम्प्यूटर पर कार्य करने का अभ्यास करवाया गया। यह प्रशिक्षण राष्ट्रीय विद्युत प्रशिक्षण प्रतिष्ठान, फरीदाबाद के प्रशिक्षक श्री दीपक स्वामी व श्री अकुल रस्तोगी द्वारा दिया गया। कार्यक्रम का समन्वय कार्य संस्थान के सहायक निदेशक (राजभाषा) श्री प्रवीण चांदला ने किया।

कर्मचारियों ने ली शपथ

संस्थान के मुख्यालय में कार्यरत अधिकारियों व कर्मचारियों ने संस्थान के निदेशक डा. सुमन कुमार पाण्डेय की उपस्थिति में आतंकवाद विरोध दिवस, सदभावना दिवस व कौमी एकता दिवस आदि अवसरों पर राष्ट्रीय एकता व आतंकवाद का कड़ाई से मुकाबला करने की शपथ ली। संस्थान व उसके क्षेत्रीय केन्द्रों में सतर्कता जागरूकता अभियान चलाकर न केवल भ्रष्टाचार उन्मूलन व ईमानदारी और पारदर्शिता की शपथ ली गई बल्कि झण्डा दिवस के अवसर पर आतंकवादी हमलों में उजड़े परिवारों व अनाथ बच्चों की सहायता के लिए धनराशि भी एकत्रित की गई।

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<i>Editorial Committee</i>	: Brajesh Singh, Anil Kumar, Avnish Atrey
<i>Published by</i>	: Dr. S.K. Pandey, Director, Central Potato Research Institute Shimla-171 001, Himachal Pradesh, India Phone: 0177-2625073, Fax: 0177-2624460 E-mail: director@cpri.ernet.in direpri@sancharnet.in Website: http://cpri.ernet.in

आलू खाओ अन्न बचाओ,
भूख मिटाओ खुशियाँ लाओ।