

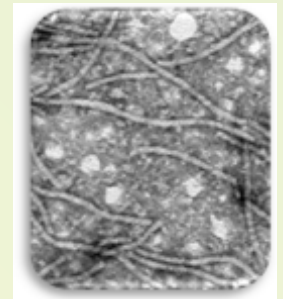
Research highlights

Detection of *Potato virus A* by leaf dip method using EM

Potato virus A (PVA) belongs to Potyviridae the largest virus family confined to the members of the Solanaceae and its widespread infection can cause up to 40% yield loss. These are long flexuous rods of the size 730 X 11nm and cause mild mosaic symptoms in most of the potato cultivars and in combination with PVX cause "potato crinkle". The concentration of the virus is very low in infected plant tissues and they are weakly immunogenic making very difficult to detect by serological based technique like ELISA. Transmission Electron Microscope (TEM) is one of the most powerful scientific tools for carrying out detail structural studies of biological materials and was used for detection of PVA through leaf dip method. Leaf dip method is mainly used for the detection of viruses particularly for those viruses that remain in very high concentration in leaf tissues. About 2-3 mm diameter of suspected/infected leaf was grinded in a phosphate buffer, 0.2 M, pH 8.0 and passed through a muslin cloth to reject the coarse plant debris. Filtrate was collected and about 10 μ l (one drop) of same was placed on parafilm or waxed slide in a wet Petriplate, onto which a carbon coated copper grid (film side downward), was placed on the surface of the droplet. Then it was incubated for 2-5 minutes at room temperature and the grid was picked with a fine forcep and washed with double distilled water. Finally the grid was stained with 2% aqueous uranyl acetate (UA) and the excess stain was immediately drained off by using Whatman filter paper. This Transmission Electron Microscope has been newly installed in the Division of Plant Protection. The virion morphology was viewed in the viewing chamber of the TEM as well as on the screen of the monitor (supported by a bottom mounted 2k X 2k CCD camera) and images were acquired after fine tuning. This Electron Microscopic examination of negatively stained grids revealed the presence of long and flexuous particle revealing the presence of *Potato virus A* (Potyvirus) in a given leaf sample. Therefore, this simple protocol of processing the sample as mentioned above can be used further for processing the leaf samples for electron microscopic examination.



Transmission Electron microscope of 120kV.



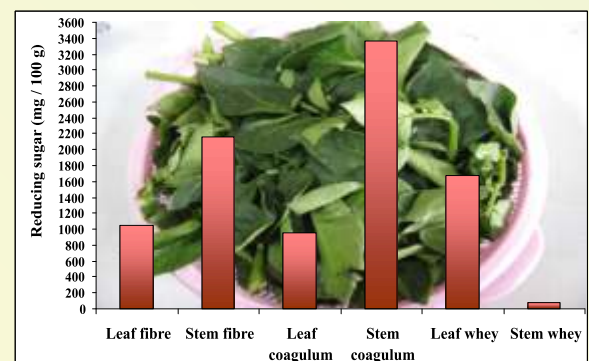
Elongated and flexuous particles of *Potato virus A*.

Baswaraj Raigond, B P Singh, Jeevalatha A, Tarvinder Kochhar and Rajinder Kumar

Potato Haulms- their nutritive values and possible utilities

Potato tubers are important staple food for humanity across the Globe. It is the fourth most important crop and has high nutritional value, therefore, has been declared food for future by the FAO especially in the developing countries. India produced about 42.3 million tonne of potato from 1.83 million hectare of land in 2010-11. However, the crop also produces enormous mass of leaves which are wasted every year in India. Taking a moderate harvest index (81.34 %) of about 4.04 million tonne of haulms are wasted in the country. There is a need to investigate the feeding value of byproducts of potato haulms. Therefore, a study on fractionation of potato haulms was initiated to find out the nutritive value of its byproducts so that it can be utilized and farmers are also benefited monetarily.

Fresh leaves and stems (1000g) of Cv. Kufri Pukhraj were collected from haulms and were processed for separating into different parts and the fibre, coagulum and whey from stem and leaf were analysed for reducing sugars, sucrose and phenols.



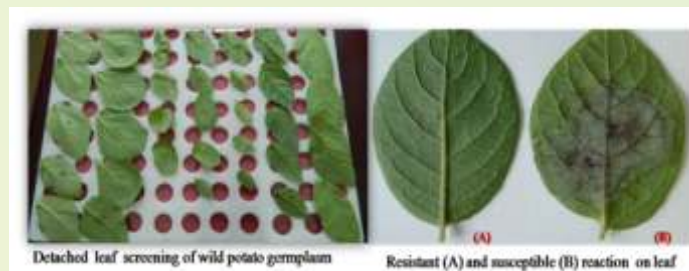
Reducing sugar (mg/100g FW) in fractionated parts of leaf and stem

The results indicated that stem fibre (2158.17 mg/100g Fresh weight) contained more reducing sugar in comparison to leaf fibre (1045.19 mg/100g FW); likewise stem coagulum (3363.66 mg/100g FW) had more content of reducing sugars in comparison to coagulum obtained from crushing the leaves (950.84 mg/100g FW). The sucrose content was invariably found more in stem fibre (111.92 mg/100g FW), coagulum (123.32 mg/100g FW), and whey (14.49 mg/100g FW), as compared to leaf fibre (73.58 mg/100g FW), coagulum (118.14 mg/100g FW) and whey (9.59 mg/100g FW). The chemical composition of all the fractions obtained in the above study indicated that potato haulms can be exploited to get fibre, glucose content etc. to develop value added products as poultry and fish feed. Whey content could be utilized for the production of yeast or micro-organism or as a medium for tissue culture, mushroom and soil improvement.

**Bandana, Vineet Sharma, BP Singh,
R Ezekiel and SK Kaushik**

Wild potato species as source of late blight resistance

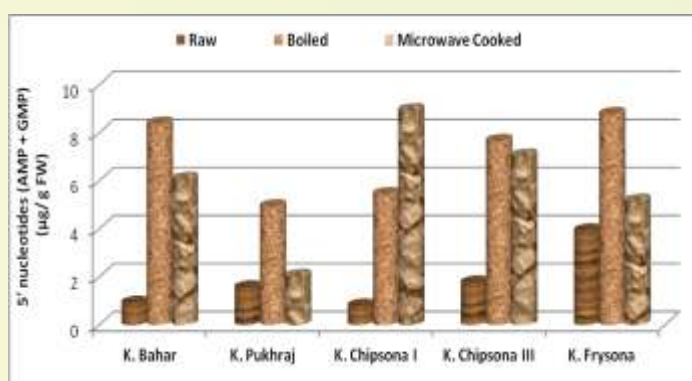
Late blight caused by *Phytophthora infestans* is the most destructive disease affecting potato crop worldwide. The disease appears in most of the potato growing regions in India causing losses up to 90% depending upon the variety and control measures adopted. In view of growing health and environmental concerns breeding and development of resistant/ tolerant varieties offer safe and economical mean for controlling the disease. Wild potato species possess resistance against many pests and diseases including late blight. They confer broad spectrum resistance as well as broaden the genetic base of the future varieties. However, transfer of resistance from wild sources to cultivated germplasm following conventional approaches is difficult due to accompanying undesirable traits. With recent advances in the gene transfer technology, it has become possible to efficiently transfer only the gene of interest either through cisgenesis or transgenesis. Keeping this in view, a total of 539 clones of 91 wild potato accessions belonging to 18 wild species were evaluated following laboratory screening through detached leaf methodology and field screening under natural epiphytotic condition in triplicate for two years. The analysis of variance depicted significant variances among clones, accessions and species for late blight resistance. The clones SS 1764-19 (*S. alandiae*), SS 1763-09 and SS 1763-25 (*S. albicans*), SS 1769-04, SS 1769-08 and SS 1770-14 (*S. arnezii*), SS 1784-07 (*S. berthaultii*), SS 1794-07 (*S. brevicaulis*), SS 0551-02, SS 0680-06, SS 1671-01 and SS 1671-03 (*S. chacoense*), SS 1835, SS 1846-05, SS 1847-09, SS 1850-0, SS 1850-01 and SS 1850-04 (*S. demissum*), SS 1926-09, SS 1926-10, SS 1926-11 and SS 1926-13 (*S. microdontum*), SS 2615-01, SS 2616-01, SS 2616-02, SS 2655-01, SS 2656-02, SS 2658-01, SS 2658-02 and SS 2658-03 (*S. pinnatisectum*), SS 1664-02 and SS 1724-40 (*S. sparsipilum*), SS 2038-04 and SS 2048-0 (*S. tuberosum* ssp. *andigena*) and SS 2082-0 (*S. vernei*) were found to be most promising having high late blight resistance under laboratory and field testing. These accessions can be used to breed late blight resistant tetraploid varieties broadening the genetic base of the cultivated potato.



**Dalamu, Vinay Bhardwaj, Sanjeev Sharma,
Vinod Kumar, A.K. Srivastava and B.P. Singh**

Method developed for (flavouring compounds) 5' nucleotides in potatoes

Potato flavour depends on the level of umami compounds as well as volatiles. The significant umami compounds present in potatoes are amino acids viz. Glutamate, Aspartate and 5' nucleotides viz. Adenosine Monophosphate (AMP) and Guanosine Monophosphate (GMP). The umami compounds generally enhance the flavour and mouthfeel and give the impression of viscosity to the food. Till date no flavouring compounds have been determined from Indian potatoes, therefore, to estimate two of the important umami compounds i.e AMP and GMP (5' nucleotides) in Indian potato cultivars. A method was standardized through High Performance Liquid Chromatograph System (HPLC) using a C-18 column and the mobile phase of acetonitrile and potassium phosphate buffer in 20:80 ratio. The analysis was performed with freshly harvested tubers of Kufri Chipsona I, Kufri Chipsona III, Kufri Bahar, Kufri Pukhraj and Kufri Frysona. Raw potatoes contained only small amounts of 5' nucleotides, ranging from 0.79 µg/g FW (Kufri Chipsona I) to 3.92 µg/g FW (Kufri Frysona), but boiling as well as microwave cooking increased the flavour (5' nucleotides) in all the tested cultivars. After boiling, the 5' nucleotides were found to be the maximum in Kufri Frysona (8.37 µg/g FW) followed by Kufri Bahar (8.00 µg/g FW) and were minimum in Kufri Pukhraj (4.93 µg/g FW). Microwave cooking increased the 5' nucleotides to the maximum level in Kufri Chipsona I (8.93 µg/g FW) followed by Kufri Chipsona III (7.04 µg/g FW), whereas they were the minimum in Kufri Pukhraj (2.03 µg/g FW).



5' nucleotides concentration in different varieties

**Pinky Raigond, Brajesh Singh,
R. Ezekiel & B. P. Singh**

Training & Technology Transfer

Farmers Training at Shimla

A training programme was organized at CPRI Shimla on "Modern Techniques for Quality Seed and Table Potato Production" during 22-24 Jan, 2013.



Farmers Training at Shimla

Progressive farmers from Mathura district of UP were trained on different aspects like recommended varieties, planting operations, disease and pest management, integrated nutrient management, processing and storage of potato by expert scientists of CPRI. Another training was organized by CPRI on similar aspect in which 28 farmers from Rampur were trained in improved methods of potato cultivation. This training was sponsored by an NGO named PLAN.

Awareness camp at Rampur, Shimla (HP)

CPRI organized one day awareness camp cum training programme on "Scientific methods of potato cultivation" on March 26, 2013. Nearly 200 potato growers of Rampur and nearby area participated in this programme. Experts from CPRI delivered lectures on various topics such as seed potato cultivation, nutrient management, plant protection and post harvest management of potato crop. Technical and extension bulletins related to potato cultivation were also supplied to farmers in this camp.

Kisan mela organized under TSP

Three large scale Kisan Mela cum workshop on potato cultivation were organized in tribal districts of Surguja (Chattisgarh), Mayurbhanj (Orissa) and Mandla (MP) during 13-14 Feb., 2013, 21-22 Feb., 2013 and 18-19 March, 2013, respectively under Tribal Sub Plan budget of the institute.



Kisan mela at Mayurbhanj (Orissa)

More than 6000 tribal farmers and other stakeholders attended these Mela. Experts from CPRI delivered lectures on various aspects of scientific method of potato cultivation during this programme. An exhibition of agricultural technologies was also put up by private companies and public sector organization. During discussion with local organization, lack of quality potato seed was found to be major problem in these areas. CPRI extended its support to help these farmers by providing breeder seeds to KVK/other organizations so that it can be multiplied and provided to farmers.

Farmers training under Mini Mission-I

The Institute organized five on-farm trainings for potato growers under the project "Training entrepreneurial skills to farmers in potato based farming system of Himachal Pradesh" in Mini Mission-I from January to March, 2013. Altogether 207 potato growers from Mandi, Kangra, Una and Sirmour districts were trained in improved techniques of cultivation of potato and other vegetables in HP. These trainings were conducted in collaboration with KVKs and NGOs of concerned districts.

Training-cum-Awareness Camp on Protection of Plant Varieties and Farmers Rights Act

CPRI organized one day training-cum-awareness camp on "पौधा किस्म और कृषक अधिकार संरक्षण: प्रशिक्षण एवं जागरूकता" for 133 farmers including students and members of self help groups at Karsog, District Mandi, HP on 28th February, 2013 under the project "Central Sector Scheme for Protection of Plant Variety and Farmers' Right Legislation". The purpose of the training was to create awareness and better understanding among people regarding the act.

Training cum workshop at Patna

A one day training cum workshop on "Potato Seed Production through Modern Techniques" was organized at Central Potato Research Station, Patna on 20th January, 2013.

The lectures were delivered on various topics related potato production technologies, good seed production techniques and TPS cultivation. Seed treatment, technologies were demonstrated before the trainees. Farm and field visit with introduction to implements commonly used in potato cultivation were also done during the programme.



Training-cum-workshop at Patna

Important Meetings & Visitors

Dr. Charan Das Mahant, Union Minister of State for Agriculture and Food Processing Industries visited CPRI

Dr Charan Das Mahant visited CPRI, Shimla on 1st January 2013. Dr. Birpal Singh, Director, CPRI briefed him about the institute activities and achievements of the institute. He inaugurated the Aeroponic facility of Seed production at the institute. He also reviewed the work done by CPRI in the field of potato research and development. Addressing the scientific and other staffs of the institute, he praised the work done by CPRI, which helped in tremendous increase in potato production and productivity thus, providing food security to millions of people of India. He also took a tour of different divisions and laboratories and gave his suggestions to improve the performance in various area of potato R&D.



Inauguration of Aeroponics at Shimla

IJSC Meeting held at CPRIC, Modipuram

The 4th meeting of CPRI joint staff council was held at CPRIC, Modipuram on 30.3.2013 under the chairmanship of Director, CPRI, Shimla. The chairman in his inaugural remarks said that all the promotional benefits and other facilities are being provided to all the categories of the staff well in time. Dr. Singh further remarked that there comes higher responsibilities with the advancement/promotions in career and it is the duty of the staff to perform the assigned work/duty with utmost honesty and devotion to maintain the standard of the Institute and to further scale new heights in the field of research and development.

Live Phone-in Programme at Doordarshan and AIR

Expert scientists of CPRI, Shimla 15 Stations participated in the Live-phone in programmes of Doordarshan and AIR from January to March, 2013. The details of the topics along with experts are given below.

Month	Title/Topics	Name of the Expert
3 rd January	Radio talk "Aloo ki kheti me savdhaniyan" on AIR	Dr NK Pandey
17 th January	Planting of potato in mid hills of shimla and other distt. of HP	Dr. SS Lal Dr.PM Govindakrishnan
11 th February	Earthing up and potato disease management in in mid hills of HP	Dr. Sanjeev Sharma Dr. VK Chandla
27 th March	Seed preparation and precaution in planting of seed potato in higher hills of HP	Dr. Vinod Kumar Dr. Ashwani Sharma
1 st Jan to 12 th March	Different scientists gave 14 phone in programmes on Aloo Krishi Pathshala at AIR, New Delhi	Director, CPRI, Jt Director, CPRIC and scientists of CPRIC, Modipuram

Human Resource

Promotions

Name	Financial Up gradation	Date
Administrative		
Smt.Bindra Gupta, Asstt.	3 rd MACP	13.8.2012
Sh.Dharam Das Kashyap, Asstt.	3 rd MACP	07.9.2012
Smt.Urmila Verma, UDC	2 nd MACP	20.7.2012
Smt. Sunita Thakur, UDC	2 nd MACP	30.4.2012
Sh.Om Parkash, UDC	2 nd MACP	16.6.2012
Sh.Lekh Ram, PA, CPRI	PayFixation	17.4.2010
Sh.Roshan Lal Verma, P S	3 rd MACP	03.6.2011
Sh. HK Sen, Private Secretary	3 rd MACP	13.04.2011
Smt.M.Rani, UDC	2 nd MACP	23.01.2011

Transfers / Selection

Administrative

Name	From	To
Sh.Sandeep, Asstt. Sh. Girish Thakur	Shimla Gwalior	Patna Shimla (Temporary basis)

Retirements

Name	Post	Retired on
Sh. Ram Nath Vishwakarma	T-3	31.1.2013
Sh.Lekh Ram Thakur	PA	31.1.2013
Sh.Arjun Singh	Asstt.	28.2.2013
Mrs M Murugeswari	SSS	28.02.2013
Sh. Dakur Sah	SSS	31.03.2013
Sh. Parmanand	SSS	31.03.2013

Awards & Honours / Foreign visits

Mahindra Samridhi Award – 2013 bagged by CPRI

Central Potato Research Institute has won the Runner up trophy of "Krishi Sansathan Samman" award of Mahindra Samridhi India Agri Awards (M S I A A) instituted by Mahindra and Mahindra Ltd. in partnership with Zee News. It



carries a cash prize of Rs. 1, 01,000 (One lakh one thousand only) and a trophy. Dr. BP Singh, Director CPRI received this award on behalf of the institute in a ceremony held on February 21, 2013 at New Delhi. The institute bagged this prestigious award for developing a large number of potato varieties and technologies for different agro-climatic zones of India. These varieties and technologies resulted in many fold increase in production and productivity of potato and thus helping the country to usher in potato revolution.

From the Director's Desk

Potatoes are infected by more than three dozens of viruses and a viroid which has widespread infection causing severe yield loss in potato. Therefore a clear and rapid diagnosis of plant virus is of great importance in scientific experiments. Electron microscope is one of the most powerful scientific tools for carrying out detail structural studies of biological materials by magnified image. With the advancement of science, the specificity of TEM was improved through immunesorbent electron microscopy (IEM) and immune-gold electron microscopic techniques. These techniques enhance the trapping of virus particles and helps in identification of the virus. CPRI, Shimla had been working on detection and diagnosis of potato viruses through TEM. The electron microscopic studies have been further enhanced by installing a new TEM of 120 kV which enabled us to work in the areas of detection and diagnosis of potato viruses by direct EM (leaf dip), Immuno and Immuno-gold electron microscopy.

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