



# ICAR–Central Potato Research Institute Newsletter

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## Research Highlights

### A new table potato variety-Kufri Mohan

A new table potato variety Kufri Mohan (MS/5-1543) has been released by the institute. It is a medium maturing, main season, high yielding potato variety having resistance to late blight. Its tubers are attractive white cream, ovoid with shallow eyes and white flesh colour. It possesses good keeping quality and moderate tuber dry matter (15-18%). It is capable of yielding 35–40 t/ha under optimum agronomical



Morphological and tuber attributes of Kufri Mohan

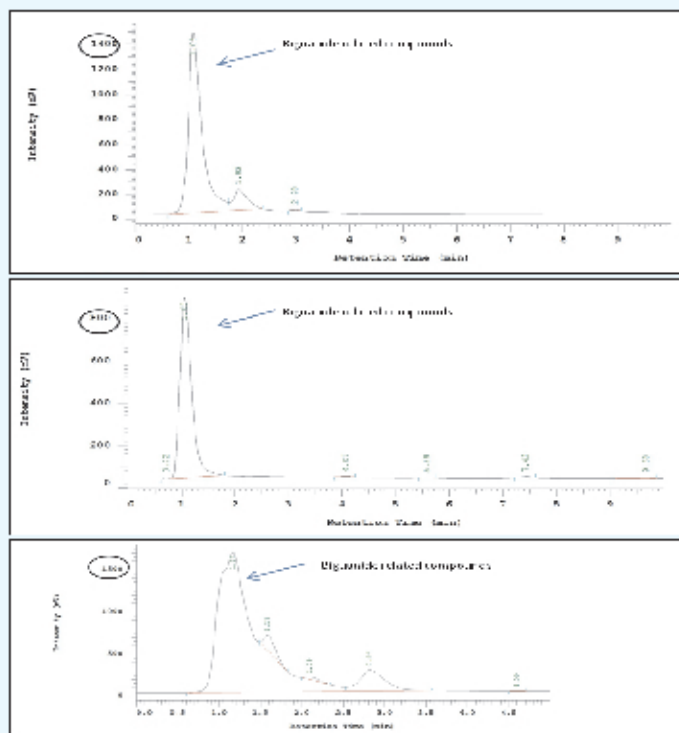
practices. Kufri Mohan responded to optimum doses of 219 kg/ha nitrogen and 81 kg/ha potassium to attain optimum yield. Though it did not respond to phosphorous, however a moderate basal dose of Phosphorus @40 kg/ha may be applied in west-central plains. The variety Kufri Mohan has an edge over cultivar Kufri Bahar in northern plains and Kufri Jyoti in eastern plains, the two most predominant varieties in the country. The new potato variety will improve the

productivity and profitability of the farmers, thus improving their socio-economic conditions.

*SK Luthra, VK Gupta, Mehi Lal, Sanjay Rawal,  
Vinod Kumar & BP Singh*

### Biguanide related compounds (anti-diabetic) in Indian potatoes

Commonly used oral antidiabetic agents available in market are biguanides and related compounds (BRCs),  $\alpha$ -glucosidase inhibitors, sulphonylureas, thiazolidinediones and meglitinides. Biguanide related compounds include guanidine, galegine, biguanide, phenformin, metformin, urea, biuret and L-arginine.



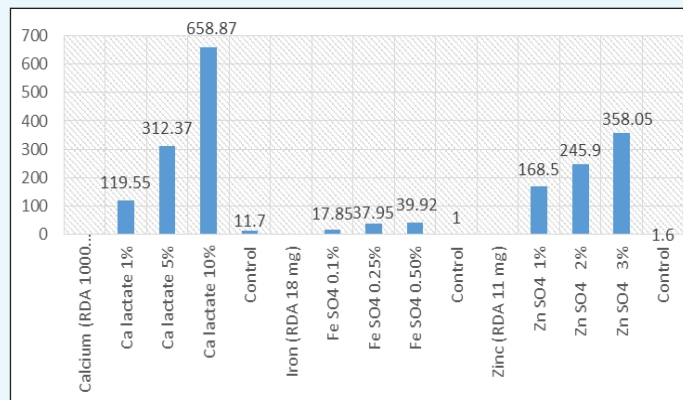
HPLC chromatogram of BRCs in peel, flesh in tubers of Kufri Chipsona-1 and one ayurvedic diabetes medicine

Metformin (1,1- dimethylbi-guanide also known as 'glucophage') is most commonly used biguanide and is prescribed as an oral hypoglycemic agent, used in management of non-insulin dependent diabetes mellitus (diabetes type-II). Potatoes are wrongly blamed to cause or worsen diabetes. To remove this misconception different compounds that affect glucose release and uptake in blood (such as  $\alpha$ -glucosidase inhibitors,  $\alpha$ -amylase inhibitors, resistant starch and amylose) have already been estimated in Indian potatoes in laboratory of the institute. To add on, a study was carried out to check the presence of biguanide related compounds (BRCs) in potatoes. Protocol for estimation of BRCs in potato was standardized through high performance liquid chromatography (HPLC) for the first time. For estimation of BRCs, freshly harvested tubers of Kufri Chipsona-1 were used. BRCs were extracted from flesh and peel separately. HPLC results revealed that potato peel as well as flesh contained BRCs. In flesh of Kufri Chipsona-1, BRCs concentration was 1.06 mg/g FW and in peel it was almost double than the flesh and the concentration was 1.9 mg/g FW. As a control, one ayurvedic medicine being used for treatment of type 2 diabetes was also extracted with the same method with multifold dilutions and run into HPLC. The BRCs concentration in tablet was found to be 80 mg/g. This proves to be a good news for potato lovers, since potatoes do not cause or worsen diabetes but contain compounds that can help in its prevention, particularly of type-2 diabetes.

**Pinky Raigond, Bhawana Kaundal,  
Brajesh Singh & S.K. Chakrabarti**

### Mineral fortification of dehydrated potatoes

Food fortification or enrichment is the process of adding micronutrients (essential trace elements and vitamins) to food. Food fortification was identified as an important strategy by the WHO and FAO in 2006 to bringing down the incidence of nutrient deficiencies at the global level. This nutritional supplementation using foods as medicine (nutraceuticals) has been effectively used in treating deficiencies and disorders affecting the immune system. Iron deficiency is one of the most prevalent forms of malnutrition in the world. As iron is involved with a number of enzymes that are required for oxygen metabolism, its deficiency has important health implications such as anaemia which is associated with increased mortality during childhood and pregnancy. Zinc, a part of every tissue in the body, is another important micronutrient which is a component in literally hundreds of body functions. It plays



Mineral content, mg/serving of 25g of fortified dehydrated potatoes

an integral role in muscle growth, injury healing and immunity building. Calcium is essential for strong bones and overall health.

CPRI has registered the process for Dehydration of potatoes for grant of patent in 2014. Possibility was explored for fortification of the dehydrated potato shreds with essential minerals such as iron, zinc and calcium to improve the nutritive value using iron sulphate, zinc sulphate and calcium lactate as fortificants, keeping their high safety values and bioavailability in view. All these three compounds are the preferred compounds and are generally recognized as safe (GRAS) as per FDA list. Different treatments of iron concentration (0.1-0.5%), zinc concentration (1-3%) and calcium concentration (1-10%) were included in the study. Dehydrated potato shreds were analysed for Fe, Zn and Ca by Atomic Absorption Spectrophotometer.

Analysed mineral data is presented as mg per serving of 25 g of dehydrated shreds which is sufficient for complete breakfast food of 100 g per person. Results showed that the process can efficiently be used to fortify the dehydrated potatoes with all the three mineral nutrients. Contents of iron, zinc and calcium in fortified dehydrated shreds were increased by 18-40 times, 105-224 times and 10-56 times, respectively with acceptable sensory scores. The organoleptic properties of the dehydrated potato were not altered in a negative way by the addition of these nutrients and the rehydrated final products were highly acceptable. As potato is habitually accepted and consumed by the larger populations throughout India, fortified potato shreds (noodles) can serve as ready-to-eat breakfast food enriched with minerals in the coming future.

**Ashiv Mehta, JS Minhas, Yogesh Gupta, Jagdev Sharma,  
Brajesh Singh & VK Dua**

## Potato varietal sensitivity to nutrient solution under aeroponics

The seed production through aeroponic system was successfully established for Shimla hills. Refinement in various production technologies is going on particularly for standardizing variety specific nutrient solution to obtain maximum production of aeroponic minitubers. The attempts had been made repeatedly to see the varietal sensitivity to nutrient solution, particularly pH and electrical conductivity (EC). The pH was kept in a range of 5.5–6.5 and the EC between 1.5 and 2.0 dS/m. Sulfuric acid was used to adjust the pH. All the varieties viz., Kufri Jyoti, Kufri Chipsona-1, Kufri Khyati, Kufri Chipsona-3, Kufri Pukhraj, Kufri Lauvkar, Kufri Surya, Kufri Badshah, Kufri Bahar, Kufri Frysona, Kufri Chipsona-4 and Kufri Himalini were exposed to the same



K. Pukhraj

K. Lauvkar

K. Chipsona-4

Varieties showing toxicity symptoms

management conditions, including standard cultural and phytosanitary preventative controls. Out of all the tested varieties, Kufri Pukhraj was found to be the most sensitive to existing nutrient solution followed by Kufri Lauvkar and Kufri Chipsona-4, which showed initial leaf burning followed by whole plant burning. This burning is considered to be a cause of some elemental toxicity, which appears after every 4-5 days of solution uptake, and it needs periodical dilution for recovery of the plants. These three varieties might need different concentration of particular micro and macronutrients, which needs to be, worked out.

**Tanuja Buckseth, K K Pandey  
& B P Singh**

## Transfer of Technology

### Farmer-Scientist interaction at Kufri

A Mass Media based Farmer-Scientist interaction programme on “Scientific cultivation of potato” was organized in collaboration with Doordarshan Kendra, Shimla on 10<sup>th</sup> June 2016. A total of 13 progressive farmers from Shimla district participated in this programme. Expert scientists from different



Scientists interacting with farmers at Kufri

fields of potato answered the queries of farmers regarding varietal requirement, planting, fertilizer management and plant protection in potato. The programme was recorded by staff of Doordarshan Kendra, Shimla for further broadcasting on Shimla Doordarshan as well as DD Kisan channel.

### Training on Processing for Women Farmers

A training programme on Potato processing techniques was organized at village Slkeri, Muzaffarnagar, UP adopted by Ministry of Agriculture and Farmers’ Welfare, GOI. The main aim of the training was to detail the village women about the different techniques for making potato processing products at their doorstep. During this training, different processing varieties of Institute like Kufri Chipsona-1, Kufri Chipsnoa-3, Kufri Chipsona-4, Kufri Frysona and products like lachha, chips, french fries were exhibited. Women were encouraged to get involved in potato processing as that can increase their family income.



Practical demonstration of processing of potato

### Agriculture Exhibition at Village Nawla & Mirpur

Agriculture exhibitions were organized by CPRIC, Modipuram in association with Indian Institute of Farming Systems at



Village Nawla & Mirpur. The exhibition at Nawla was inaugurated by Hon'ble State Agriculture Minister Sh. Sanjeev Balyan. During these exhibitions, different technologies of Potato production and processing along with research achievements of CPRI, were exhibited. Large number of farmers participated in these exhibitions and were benefitted due to updation of latest technologies.

### Live Phone- in Programme at Doordarshan

Scientists from CPRI, Shimla participated in the Live-phone programmes on different subjects on Doordarshan from April to June, 2016. The details of the topics along with experts are given below.

Month	Topics (Live phone in on Doordarshan)	Name of the Expert
April	Varietal requirement and planting of potato in higher hills of HP	Dr. Ashwani Sharma Dr. (Ms.) Dalamu
May	Inter cultural operations of potato in HP	Dr. Jagdev Sharma Dr. NK Pandey
June	Harvesting and Storage of potato in mid hills of HP	Dr. Brajesh Singh Dr. NK Pandey

### Important Meetings, Events & Visitors

#### Review Meeting of Finance Heads of ICAR Institutes of North Zone

The interactive review meet of finance heads of ICAR Institute located in North Zone with Additional Secretary & Financial Advisor, DARE/ICAR was held on 18<sup>th</sup> April, 2016 at ICAR-CPRI, Shimla. In his welcome address, Director, ICAR-CPRI, Shimla briefed about the Institute, its mandate, its achievements and future thrust.

In concluding remarks, Sh. SK Singh, AS&FA emphasized at streamlining the system making it more transparent and



enforcing financial discipline and economy instructions of the Ministry of Finance, Govt. of India in letter & spirit. He also impressed upon the Finance officers that they must follow the GFR and Vigilance Manual scrupulously and must not deviate from instruction enshrined therein.

#### Workshop on Potato Varieties

A workshop on Development and adoption of potato varieties in India was organized at CPRIC, Modipuram in collaboration with International Potato Centre (CIP). In this workshop, scientists of International Potato Centre and ICAR-CPRI alongwith progressive potato growers and processors deliberated on relevant issues related to the workshop. Scientists of CIP informed the participants regarding the popularization of Indian Potato Varieties and also reasoned the non-adoption of other varieties. The outcome of the workshop was that varieties popular in Uttar Pradesh have been primarily developed by ICAR-CPRI.



#### International Yoga day at CPRI, Shimla

International Yoga Day was organized at CPRI, Shimla & its regional stations on 21.06.2016. Instructor from Isha Yog demonstrated various Yoga asanaas. Dr. S.K Chakrabarti, Director and other staff of the Institute participated with full spirit on this yoga day.



## CPRI participated in ICAR North Zone Inter-Institutional Sports meet

ICAR-CPRI, Shimla participated in ICAR North Zone Inter-Institutional Sports meet held at NDRI, Karnal during 16-19 April, 2016. During the meet, CPRI participated in different games i.e Shot-put, Javelin, Discuss throw, Table Tennis, Badminton, Long Jump, Chess and Kabaddi. CPRI bagged 8 Gold, 2 Silver and 3 Bronze medals in the meet. CPRI also bagged Best Women Athlete award.



## Human Resource

### Scientific

#### Joining

1. Sh. Gaurav Verma, Scientist, Plant Pathology joined on 11.04.2016 (FN).
2. Dr. Rajesh Kumar Singh, Principal Scientist, Central Institute for Sub-tropical Horticulture, Lucknow joined as Head, Division of Seed Technology, CPRI, Shimla on 30.04.2016 (FN).

### Promotions

1. Dr. Vijai Kishore Gupta, Sr. Scientist, CPRIC, Modipuram placed in the RGP of Rs. 10,000 as Principal Scientist from 27.12.14.
2. Dr. Vinay Bhardwaj, Sr. Scientist, CPRI, Shimla placed in the RGP of Rs. 10,000 as Principal Scientist from 22.11.2014.
3. Dr. Ashwani Kumar Sharma, Sr. Scientist, CPRS, Kufri placed in the RGP of Rs. 10,000 as Principal Scientist from 01.09.2014.

### Transfers

1. Dr. Rajender Prasad Pant, Principal Scientist, CPRIC, Modipuram relieved from 15-06-2016 (AN) to join at IARI, New Delhi.
2. Dr. TK Bag, Principal Scientist & Head, CPRS, Shillong relieved from 04-06-2016 (AN) to join IARI, New Delhi.

### Technical

#### Retirements

1. Sh. Vijay Kumar Rai, Sr. Technician (Driver), CPRS, Jalandhar retired on 30.04.2016

### Administrative

#### Promotions

1. Sh. Prem Chand Sharma, Assistant promoted to the post of Asstt. Adm. Officer, CPRI, Shimla w.e.f. 08.04.2016.
2. Smt. Chandni Bhagta, UDC, CPRS, Kufri promoted to the post of Asstt. w.e.f. 08.06.2016.

#### Retirements

1. Sh. KC Chopra, Asstt. Adm. Officer, CPRI, Shimla superannuated on 30.04.2016.
2. Sh. Miraj Ul-Haq, Asstt. Adm Officer, CPRIC, Modipuram superannuated on 30.06.2016.

### Skilled Supporting Staff

#### Retirements

1. Sh. Narain Dass, Skilled Support Staff, ICAR-CPRI, Shimla superannuated on 30.6.2016.
2. Sh. Hans Raj, Skilled Support Staff, ICAR-CPRS, Jalandhar superannuated on 30.6.2016.

## From the Director's Desk



A well-organized scientific strategy of breeder seed production was envisaged in 1962-63 through clonal selection, tuber indexing and stage-wise field multiplication of healthy indexed tubers in subsequent four generations. Presently, indexing of tubers against contagious and insect transmitted viruses is done by ELISA against PVX, PVS, PVM, PVA, PVY and PLRV while PALCV and PSTVd by PCR. to improve the seed potato quality in sustainable manner. The breeder seed produced by the institute is supplied to various state Govt. organizations for further multiplication in three more cycles' viz., Foundation-1, Foundation-2 and Certified seed under strict health standards. However, the current status of breeder seed multiplication by the state government is not as per the desired seed multiplication resulting in huge shortage of certified seed in the country. The conventional system has some limitations viz. i) low rate of multiplication, ii) requires more number of disease free propagules in the initial stage, iii) development of 100% healthy seed stock from infected material is slow and time taking, vi) Progressive accumulation of degenerative viral diseases is there in each field exposure, v) require several field Multiplications of initial disease-free material (7 years). The only way-out to overcome the above said limitations is augmentation of seed production through hi-tech system to improve the quality and to reduce the field exposure. Therefore, this institute is gradually shifting from conventional system of seed production to hi-tech seed production system. Potato has readily responded to the totipotent nature of plant tissues in micro propagation and it has become easy to export/import disease free planting material in tissue culture form without any risk of importation of deadly diseases.

The process of micropropagation has become much more important in the case of potato for the purpose of production of disease-free plants from infected one. There is a tremendous scope to increase healthy seed production vertically by adopting aeroponic technology where increase in multiplication rate from 5:1 to 50:1 can be achieved. We do not need any excess area for aeroponic based healthy seed production. In this technique, only 1% of conventional water usage is required which is basically recycled water. It is the ideal technology for cost-effective production of quality seed in the present era. The adoption of high-tech seed production technologies developed by the Institute has led to opening of more than 20 tissue culture labs throughout the country. Several private seed companies had been taking virus-free in vitro plantlets since last several years from ICAR-CPRI, Shimla of important released varieties for further multiplication in their seed production programme. Currently CPRI produces 3186.82 tons of nucleus and breeder seed of 25 potato varieties, out of which 70% is through conventional system whereas, 30% through high-tech system, which is only sufficient to meet the demand of healthy seed potato in the country. However, keeping in view the production of 125 million tons of potatoes from 3.62 million ha by 2050, this supply of breeder seed is likely to fall short of the demand. ICAR-CPRI, targets to produce 4200 tonnes nucleus and breeder seed during 2050. As there is limited scope to increase quantity of breeder seed at ICAR-CPRI farms, due to limitation of additional availability of land for seed production therefore, possibilities are being explored with the help of SAUs/KVKs/Pvt. farmers to identify the new areas of seed production, multiplication of breeder seed into FS-I, FS-II and Certified Seed under MoU and to produce seed through hi-tech system with the help of entrepreneurs/private companies.

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