



Vegetable-Newsletter

ICAR-Indian Institute of Vegetable Research



Volume 9, No. 1

January- June 2022

RESEARCH UPDATE

Research Update

- Nutraceutical's significance in human health from vegetable crops
- Postharvest variability in bioactive properties & enzymatic activities in eggplant (*Solanum melongena* L.) genotypes
- Ecofriendly Insecticides against Major Insect-pests of Cabbage under Mid-hills of Himachal Pradesh
- VRCUP 20-02: New partenocarpic cucumber line suitable for cultivation in protected condition
- The microbial technology of BC6 *Bacillus* species consortium and impact
- First report on bacterial wilt (*Ralstonia solanacearum*) on solanaceous vegetables
- Detection of seed borne pathogens of different vegetable crop seeds

Success story

- FPO based training to marketing model for sustainability of mushroom production by women group at Varanasi: An ICAR-IIVR ingenuity

Events

- Kisan Mela cum VEGEXPO-2022 organised at IIVR
- National Youth Day observed at ICAR-IIVR
- Organization of Technology Promotion Day
- Celebration of National Girl Child Day
- 21 Days winter school organized at ICAR-IIVR
- World Pulse Day was celebrated at IIVR
- Inauguration of Sumrat Bhoomi Farmers Producer Company at Sonbhadra
- Organization of National Science Day
- International Women Day observed at IIVR
- World Water Day observed at IIVR
- MoU signed for the promotion of green chilli powder
- ICAR-IIVR observed Azadi ka Amrit Mahotsav (AKAM) Kisan Bhagidari Prathmikta Hamari campaign during 25-30th April 2022
- World Honeybee day celebrated at ICAR-IIVR
- Chief Development Officer (CDO), Mirzapur Ms. ShriLaxmi V S visited the institute
- 2nd Technology Promotion Day for kharif vegetables organized at IIVR
- RAWE programme organized for the students of UP College, Varanasi
- Orientation training programme on Agri-export marketing for cooperatives and FPOs organized in physical and virtual mode
- 40th Group Meeting of All India Co-ordinated Research Project on Vegetable Crops organised
- International Yoga Day 2022 celebrated at ICAR-IIVR, Varanasi
- National level campaign on "Efficient and balanced use of fertilizers" organized at ICAR- Indian Institute of Vegetable Research, Varanasi

From the Director's Desk

Indian vegetables are renowned for their wide variety of hues, forms, and sizes. Around 1097 different vegetables are grown for human consumption worldwide. These vegetables are inexpensive sources of vitamins and nutrients and give farmers both on and off-farm income. Dietary fiber-rich vegetables improve digestion, lower cholesterol, and also alleviate the risk factors for heart disease, diabetes, and obesity. Because they are a part of every diet, vegetables can be a potent tool in the fight against malnutrition. India consistently breaks its own record for vegetable production, with 204 MT production in 2020–21 as compared to 200.45 MT in previous year. Nevertheless, the country's impressive increase in vegetable production has been accompanied by utilizing cutting-edge technologies and modern tools with a track record in science is necessary to reach the desired level of production. The use of new breeding techniques will be intensified in order to speed up the development of futuristic varieties and hybrids that are resistant to diseases and insect pests, tolerant of abiotic stresses, nutrient use efficient, micronutrient rich, and enhanced for industrial suitability. To improve plant health and secure vegetable production, good agricultural practices (GAP) for controlling arthropod pests and diseases, better water and nutrient use efficient methods, good soil management and conservation practices are need of the hour. In order to preserve nutrient content, flavour, and taste, the technologies are required to curtail postharvest losses and human labour, improve storage, transport, and processing parameters. The long-term success of such venture also depends on both quality control of those products and a stable market.




T K Behera
Director, ICAR-IIVR

Research Update

Nutraceutical's significance in human health from vegetable crops

Vegetables are important component of balanced diet and are consumed for nutrition as well as for health maintenance and prevention of diseases owing to the presence of rich spectrum of bioactive compounds/phyto-nutraceuticals. Considering the therapeutic significance of vegetables, they are also referred to as protective foods or functional foods. Different vegetables vary significantly and possess unique compositions of nutraceuticals. Nutraceutical is a blend of 2 words- 'Nutrition' and 'Pharmaceutical' and refers to the substances that may be considered a food or part of a food

and have an impact on health care system. Vegetables are rich source of vitamins (ascorbic acid, folic acid etc), minerals (iron, calcium, phosphorus etc) and have medicinal importance since ancient times. They are also packed with essential amino acids, antioxidants, fibres, proteins, carbohydrates, and fats. Vegetables such as asparagus, brinjal, broccoli, brussel sprouts, celery, capsicum, chilli, chinese cabbage, cucurbits, green beans, green cabbage, green onion, green peppers, garlic, lettuce, okra, peas, spinach and tomato are widely cultivated on commercial scale in India. In the South Asian region, India is one of the fastest growing countries but has failed to combat malnutrition that adversely affects the country's socio-economic progress. India houses more than one-third of the world's malnourished children. Half of the world's malnourished children reside

Table: List of some common nutraceuticals isolated from vegetable crops

Sr No	Vegetable Crops	Nutraceuticals (Chemical compound)	Properties
1	Onion and Garlic	Allyl propyl disulfide, Quercetin, Alliin, Methiin	Antifungal, antibacterial, antioxidant, used to treat arteriosclerosis
2	Carrots, pumpkins, sweet potatoes, winter squash, broccoli, spinach and kale	Beta carotene	Antiaging, anticancerous, improve lung function, reduce complications associated with diabetes
3	Red Chilli	Capsaicin	Used for pain relief topically and as a digestive aid when taken internally, antioxidant, antiallergic
4	Carrot	Caffeic acids	Inhibitor of the lipoxygenase enzyme that forms leukotrienes from arachidonic acid
5	Broccoli, carrot, celery, onion	Tocopherol	It is a fat-soluble antioxidant that stops the production of reactive oxygen species formed when fat undergoes oxidation
6	Tomato	Lycopene	Anticancer
7	Brinjal and red cabbage	Proanthocyanin	Help in urinary tract infections by inhibiting adhesion of microorganisms like <i>E. coli</i> to the urinary tract wall
8	Red Onion	Resveratrol	Anticancer (skin and breast cancer), anti-ageing
9	Cole crops	Glucosinolates, sulforaphane, vitamin C, luteolin, apigenin	Breast cancer, stomach and lung cancer
10	Broccoli	Sulphoraphane	Used against breast cancer
11	Turnip and Rutabaga	Glucorucin and glucoraphanin	Cancer and heart diseases
12	Beet root	Ferulic acid and betanin	Skin disease, antiageing
13	Legume vegetables	Isoflavonoids	Osteoporosis and obesity and menopause
14	Okra	Quercetin and flavonol derivatives	Diabetes and Vitality
15	Celery	Luteolin, apigenin, butylphthalide	Cancer of breast, skin, used in high blood pressure

in 3 countries: Bangladesh, India, and Pakistan. Vegetables packed with nutraceuticals can help in overcoming malnutrition in human beings and are important to achieve nutritional security in the country by sustainable and cost effective means. As per World Health Organization (WHO), 400 g of vegetables should be consumed in a balanced diet daily. Nutraceutical present in different vegetable crops are given in Table1. Several nutraceuticals present in vegetables could help in curing of various diseases viz., cancers, diabetes, blood pressure and cholesterol etc. The diversified and highly nutritive vegetables are of great importance in alleviating malnutrition. The presence of phytochemicals, in addition to vitamins and pro-vitamins, in vegetables which are referred to as nutraceuticals makes vegetables of crucial nutritional importance in the prevention of malnutrition and various diseases. Considering the importance of nutraceuticals in prevention as well as curing of various chronic human diseases, the acceptance for consumption of vegetables biofortified with nutraceuticals is increasing. Different methods have been practiced in developing nutraceuticals rich vegetables. Various agronomical techniques viz., seed treatment, foliar application, use of organic manures etc. are used for increasing the nutraceuticals values in various vegetable crops. These agronomical approaches are comparatively less expensive and quick as compared to any other methods of improvement. These techniques are useful for elevating mineral contents in various vegetables. Developing biofortified varieties through conventional breeding methods like selection, introduction, and hybridization have been exploited for developing nutraceuticals in vegetables as well as tuber crops. Several resistant sources of nutraceuticals have been identified and transferred in popular cultivars through traditional breeding methods. In India different biofortified varieties have been released in various vegetables crops eg. Punjab Black Beauty, Pusa Asita and Pusa Rudhira in carrot, Kashi Lalima in Okra, Pusa Gulabi and Pusa Jamuni in Radish, Palm Vichitra in Broccoli and Pusa Beta Kesari 1 in Cauliflower. Nutraceuticals bio-fortified vegetables seem to have the potential required to handle hunger and malnutrition issues. Being an eco-friendly and cost effective possible solution to combat these issues, there is a need to develop, produce and to popularize these crops

for human consumption so as to prevent and control various health issues. Increase in awareness and strengthening research on indigenous vegetables is required to enhance bio-fortification of nutraceuticals in vegetable crops.

**Manisha Thakur, Parampreet Kaur and
Amandeep Singh Sidhu**

School of Organic Farming, Punjab Agricultural University,
Ludhiana 141004, Punjab

Postharvest variability in bioactive properties & enzymatic activities in eggplant (*Solanum melongena L.*) genotypes

Eggplant (*Solanum melongena L.*) is native to India and is being cultivated here since last 4,000 years. Consequently, a huge diversity in plant and fruit characteristics, bioactive properties and enzyme activities exists among the different cultivated as well as wild genotypes. Upon evaluating the functional quality and enzyme activity in twenty three eggplant genotypes (15 long and 8 round), interesting results were observed. It was found that overall, the long eggplant cultivars showed higher phenolics and flavonoids content over round types. On ranking the genotypes based on antioxidant capacity, it was seen that top ten ranks were occupied by long type eggplant cultivars with only IVBHR-16 (round) at fifth position. Further, ~3.5 fold variation in enzymatic activity clearly indicates the scope for breeding cultivars with lesser flesh browning. Lower polyphenol oxidase (PPO) and peroxidase (POD) activities were recorded in round genotypes over long group. This may

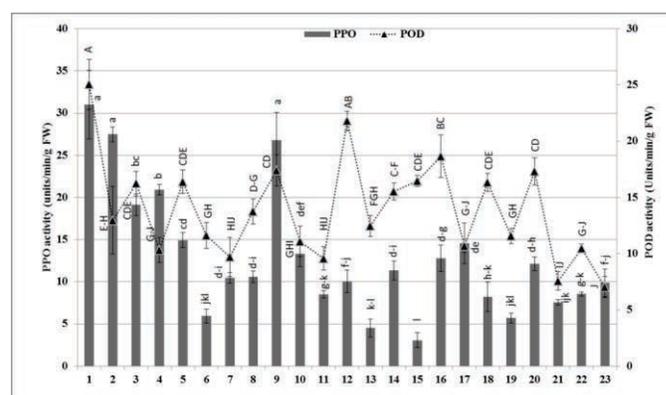


Fig. Variation in polyphenol oxidase (PPO) and peroxidase (POD) enzyme activities among eggplant genotypes

explain the traditional culinary preference for round cultivars for specialized dishes such as “Bharta” and “Fried slices” over the long cultivars. This information would be useful for pre-breeding parental selection for higher antioxidant capacity and assorting genotypes with processing traits.

Swati Sharma, S.N.S. Chaurasia, Jagdish Singh, Shailesh Tiwari and T.K. Behera

ICAR- Indian Institute of Vegetable Research,
Varanasi 221005, Uttar Pradesh

Ecofriendly Insecticides against Major Insect-pests of Cabbage under Mid-hills of Himachal Pradesh

Among the winter vegetables, the cabbage (*Brassica oleracea var. capitata L.*) is extensively cultivated in Himachal Pradesh because of its nutritional and economical values. Cabbage is cooked as a green vegetable or eaten as raw. It is rich in vitamin C and high in minerals and proteins. The cabbage crop is attacked by cabbage aphid (*Brevicoryne brassicae L.*), cabbage butterfly (*Pieris brassicae L.*), diamond back moth (*Plutella xylostella L.*) etc which results in loss of quality and production. In cabbage aphids, both nymphs and adults cause damage to the crop by sucking of cell sap, as a result leaves start twisting and curling of leaves take place, while in cabbage butterfly and diamond back moth only larval stage is the damaging one, which initially scrape the leaf surface but later on they eat up entire leaves. In India, yield loss due to these insect-pests is estimated to be approx 52%. Insecticides such as synthetic pyrethroids and organophosphates which are commonly used against major insect pests of cabbage are non environment friendly. Therefore, use of ecofriendly insecticides is a



good alternative against these insect-pests of cabbage as they are environmental friendly, degrade easily and have no residual effect. Among various ecofriendly insecticides tested against above pests of cabbage, Rynaxypyr @0.3ml/lit resulted in minimum number of aphids, cabbage butterfly larvae, DBM larvae per plant with higher yield (240q/ha). Whereas, Neem Seed Powder Pellets @30g/lit, Spinosad @0.3ml/lit and Neem oil @2ml/lit were found equally effective. However, benefit cost ratio (B:C) was higher (1.63) with Neem Seed Powder Pellets in comparison to control (1.20).

Tanuja Banshtu, AK Joshi, Ramesh Kr Bhardwaj, Sandeep Kansal and Kuldeep Thakur

Dr Yashwant Singh Parmar University of Horticulture & Forestry,
Nauni, Solan- 173230, HP

VRCUP 20-02: New partenocarpic cucumber line suitable for cultivation in protected condition

Cucumber being a cross pollinated crop, hand pollination is essential to set the fruits under protected cultivation. One of the solutions to artificial pollination is parthenocarpy wherein the fruits develop without fertilization. Most of the parthenocarpic cucumber cultivars under cultivation are developed from private sector. Only three public sectors parthenocarpic cucumber variety/hybrids have been recommended for cultivation. Therefore, a new research on breeding of parthenocarpic cucumber lines adapted to green/plastic-house was initiated. The commercial F1 hybrids were selfed by inducing the male flower, and subsequently selection for gynocious parthenocarpic plants was carried out upto F6 generation. Silver thiosulphate spraying during flowering stage insured male flowers production in this line. These male flowers were used to self the female flowers of the same plant. The finally selected line VRCUP-20-2 were exposed to different temperature and day length to confirm the stability of gynocery and parthenocarpy. After the lines were stabilized, a yield trial in the protected condition was conducted using the hybrid checks defender and KPCH-1 (hybrids were used as checks due to lack of public/private sector OP variety). The yield of VRCUP-20-02 was at par with the public sector hybrid KPCH-1 and it can be grown in a protected structure both during the off season as well as the main season. The fruit colour of this genotype is

Table: Horticultural features of VRCUP-20-2 and other partenocarpic lines.

S.No.	Genotype	Days to 50% flowering	No of fruits per plant	Fruit length (cm)	Fruit diameter (cm)	Average fruit weight (g)	Yield per plant (kg)	Fruit colour
1	VRCUP-20-02	36	41.4	14.41	3.17	121.21	4.98	Green
2	Defender	35	42.2	15.44	3.32	135.29	5.08	Green
3	KPCH-1	42	30.4	13.92	3.08	127.42	3.75	Dark Green

green with a length and diameter of 14.41 and 3.17 cm, respectively. The VRCUP-20-2 can be released as an open pollinated variety suitable for cultivation under protected structures.



Fig: Plant of VRCUP-20-2 and fruits under the protected cultivation.

**Sudhakar Pandey, Vidhya Sagar, Vikas Singh,
T. Chaubey, P. Karmakar, PM Singh and TK Behera**

ICAR- Indian Institute of Vegetable Research,
Varanasi 221005, Uttar Pradesh

The microbial technology of BC6 *Bacillus species* consortium and impact

The technology of the talc powder-based bio stimulant formulation product named “KASHI BIOFERT BC6” was developed. The bio product is a consortium of *Bacillus species* having multiple plant growth promoting properties. It was developed taking into consideration the limitations of farming systems based on hazardous synthetic chemicals and/or single microbial inoculants based-biofertilizers, which have several demerits of survival and growth of the organisms in the soils. The product enhances the scope of introduction of microbial-based products of natural origin at the farmer's fields. KASHI BIOFERT-BC6 bio formulation consists of six *Bacillus*

species namely *Lysinibacillus macroides* BM5, *Bacillus safensis* BV6, *Bacillus liquifaciens* RD7, *Bacillus albus* BV7, *Bacillus subtilis* BV4 and *Bacillus species* BV8. The substrate for the product is dry white talc powder and the CFU of the cultures mixed with the powder ranges from 1.8-2.9 x 10⁷ to 10⁸ per gram. All these species are well known for multiple biological traits like phosphate solubilization, Zn mobilization and siderophore production along with offering systemic induction of bio molecules for stress tolerance in plants. When applied at the root zone, BC6 colonizes plant roots and flourish in the rhizosphere. The product can be applied for seed coating, root dip and soil conditioning (by mixing with vermicompost) for all the crops and can be successfully stored at room temperature for more than One year by maintaining high viability of the *Bacillus* cells in the product. Since last two years, we have distributed more than 30 kg of the consortium bio formulation among the farmers of the districts Varanasi, Mirzapur, Sonbhadra, Ghazipur and Chandauli for field demonstration purposes. In both the in house field trials and at the farmer's field, BC6 performed very well, enhanced plant growth, provided protection against damping off disease and increased tolerance in plants against local abiotic stress conditions.



D P Singh and Sudarshan Maurya

ICAR- Indian Institute of Vegetable Research,
Varanasi 221005, Uttar Pradesh

First report on bacterial wilt (*Ralstonia solanacearum*) on solanaceous vegetables

Recently bacterial wilt occurrence on solanaceous vegetables is being noted in farmers field around research farm, ICAR-IIVR, Varanasi, Sonebhadra and Mirzapur district of Eastern U.P., coinciding with warmer and higher humid month of August to November 2021. A wide array of hybrid varieties of brinjal (NavKiran, Naveen, Sampuran), chilli (VNR-305, Josh, NS 1101, NS 5018, Bioseed 615, Sanaya 3131) and tomato (Namdhatri 585, Arya, 5018, Durg) of the multinational companies (MNCs) including public sector (Kashi Sandesh) were found under cultivation in different farmers' field where bacterial wilt incidence was recorded up to 100%. Its incidence was in brinjal (*Solanum melongena*) hybrid having oblong, purple fruits variety NavKiran (35%) at Arazi line (Varanasi), Magaraha and Kiryat location in Mirzapur including Kashi Sandesh at Bangalipur (Varanasi) however it was 75% in tomato (*Solanum lycopersicum*) hybrid cv Namdhari 585 at Arazi line (Varanasi) and Kiryat (Mirzapur) and 40% in chilli (*Capsicum annum*) hybrid cv VNR 305 at Kusi Dour location in Sonebhadra.

Interestingly, Kashi Sandesh (ICAR-IIVR round fruited hybrid) was found highly susceptible at Bangalipur location in Varanasi but Kashi Sandesh including other brinjal varieties viz. Kashi Taru, Kashi Himani, Kashi Manohar and Kashi green were found completely resistant at Kusi Dour location in Sonebhadra however, private seed company chilli hybrid 'VNR 305' was found highly susceptible at same location. Differential disease reaction of same hybrid cultivar was observed in different locations of Varanasi, Mirzapur and Sonebhadra district of Eastern Uttar Pradesh. Initially, the symptoms appeared as drooping in lower leaves before wilting. Later, vascular system particularly xylem of affected plants showed light brown discoloration with slimy bacterial ooze (exudates). Finally, all the affected plants wilted, defoliated and dried. Whitish ooze exudates come out from the vascular vessels of affected plants when stem suspended in clean water. Pure cultures (Rsb-1, Rsb-2 & Rsc-2) of bacterial wilt pathogen, *Ralstonia solanacearum* were established from infected samples of brinjal and chilli on Kelman's triphenyl tetrazolium chloride (TZC) medium. Based on the cultural, morphological



Incidence of Bacterial Wilt on brinjal (Naveen) at Araziline (Varanasi)



100 percent Incidence of Bacterial Wilt on chilli (VNR-305) at Kusi Dour (Sonabhadra)



Incidence of Bacterial Wilt on tomato (Namdhari 585) at Kiryat (Mirzapur)



Growth of *R. solanacearum* isolate on TZC medium

characteristics, sugar oxidation test and cross pathogenicity test we confirmed that race 1/ biovar III of *R. solanacearum* caused the wilt on solanaceous vegetables. This is the first report of occurrence of this pathogen in eastern Uttar Pradesh in India on solanaceous vegetable crops. Bacterial wilt management remains difficult due to non-feasibility of chemical control, exceptional survival ability of pathogen in soil and non-hosts. Further work is necessary for better understanding of diversity spectrum of existing population of the pathogen for formulation of viable integrated disease management strategies.

A.N. Tripathi, S. K. Tiwari, and T.K. Behera

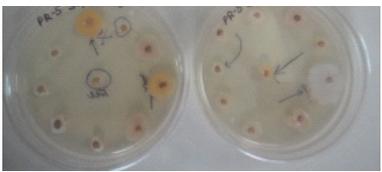
ICAR- Indian Institute of Vegetable Research,
Varanasi 221005, Uttar Pradesh

Detection of seed borne pathogens of different vegetable crop seeds

Seed samples of different vegetable crops viz. brinjal, chilli, tomato, cabbage, cauliflower, bottle gourd, cowpea, cluster bean, French bean (rajma), Indian bean, pea, winged bean were subjected under blotter paper and agar plate method for seed health evaluation to determine germination percentage and detection of seed-borne/seed-transmitted pathogens. Vegetable crop seeds are sterilized with sodium hypochlorite (1.0%) for one minute and rinse with sterilized water. Surface sterilized seeds were plated @ 10 seeds per Petri plates and incubated at 24±2 °C for 7-21 days. Fungal pathogens

were identified on the basis of habitat characteristics on blotter paper and colony morphology on potato dextrose agar (PDA) however seed borne bacterial pathogens were identified on nutrient agar. Seed borne bacterial pathogens viz *Xanthomonas axenopodis* pv *vesictoria* on brinjal (11%) and tomato (10%); *Xanthomonas compestris* pv *compestris* on cabbage (10%), *Pseudomonas spp.* on winged bean (33%) were recorded. Important seed borne fungal pathogens namely *Phomopsis vexans*, *Curvularialunata*, *Alternaria*, sp. *F. oxysporum*, *Macrophomina phaseolina* on brinjal; *Colletotrichum dematium*, *Alternaria spp.*, *Fusarium solani* on chilli; *Alternaria spp.*, *F. oxysporum* on tomato; *A. brassicae*, *A. brassicola* on cabbage and cauliflower; *Fusarium spp.*, *Didymellabrayoniae* on bottle gourd; *Macrophomina phaseolina*, *Phomasp.*, *Colletotrichum*, *Phomopsis*, *Fusarium* on cluster bean; *Sclerotinia sclerotiorum*, *Fusarium*, *M. phaseolina*, *Colletotrichum* on Indian bean, *Sclerotinia sclerotiorum* on French bean; *Fusarium*, *Alternaria spp.*, *Macrophomina phaseolina* on cow pea and *A. pinodes*, *A. pisi*, *B. cinerea*, *F. moniliforme*, *S. sclerotiorum* on pea were recorded. Maximum germination percentage varied in the range of 30-86% in brinjal, 90% in chilli, 70-80% in tomato, 46% in cabbage and 90% in cauliflower, 70% in bottle gourd. Moreover, so far no research works has been done in ICAR-IIVR, Varanasi related to Seed pathology/evaluate the health status of vegetable crop seeds/germplasm conserved under seed/gene bank facility. Evaluation of seed health is very important for profiling of seed borne pathogens and

decision making towards disease free seed production, seed storage, seed certification, safer seed treatment, management of seed borne diseases (pathogens), safe trans-boundary movement of seeds and quarantine regulation.

		
<i>Xanthomonas axenopodis</i> pv <i>vesictoria</i> on brinjal seeds plated on Nutrient Agar	Fungal pathogens on brinjal seeds plated on PDA	Fungal pathogens on cluster bean seeds plated on PDA
		
French bean	Germination of bottle gourd seed on blotter paper	Chilli seeds on germination paper

A.N. Tripathi and Bhanu Prakash Singh

ICAR- Indian Institute of Vegetable Research, Varanasi 221005, Uttar Pradesh

Success stories

FPO based training to marketing model for sustainability of mushroom production by women group at Varanasi: An ICAR-IIVR ingenuity

Farmer's Producer Organization (FPO) based extension delivery model performs better than the conventional extension delivery model. For assessing the efficiency of FPO based extension model, an initiative was taken at ICAR-Indian Institute of Vegetable Research, Varanasi by conceptualizing 'Training to Marketing Model' in mushroom production. Training programme on Nutritional security and women empowerment through mushroom production was organised during last week of August, 2021 for 20 farm women among whom 10 were FPO members and rest 10 were not associated with any FPO. It was a three days residential training programme and hands on training was provided to them through learning by doing approach. After completion of the training, they were asked to prepare mushroom bags and start mushroom production at their household level. After one month, during last week of September 2021, team of scientists from ICAR-IIVR visited the villages to see the progress in mushroom production. And it was disappointing to see that, the mushroom bags were very poorly managed and were full of coprinus (the unwanted fungus grows due to unhealthy conditions and mismanagement of the bags). We were upset and thought that, the training effort was in vain like many others.

The good thing happened next morning. Three women belonged to FPO category came back to IIVR and told that, after returning from the training they forgot many of the aspects regarding take care of the mushroom bags resulted the failure and requested for another training. Being the members of FPO and peer pressure might have motivated them to return back and work for prosperity. On the other hand, the non-FPO women did not turn up, because they might not get any peer pressure and motivation to prosper.

So, another one day workshop was organised to recapitulate the things and only interested 10 women were selected for the workshop. In the month of November 2021, the women group invited us for a visit

and we were so happy to see that each and every mushroom unit was well maintained with bumper production of milky white oyster mushroom.

The story does not end here. Oyster mushroom is less popular and have less market demand. Heavy mushroom flushes were coming out and the women group were worried about its marketing. It was a big challenge before us that, how to make those small mushroom ventures sustainable. "Then the idea clicked- why not start marketing from IIVR!" Being part of a research organization all staffs of IIVR are well versed about the taste and nutritional value of oyster mushroom. The women group brought the oyster mushroom at IIVR and it was sold at the rate of Rs. 100.00 per kg. And the same thing they did in many other organizations nearby like bank, post office, schools and colleges. So, the "institutional marketing model" for oyster mushroom established. Meanwhile link was established with one mushroom entrepreneur who started his business of value added mushroom products like mushroom pickle, chutney, mushroom powder etc. And he started collecting raw mushrooms from the women group. The group consisting 16 women had earned Rs. 25300.00 besides consumption at home during five months period of October 2021 to February 2022. This is how the training on mushroom production reached a logical end towards sustainability with the group of farm women who were members of FPO. FPO was the platform which motivated the women group to work together and find out different market possibility of the produce and supports the analogy that, "FPO based extension delivery model could work better than conventional extension delivery model".



Shubhadeep Roy, Sudarshan Maurya, A N Tripathi, Hare Krishna, Neeraj Singh and T K Behera
ICAR- Indian Institute of Vegetable Research,
Varanasi 221005, Uttar Pradesh

EVENTS

Kisan Mela cum VEGEXPO-2022 organised at IIVR

A kisan mela cum Vegexpo was organized at ICAR-IIVR, Varanasi on 8th January 2022 for promotion of vegetable marketing and export and entrepreneurship development of the farmers of SC and ST category. This event was attended by 1200 farmers belonging to SC and ST community from Varanasi, Mirzapur, Sonbhadra and Chandauli districts of Uttar Pradesh. Dr. Panjab Singh, former Director General, Indian Council of Agricultural Research, New Delhi was the chief guest of the function. Other dignitaries present were Dr. Sanjay Singh, Director, ICAR-IISS, Mau, Dr. C. B. Singh, DDM, APEDA, District Horticulture Officer, Varanasi and others. Apart from exhibitions and technical sessions small agricultural implements like dibbler, wheel-hoe, corn-shaler etc were distributed among the farmers.



National Youth Day observed at ICAR-IIVR

ICAR- Indian Institute of Vegetable Research, Varanasi observed National Youth Day, 12th January 2022 on the



eve of birth day of Swami Vivekananda, the pioneer of modern India. Dr. T. K. Behera, Director along with other staff of the institute walked 5 km stretch to enhance youthfulness and decrease obesity, laziness and work related stress among the staff.

Shubhadeep Roy

ICAR- Indian Institute of Vegetable Research,
Varanasi 221005, Uttar Pradesh

Organization of Technology Promotion Day

Technology Promotion Day was organized on 18th January 2022 in collaboration with Zonal Technology management Unit, IIVR for popularization of brinjal, chilli, tomato, pea, dolichos bean and summer squash to the private companies and other stakeholders. On this occasion 16 private seed companies participated and witnessed the good demonstration of the crops. Director, Dr. T. K. Behera told that, promising varieties and hybrids should be popularized through public private partnership mode.



Celebration of National Girl Child Day

ICAR-Indian Institute of Vegetable Research, Varanasi has organized National Girl Child Day on 24th January, 2022 at Govt. Girls' Inter College, Jakhini, Varanasi, Uttar Pradesh. The girl students of class-XI were scintillated about the importance of the day. Scientists of the institute highlighted the importance of vegetables which are rich sources of vitamins, minerals, dietary fibres and antioxidants as they are pivotal for the proper functioning of the human body and briefed about the technology developed by ICAR-IIVR in this venture for nutritional

security of the country. Scientists also highlighted the scope of agriculture for higher studies and its entrepreneurship. The students also enthusiastically interacted during the event. Kitchen garden seed packets comprising seeds of spinach, okra, bottle gourd, pumpkin, sponge gourd, cowpea etc. for summer season vegetables were also distributed among the students to promote inclusion of vegetable in their daily diets.



Shubhadeep Roy, J. Halder and S. K. Tiwari

ICAR- Indian Institute of Vegetable Research,
Varanasi 221005, Uttar Pradesh

21 Days winter school organized at ICAR-IIVR

ICAR-Indian Institute of Vegetable Research Varanasi conducted 21 days winter school training programme on "Underexploited Vegetables: Unexplored treasure trove for Food, Nutritional and Economic Security" from 02 to 22 February 2022. The main objective of the training programme was to focus on nutritional, medicinal and economical importance of underexploited vegetables. Apart nutritional and medicinal importance, the



participants were also exposed on historical and spiritual importance, potential, genetic resources diversity, nutritional, phytochemical compositions, organic protocols, microgreens as smart nutria-rich healthy food, processing and value addition, ITKs, application of ICTs and suitability of these crops in small farming system, modern irrigation techniques, application of biotechnological & bioinformatics tools in systemic study of the underutilized vegetables. A total of 25 faculty/scientist/SMS and other participants from across the country participated in the training programme.

World Pulse Day was celebrated at IIVR

World Pulse Day was celebrated at ICAR-IIVR on 10th February 2022 to commemorate the importance of pulses in our daily diet. There is immense importance of incorporation of pulses in daily diet in the vegetarian country like India. Not only nutrition to the human health, pulse cultivation increases the soil health also. Dr. M. N. Singh, retired professor BHU and renowned pulse breeder was the chief guest in this programme.



Shubhadeep Roy

ICAR- Indian Institute of Vegetable Research,
Varanasi 221005, Uttar Pradesh

Inauguration of Sumrat Bhoomi Farmers Producer Company at Sonbhadra

Sumrat Bhoomi Farmers Producer's Company was formed under the mentorship of the scientists of ICAR-IIVR and inaugurated by DR. T. K. Behera, Director on 23rd February 2022. A kisan gosthi was also organized in this occasion. Board of Directors along with 250 members of that FPC

were present in the programme. This FPC is working on commercial vegetable cultivation.



Shubhadeep Roy, Neeraj Singh, Sudarshan Maurya and A. N. Tripathi

ICAR- Indian Institute of Vegetable Research,
Varanasi 221005, Uttar Pradesh

Organization of National Science Day

National Science Day was observed at ICAR- Indian Institute of Vegetable Research on 28th February 2022. Scientists of the institute had a meeting on this occasion and discussed about improvement of scientific environment at institute and dedicated research towards farming community of the country.



International Women Day observed at IIVR

International Women Day was observed at ICAR-IIVR on 8th March 2022 in which 50 farm women participated. Dr. T. K. Behera, Director told to form SHGs, FPOs to promote business mindness and entrepreneurship among the rural

women for their social empowerment. In this occasion, the farm women were honoured by institute by providing them vegetable seeds and small farm implements.



Shubhadeep Roy and Neeraj Singh

ICAR- Indian Institute of Vegetable Research,
Varanasi 221005, Uttar Pradesh

World Water Day observed at IIVR

World water day was observed at the institute on 22nd March 2022. Dr. V. K. Tripathy, Assistant Professor for B.H.U. delivered an invited lecture on the significance of the day. Director Dr. T. K. Behera emphasized rational use of irrigation water in agriculture sector.



Shubhadeep Roy and Anant Bahadur

ICAR- Indian Institute of Vegetable Research,
Varanasi 221005, Uttar Pradesh

MoU signed for the promotion of green chilli powder

ICAR-Indian Institute of Vegetable Research, Varanasi has developed and patented technology of preparing green chilli powder which contain more than 30% Vit-C, 94-95% chlorophyll and 65-70% capsaicin. Seeing its characteristics M/s Holten King from Himachal Pradesh signed Mou with IIVR to produce and market green chilli powder on 5th April 2022.



ICAR-IIVR observed Azadi ka Amrit Mahotsav (AKAM) National Campaign on Kisan Bhagidari Prathmikta Hamari campaign during 25-30th April 2022

Different activities were organized at the institute to commemorate AKAM- Kisan Bhagidari Prathmikta Hamari campaign during 25-30th April 2022. Exposure visits, Training and capacity building programme on natural and organic farming, mushroom production, importance of microorganisms in agriculture and importance of formation of FPOs for sustainability were the main focus of discussion. More than 350 farmers and farm women participated in this campaign during 5 days.



Shubhadeep Roy and Neeraj Singh
ICAR- Indian Institute of Vegetable Research,
Varanasi 221005, Uttar Pradesh

World Honeybee day celebrated at ICAR-IIVR

World honeybee day was observed at the institute on 20th May 2022. A brainstorming session was organized on importance of honeybee and different byproducts apart from honey and employment opportunities of the farmers in beekeeping sector. Honeybee helps in the pollination of field crops particularly vegetables, hence importance of honeybee in vegetable sector was duly acknowledged. Director of the institute asked to strengthen the IBDC centre at IIVR and conduct regular capacity building programme in beekeeping techniques.



Shubhadeep Roy and P. A. Divekar
ICAR- Indian Institute of Vegetable Research,
Varanasi 221005, Uttar Pradesh

Chief Development Officer (CDO), Mirzapur Ms. ShriLaxmi V S visited the institute

Chief Development Officer (CDO), Mirzapur Ms. ShriLaxmi V S visited the institute on 23rd May 2022. During her visit, she appreciated the excellent work done by the scientists of the institute. She expressed her concern about post harvest processing of the perishable agri commodities like vegetables and urged scientists to develop technologies to minimize post harvest loss.



2nd Technology Promotion Day for kharif vegetables organized at IIVR

2nd Technology Promotion Day was organized on 23rd May 2022 in collaboration with Zonal Technology management Unit, ICAR-IIVR for popularization of bottle gourd, pointed gourd, bitter gourd, cucumber, amaranths, palak, radish, water melon, mask melon, water spinach etc. to the private companies and other stakeholders. On this occasion 15 private seed companies participated and witnessed the good demonstration of the crops. Director, Dr. T. K. Behera told that, promising varieties and hybrids should be popularized through public private partnership mode.



RAWE programme organized for the students of UP College, Varanasi

A field visit cum interaction workshop organized for RAWE programme of B.Sc. (Ag) final year students of UP College, Varanasi on 30th May 2022. Nearly 120 students participated in the programme. A team of scientists from ICAR-IIVR demonstrated different technologies of the



institute and discussed about career opportunities of the students in agriculture sector.

Shubhadeep Roy, Nakul Gupta and A. N. Tripathi

ICAR- Indian Institute of Vegetable Research,
Varanasi 221005, Uttar Pradesh

Orientation training programme on Agri-export marketing for cooperatives and FPOs organized in physical and virtual mode

Agri Business Management (ABI) unit, ICAR-IIVR, Varanasi in collaboration with VAMNICOM, Pune and APEDA organized four days orientation training programme on Agri-export marketing for cooperatives and FPOs in physical and virtual mode as well during 01 to 04 June 2022. The executives of cooperatives and FPOs from Bihar and Uttar Pradesh participated in the training in physical mode (35 no) and more than 100 participants were connected virtually. Discussions were carried out on different aspects of export of vegetables and marketing. Special emphasis was on export infrastructure development, processing and packaging of vegetables. Interactions were conducted on export value chain and market linkages also.



40th Group Meeting of All India Co-ordinated Research Project on Vegetable Crops organised

During 15-17th June 2022, the 40th group meeting of All India Co-ordinated Research Project (Vegetable Crops) was organized at ICAR-Indian Institute of Vegetable Research, Varanasi in virtual mode. The chief guest of the group meeting Dr. A.K. Singh, Deputy Director General (Horticulture) along with other experts evaluated the 35

regular centres and 24 voluntary centres of AICRP (VC). The experimental trials conducted during 2020-21 were reviewed during this 40th Annual group meeting.

International Yoga Day 2022 celebrated at ICAR-IIVR, Varanasi

International Yoga Day was celebrated at the institute on 21st June 2022 in which all the employees of the institute including scientists, technical, administrative and supportive staff participated. Director of the institute Dr. T. K. Behera emphasized the importance of Yoga in daily life and research activities.



National level campaign on “Efficient and balanced use of fertilizers” organized at ICAR- Indian Institute of Vegetable Research, Varanasi

A farmer awareness Campaign cum training programme on “Efficient and balanced use of fertilizer” was organized at the ICAR- Indian Institute of Vegetable Research,

Varanasi on 21st June 2022 in which scientists and 37 farmers participated. Director of the institute Dr. T. K. Behera, in his inaugural address told about importance of use of balanced fertilizers in soil and urged to the farmers take care of their soil. Farmers were educated on the importance of balanced fertilization and role of organic manures in vegetable cultivation for sustainable and remunerative production. They were also informed about the role of soil testing and the use of drip fertigation in vegetable cultivation for balanced and economized use of fertilizers. Later farmers visited the residue management complex of the institute to know about the production of organic manures by recycling of vegetable wastes. They also visited the various demonstration plots at the research farm of the institute and the soil testing laboratory to have knowledge on soil sampling technique and soil analysis.



Shubhadeep Roy and S K Singh

ICAR- Indian Institute of Vegetable Research,
Varanasi 221005, Uttar Pradesh



Joining/Transfer/ Promotion/ Retirement

Joining Dr. Jagesh Kumar Tiwari Sh. Ramji Giri	Date of joining 04.04.2022 22.05.2022
Transfer Sh. Ankit (IIVR to ICAR HQ)	Date of transfer 30.06.2022
Promotion Dr. Nakul Gupta Dr. Manimurugan C. Dr. Shubhadeep Roy Ms. Shweta Kumari Sh. Bharat Raj Meena Dr. J. Halder Dr. A. T. Rani Dr. P. Divekar Dr. Manjunatha Gowda T. Sh. Ashok Kr Singh Dr. Rameshwar Singh Sh. Y. P. Singh Dr. P. C. Singh Sh. Ajay Tiwari Sh. Arun Pratap Singh Sh. V. V. Diptikar Sh. S. K. Gupta	Date of DPC 07.01.2022 07.01.2022 05.04.2022 05.04.2022 26.05.2022 10.06.2022 10.06.2022 10.06.2022 21.06.2022 24.04.2022 24.04.2022 24.04.2022 05.05.2022 05.05.2022 05.05.2022 05.05.2022 11.03.2022
Retirement Dr. J. Singh	Date of retirement 28.02.2022

Editorial board

Shubhadeep Roy, Jaydeep Halder and Neeraj Singh

Published by

T. K. Behera, Director, ICAR-IIVR

ICAR-Indian Institute of Vegetable Research

Post Bag No.-1, P.O.- Jakhini (Shahanshahpur), Varanasi-221 305, Uttar Pradesh

Phone: +91-542-2635247, Tele-fax: +91-5443-229007

Emails : vegetablenewsletter@gmail.com; directoriivr@gmail.com