



ICAR-NATIONAL INSTITUTE OF BIOTIC STRESS MANAGEMENT

Baronda, Raipur - 493 225, Chhattisgarh

From The Director's Desk

Conservation Agriculture

Conservation Agriculture is one of the most viable and sustainable production systems widely practiced in the world with three basic principles i.e. minimum tillage and soil disturbance, permanent soil cover with crop residues and live mulches, and crop rotation and intercropping. Direct sowing/planting involves minimum disturbance of soil, and use of cover crops suppress the weed population to research gaps greater extent, crop rotation improves water use, soil fertility and also reduce biotic stresses (pest and diseases). Wide variety of studies have proved that CA can significantly suppress weed populations. However, holistic and systematic scientific investigations on ecological foundations of pest dynamics, emergence of new biotic stresses and mechanism of emergence have not been understood. In addition to weeds, insect pests and diseases are another important biotic stress that cause huge economic losses to crops annually across the globe. Habitat management, bioecology, role of alternate and collateral hosts, changing microclimate could affect the biology and ecology of insect significantly. Much studies in isolation have proved best for successful control of the key pests; stem borers of maize, sorghum, rice etc. Major crop rotations followed in India are Rice-wheat-pulses or rice- mustard-cowpea/gram. Conservation agriculture and organic farming are very well adopted and practiced in some parts of the country and the government has making efforts to extrapolate/ replicate the in the entire country.

Very surprisingly, it was reported that sudden outbreak of rice mealybug and cutworm in rice crop in the seventh year of long-term rice-wheat based cropping system in Middle East Indo-Gangetic Plains of India (Patna) due to its global distribution, changing climatic scenario, presence of grassy weeds as alternate hosts unlike conventional



agriculture. The direct seeded rice with zero tillage wheat, and direct seeded rice + brown manuring (BM) with zero tillage wheat systems resulted in significantly higher parasitic nematodes, *Tylenchorhynchus brevilineatus*, *Meloidogyne graminicola*, *Pratylenchus thornei* than direct seeded rice with zero tillage as *Sesbania* is a host of *Meloidogyne* spp. The infestation of fall armyworm in long term conservation agriculture maize has significantly increased as compared to conventional maize. Similarly, the incidence and infestation of Bihar hairy caterpillar in summer green gram was three and two times higher in long term CA as compared to conventional green gram. While incidence of some of the pests in conservation agriculture plots has decreased as compared to conventional agriculture. In this connection, ICAR-NIBSM in collaboration with ICAR-DWR, Jabalpur and ICAR-IARI, New Delhi is investigating the change in pest profile and the causes/mechanisms underlying in emergence or outbreak of biotic stresses in long term conservation agricultural production system.


(P. K. Ghosh)

Director and Vice-Chancellor

Research Highlights

AGRICULTURAL BIOTECHNOLOGY

Molecular characterization of begomoviruses infecting okra in Chhattisgarh

(Mallikarjuna, J, M. Pitchamuthu, P.N. Sivalingam, Vinay Kumar, Sridhar, J., Ashish Marathe, Vinay, N. D.)

Bhendi yellow vein mosaic disease (BYVMD) and okra enation leaf curl disease (OELCD) causing potential yield loss of up to 100% in okra. In the present study, three BYVMD samples from Raipur, Kanker, and Kawardha of Chhattisgarh and two OELCD samples from Raipur and Kawardha of Chhattisgarh were collected. Molecular characterization of begomovirus-induced diseases in okra was done to identify novel genetic resources and genes against biotic stresses. Amplification of viral DNA of three Bhendi yellow vein mosaic disease infected (BYVMD) samples and two okra enation leaf curl disease (OELCD) infected samples indicated that OELCV was found to be associated with all the samples. Three full-length betasatellites were found to be associated were Ludwigia leaf distortion betasatellite (LLDB), bhendi yellow vein mosaic betasatellite (BYVB), okra enation leaf curl betasatellite (OLCB). One sub-genomic betasatellite was also reported to be associated with BYVMD.

Broad-spectrum resistance (BSR) genes from wild and cultivated *Oryza* species

(Vinay Kumar, P.N. Sivalingam)

Plants are sessile in nature when they have their own intrinsic mechanism by which withstand the several stresses. Among them broad-spectrum resistance (BSR) genes are known to play a crucial role. BSR genes have been selected on the basis of literature surveys which were having resistance to the different strains of BLB diseases and blast disease. Japonica and Indica rice and wild species namely *O. glaberrima*, *O. longistaminata*, *O. minuta* BSR genes were targeted and their nucleotide and coding sequences namely OsPAL4, OsGLP, OsLYP4, OsPAD4, Xa13 (SWEET11), Xa5 SWEET14, OsWAK25, Xa21, SPL33 were retrieved from the Genbank and Gramene database were aligned to detect the structural variation and insertion/deletion. The consensus sequences among the wild and cultivated species were identified. For *in silico* analysis, all the attributes and nucleotide sequences of nine BSR genes were retrieved and comparative sequences analysis for BSR genes in *Oryza* species showed the regions of structural variation (Indels and SNPs), in the different wild and cultivated *Oryza* lines which could be utilized for functional validation to correlate the BLB disease resistance reaction in rice lines. Identification of BSRs in rice will be helpful in developing varieties resistance to the multiple stress tolerance using conventional breeding or modern biotechnological tools such as genome editing.

Designing CRISPR constructs specific to Flavonone-3-hydroxylase gene in soybean

(Ashish Marathe, P. N. Sivalingam, Vinay Kumar, Mallikarjuna J.)

Target oligos specific to *F3H* gene in soybean were annealed following the standard procedure cloned into pBLUGRNA vector and resolved on 3% agarose. The annealed oligos were subsequently cloned into pBlugRNA vector. *Escherichia coli* DH5a was transformed with the recombinant vector and colonies were screened for integration of target oligos through restriction digestion using *EcoRI*. gRNA cassette from the positive transformed colonies was then cloned into destination vector pMDC123 containing the Cas9 gene and confirmed through restriction digestion using *EcoRI*. EHA105 strain of *Agrobacterium tumefaciens* was transformed with the plasmid isolated from positive clones and confirmed through PCR using gRNA specific primers.

Cytological observations of *Pyricularia grisea* and neck and finger infections

(S. K. Jain, Mamta Choudhary, Ashish Marathe)

Resistant and susceptible genotypes of finger millet were inoculated by spore suspension of *Pyricularia grisea* pathogen for neck and finger infections and samples were harvested at different time points. Microtome sections were cut and stained with Hematoxylin and Eosin stains and observed under microscope. Cytological observations of neck and finger tissues revealed higher mycelium growth of the pathogen in cells of susceptible line (24 hai) and penetration in cells were clearly observed (96 hai). In the resistant line GPU 45, mycelial growth was reduced and most of the cells were observed with the deposition of brown colour deposits indicating resistant response.

CHEMICAL ECOLOGY

Promising volatiles in various profiles across the crops and the insect pests

(R. K. Murali Baskaran, Yogesh Yele, K. C. Sharma)

1-Nonadecene, Eicosanoic acid, methyl ester, Phenol, 2,6-bis(1,1-dimethylethyl)-, 1-Tetradecene 1-Heptacosanol and Hexadecanal appeared commonly in the brown planthopper- and leafhopper-induced profiles of rice, Oxirane, hexadecyl, Eicosanoic acid, methyl ester and 1-Nonadecene shared in the profiles, induced by pod borer and pink stem borer in chickpea and wheat, respectively; Eicosane, Tetracosane, Pentatriacontane, Hexacontane, 2-Butenedioic acid (Z)-, monododecyl ester and 1-Nonadecene occurred commonly in fall armyworm-induced profiles in rice and maize; and Eicosane, Propanoic acid, 3-mercapto-, dodecyl ester and Hexacontane occurred commonly in all the whitefly-induced profiles in soybean, green gram, black gram and cowpea are important volatiles to be explored in the development of management strategies.

Nano-formulation of sex pheromones against rice yellow stem borer and maize fall armyworm

(R. K. Murali Baskaran, K. Subaharan)

A field experiment was conducted during summer 2023 in low land rice (cv. MTU 1010) to evaluate the nano-formulation of sex pheromone of yellow stem borer in comparison with rubber septa and trap without lure. A maximum number of male yellow stem borer of 651 were collected in the traps with nano-pheromone while it was only 67 number in traps with rubber septa during eight-week periods. Initially traps with rubber septa was effective, trapping 47 adults on 11th MSW, 10 adults on 12th MSW and 10 adults on 13th MSW, thereafter no adult was caught in the trap with rubber septa. Adult collection increased from 12th MSW (163 nos.), 13th MSW (191 nos.) and 14th MSW (132 nos.) in the traps with nano-pheromone; and attraction was noticed up to 7th MSW (28 nos.) after installation.

Farmer FIRST Programme (FFP)

(P. Mooventhan, B. K. Choudhary, J. Mallikarjuna, G. L. Sharma, L. K. Verma, Gunjan Jha)

In the crop-based module, we introduced drought-tolerant rice (DRR Dhan-42) and bio-fortified rice (Proteinzin), covering 28 hectares and benefiting 78 farm families. Demonstrations included scientific practices for rice fallow pulses over 14.50 hectares and finger millet in 0.30 hectares. In horticulture, poly house and open cultivation of tomatoes, okra, pumpkin, ash gourd, and cauliflower spanned 12.30 hectares, benefiting 32 families. Fruit plantations for home nutritional gardens were promoted. Soil health was addressed with IIHR - Arka Microbial Consortium on 2.50 hectares. Livestock initiatives hatched over 230 Kadaknath and quail eggs, benefiting 6 families. The enterprise module showcased paddy straw mushroom technology, and Agro-processing covered various products. Ash gourd Petha making was demonstrated for women SHGs. Natural Resource Management featured Azolla production for poultry and livestock. E-Extension services disseminated 2577 messages, photos, and videos to 1083 farmers. Additionally, 29 HRD programs engaged 612 tribal farmers, enhancing agricultural practices.

Institute Activities

Biotic Stress Management in Oilseeds (August 07, 2023)

A brainstorming meeting on 'Biotic Stress Management in Oilseeds' was conducted on 7.9.2023 at the ICAR-National Institute of Biotic Stress Management, Raipur under the Chairmanship of Dr. P. K. Ghosh, Founder Director and Vice-Chancellor. Four



institutions/organizations, which are listed below, took part in the hybrid mode of the meeting. Dr. M. Sujatha, PS and Head (Crop Improvement), ICAR-IIOR in her deliberation, highlighted the research being undertaken at ICAR-IIOR, Hyderabad including oilseeds germplasm bank, varieties released, AICRP centers, expertise in microbial biopesticides, and status of biotic stress in climate change. The research progress made in six oilseed crops with reference to insect pests and diseases was presented by Dr. M. Santha Lakshmi Prasad, PS and Head (Crop Protection), IIOR, Hyderabad. For the purpose of further research, Dr. A. K. Vishwakarma, Project Coordinator for Sesame & Niger, has agreed to share oilseed resistant materials.

10th Institute Management Committee Meeting (August 11, 2023)

Dr. P. K. Ghosh, Director and Chairman of the 10th IMC of NIBSM welcomed all the members and special invitees. He briefed the genesis, mandate and objective of the institute. Dr. Pankaj Kaushal, Principal Scientist briefed overview of ICAR-NIBSM, Raipur. In addition, six JDs, Dr. Ambast, PS, Dr. K. C. Sharma, PS, AO and FAO have attended as special invitees. Thereafter seven agenda items were put up before the committee and recommendations were provided after making lengthy discussion. The meeting was ended with the vote of thanks by the FAO, NIBSM.



9th Institute Research Committee meeting (August 16-17, 2023)



The 9th Institute Research Committee meeting was held during 16-17 August 2023 under the Chairmanship of Dr. P.K. Ghosh, Director, ICAR-NIBSM, Raipur. On his address, the Chairman, IRC emphasized to maintain the average NAAS impact attained. He also expressed

his happiness on many other publications made by the scientists during his tenure including Outreach Extension. He praised that the research outcome of NIBSM now reached to sellable products and urged to the scientists for focus on commercialization. He narrated about the nine research programme placed in EFC2021-26 and prioritization of five research programme. He further advised to work on multi-disciplinary mode of approach. He also indicated that NIBSM should take lead on storage pests, utilization of artificial intelligence in metabolic network and germplasm screening etc on biotic stress of crops etc. During the meeting, the progress on research projects were reviewed and future action on the projects were suggested. Totally 15 institutionally and six externally funded projects were presented by the PIs and documented the review comments.

Vigilance Awareness Campaign 2023 (August 16 to November 15, 2023)



A three-month long Vigilance Awareness Campaign was organized from August 16 to November 15, 2023. To spread awareness and campaign about “Complaints under PIDPI (Public Interest Disclosure and Protection of Informers)”, three posters

in Hindi and English languages were displayed. A Gram Sabha was organized in the ICAR-NIBSM, Raipur adopted village Adsenda district Raipur on 17.10.2023 in which about 45 villagers participated including Sarpanch, Upsarpanch and Panchayat Sachiv. Dr. S.K. Jain, PS & VO participated in the seminar on Vigilance Awareness and Anti-bribery management system organized by ACB, CBI Chhattisgarh in Raipur on 04.11.2023. In the seminar, lectures on anti-bribery management system, judicial aspects of vigilance/anti-corruption cases and spiritual approaches for corruption free nation were organized. In the closing ceremony on 15.11.2023, a lecture was organized on the Cyber hygiene & security and systems and procedures for the organization.



77th Independence Day (August 15, 2023)

Independence Day was celebrated on 15.8.23 in ICAR-NIBSM, by hoisting national flag. All scientific, administrative, YPs, SRFs and labourers participated.

Parthenium Awareness Week (August 16-22, 2023)

Parthenium awareness week programme was organized at ICAR-NIBSM, Raipur and biotic stress managed village, Adsenda, Raipur during August 16-22, 2023 to make farmers and the general public aware of the menace of Parthenium, which is responsible for causing health

problems in human beings and animals, beside deteriorating environment, loss of productivity and biodiversity. During the programme, Dr. Vinod Kumar Wasnik, Senior Scientist (Agronomy) delivered the detailed lecture on integrated Parthenium management and its utilization as compost. More than 100 participants from institute and village attended the programme.



XVI Annual Review Meeting of AICRP Nematodes in Agriculture (September 12-13, 2023)

16th Annual Review Meeting of All India Coordinated Research Project on Nematodes in Agriculture organized by the ICAR-National Institute of Biotic Stress Management, Raipur from 12-13 September, 2023. The Chief Guest, Dr. P. K. Ghosh, Director and Vice Chancellor, ICAR-NIBSM urged the AICRP Nematodes group to include basic research in their technical programme. Dr. S. C. Dubey, ADG (PP&B), ICAR provided useful suggestions during two days technical sessions. Dr. H. S. Gaur, Former Vice Chancellor, SVPUAT, Meerut and Dean, IARI and Dr. Rakesh Pandey, Former Head, CIMAP, Lucknow provided their remarks as Guest of Honour. Dr. Gautam Chawla, PC, AICRP Nematodes presented annual progress report for the year 2022-23. The delegates from all the coordinating and voluntary centres participated in two days deliberations and presented their progress report. Dr. Mallikarjuna, J., PI of AICRP Nematodes scheme was the co-organizing secretary of the programme.



Special Campaign 3.0 (September 29 to October, 31, 2023)

Special campaign was organized from 29 Sept., to 31st Oct., 2023 in which various campaigns including Swachhhta drives were carried out in the campus and outside campus.



12th NIBSM Foundation Day (October 07, 2023)

NIBSM has celebrated its 12th foundation day on 7.10.23. Dr. Paroda, former DG of ICAR has presided over the function as a chief guest. In his deliberations, he appreciated the infrastructure, laboratory facilities and progress made in research. During the occasion, two books, one e-book and one Kadaknath app were released. Various awards like Best scientist of the year, Best research paper award, Best student award and Institute recognition award were offered to the scientists of the NIBSM by the chief guest. Dr. Ambast, JD (Dean) acting and his team co-ordinated the programme.



8th Research Advisory Committee (RAC) Meeting (November 02-03, 2023)



The 8th Research Advisory Committee (RAC) Meeting of ICAR-NIBSM, Raipur was conducted for two days, 02-03rd November 2023 under the chairmanship of Dr. A.N. Mukhopadhyay, Former Vice-Chancellor, Assam Agricultural University, Jorhat, Assam. On the first

day (2nd November 2023), RAC visited the village Adsena which was adopted by the NIBSM as the Biotic Stress Model Village for implementing various biotic stress management technologies in the farmers' field. A farmer's meeting was organized at Adsena village. About 200 farmers participated. Later the RAC committee visited various sites including Agro Processing Unit/ Custom Hiring Centre etc. of Kasdol village adopted under FFPs. On the second day of RAC team visited the facilities created at the NIBSM. The RAC Chairman appreciated the achievements made by NIBSM during the previous year and the support rendered by the ICAR.

World Soil Day (December 05, 2023)



The ICAR-NIBSM, Raipur has organised 'World Soil Day' on the theme of "Soil and Water: A Source of Life" on 5.12.23 in hybrid mode. In this event, Dr. Debashish Mandal, Head, Soil Science and Agricultural Chemicals, ICAR-IARI, New Delhi has delivered a lecture on

"Achieving Land Degradation Neutrality: An Old Problem with New Urgency". More than 150 participants covering staff members, YPs, newly inducted students etc., participated in the programme and was coordinated by Dr. Sushil K. Sharma, Principal Scientist and Nodal Officer, NIBSM, Raipur.

Swachhta Pakhwada (December 16-31, 2023)



The *Swachhta Pakhwada* was inaugurated on 16.12.23 with brief introduction by Dr. Sushil K. Sharma, Principal Scientist & Nodal Officer, *Swachhta Abhiyan*. Subsequently, Dr. P. K. Ghosh, Director and Vice-Chancellor of ICAR-NIBSM, Raipur has

administered the *Swachhta* pledge to all the staff members by physical mode and delivered a presidential speech on the *Swachhta Abhiyan* and ODF status in the India, followed by *Swachhta* drive in the premises which was coordinated by Dr. Vinod K. Wasnik, Senior Scientist. More than 200 staffs including scientists, administrative staffs, YPs, students (UG, PG and Ph. D.) and other farm labourers participated in the cleanliness of different areas in the campus.

Institute Technology Management Committee (ITMC) (December 20, 2023)

A meeting of ITMC was conducted on 20th December, 2023 under

the Chairmanship of Dr. P. K. Ghosh, Director and Vice-Chancellor, ICAR-NIBSM, Raipur. The meeting was attended by the members including Dr. Pankaj Kaushal, former JD (Research) and Chairman (PME), Dr. Ashis Kumar Das, Principal Scientist, ICAR-CCRI, Nagpur, Dr. R.K. Murali Baskaran (Principal Scientist), Dr. S.K. Jain (Member Secretary & PI-NAIF), Dr. P.N. Sivalingam (Principal Scientist) and Dr. Ashish Marathe (Co-PI, NAIF). In the meeting the discussion held on the technologies which are in pipeline and the requirement of basic data generations. It was decided that the filing for copyright of the mobile apps through the empanelled attorney's should be taken up. It was also decided that the awareness programme on IPR for scientists and other staff should be conducted twice in a year.

Orientation Programme (December 28, 2023)

Orientation Programme was held on 28.12.23 under the Chairmanship of Dr. P. K. Ghosh, Director, NIBSM to UG, PG and Ph. D. students who got admitted in ICAR-NIBSM to undergo education and thesis dissertation physically during the calendar year 2023-24. All



Joint Directors and Director of NIBSM facilitated students.

DA & FW for submission on Agricultural Mechanization for implementation of its component No. 1 under Drone Technology Demonstration

(PI and Nodal Officer: Dr. P. Mooventhan)

ICAR-NIBSM implementing "DA&FW's Drone technology demonstration" under the Sub Mission of on Agricultural Mechanization from 2022. A series of Agri-drone spraying demonstration was conducted at nearby villages to create farmers awareness and promotion of drone technology. It is also commendable that ICAR-NIBSM conducted demonstrations in nine villages near Kharora, Raipur, covering a substantial 14-hectare field. The fact that approximately 448 farmers and stakeholders were benefitted under this outreach efforts. The successful implementation of drone technology in agriculture not only enhances productivity and sustainability but also showcases the potential for technological advancements to benefit the farming community. Such initiatives play a crucial role in bridging the gap between technology and its practical application in the agricultural sector.

Details of Pesticides spray at farmers' field

Agribot UAV 10 liters (SI. No: IA6A1122G1900145 & IA6A1122G2000146)

Date and Place of Demonstration	Area Covered under the Drone Spray	Number of farmers Benefited
Adsena, Raipur on 02.11.2023	1.0 ha	30
Mohadi, Raipur on 02.11.2023	0.40 ha	25
Chandkhuri, Raipur on 02.11.2023	1.21 ha	18
Pacheda, Raipur on 02.11.2023	0.20 ha	32
Dondekhurd, Raipur on 02.11.2023	0.40 ha	41
Matiya, Raipur on 02.11.2023	0.40 ha	33
Barbanda, Raipur on 02.11.2023	0.60 ha	34
Baronda, Raipur on 02.11.2023	0.40 ha	45
Saragaon, Raipur on 02.11.2023	0.40 ha	27

Workshops/symposium/seminar/conference/training/other fora attended

Organized by ICAR-NIBSM

S. No.	Symposia/seminar/training attended	Period	Name of scientist (Dr.)
1.	Animal Vaccination programme on adopted village Adsena against Foot and Mouth disease, Haemorrhagic Septicaemia and Black Quarter disease on large and small ruminants	12.7.23, 2.11.23	S. Dash
2.	Brainstorming on biotic stress management in oilseeds	7.9.23	Pankaj Kumar Sharma, R. K. Murali Baskaran
3.	XVI Annual Review Meeting of All India Coordinated Research Project on Nematodes in Agriculture	12-13.9.23	Pankaj Kumar Sharma, Mallikarjuna, J.
4.	One Day Training cum exposure visit of farmers (ATMA, Balaghat)	18.9.23	Vinay Kumar
5.	Fire safety training programme	17.10.23	Binod K. Choudhary
6.	Training programme on plant protection measures using biocontrol agents and biofertilizers for improving crop yield	21.12.23	Vinay Kumar

Attended by the Scientists of ICAR-NIBSM

S. No.	Symposia/seminar/training attended	Period	Organized by	Scientist (Dr.)
1.	International conference on Innovative and Current Advances in Agriculture and Allied Sciences	10-16.7.23	ICAAAS-2023	J. Sridhar
2.	Data Science in Agriculture	4-15.9.23	ICAR-IASRI, New Delhi	Arkaprava Roy
3.	XVI Agricultural Science Congress, ICAR-Central Marine Fisheries Research Institute (CMFRI), Kochi	10-13.10.23	FFP research poster organized by the NAAS and hosted by the, Kerala from 10 th to 13 th October 2023	P. Mooventhan
4.	Phage Futures: Global Digital Summit	25.10.23	Phage CDMO and JAFRAL in collaboration with by Kisaco Research, London, UK	Lata Jain Vinay Kumar
5.	International Conference through virtual mode on Microbial Bio-prospecting towards Sustainable Development Goals	24-25.11.23	Lovely Professional University, Phagwara, Punjab	Lata Jain Vinay Kumar
6.	Antimicrobial Resistance: A One Health Perspective (virtual)	23.11.23	Nagpur Veterinary College, Nagpur	Lata Jain
7.	Preventing Antimicrobial Resistance (AMR), through a One Health approach	24.11.23	Department of Animal Husbandry and Dairying, Government of India	Lata Jain
8.	Global Micronutrient Summit 2.0	5-6.10.23	International Zinc Association, the Fertilizer Association of India and Rio Tinto	Arkaprava Roy
9.	Two Days Training Programme on "Advances in Weed Management under Changing Climate Scenario"	28-29.10.23	DFSRDA, VNMKV, Parbhani	Anil Dixit
10.	XXII National Symposium of Indian Society of Agronomy on "Climate Smart Agronomy for Resilient Production Systems and Livelihood Security"	22-24.11.23	ICAR-CCARI, Goa	Arkaprava Roy
11.	28 th Asian Pacific Weed Science Society Conference oral presentation on "Weed Allelochemicals for possible pest management"	26-29.11.23	APWSS, Phuket, Thailand	Anil Dixit
12.	Biocontrol Expo (displayed NIBSM charts and exhibits)	19.11.23	ICAR-NBAIR, Bengaluru	R. K. Murali-Baskaran
13.	XXII Biennial Symposium on "Climate Smart Agronomy for Resilient Production Systems and Livelihood Security"	22-24.11.23	ICAR-CCARI, Goa	J. Sridhar
14.	National Conference of Plant Physiology	9-11.12.23	IARI, New Delhi	Sandeep Adavi, B.
15.	3 rd Pedagogy Development Program	28-30.11.23 1-2.12.23	NAAS, ICAR, New Delhi	Yogesh Yele
16.	International Conference on Feeding the Future through Sustainable Eco-friendly Innovations in Rangeland, Forages and Animal Sciences	2-4.12.23	UAS, GKVK, Bengaluru	P. Kaushal
17.	CAU-Regional Agri Fair-2023-24	12-14.12.23	North East India Farmers Conclave, Dimapur, Nagaland	P. Mooventhan

Professional Attachment Training

S. No.	Title of PAT	Period	Host institute	Name of scientist (Dr.)
1.	Water logging impact on host-pathogen interaction with reference to onion anthracnose/twister disease	28.8.23 to 28.11.23	ICAR-NIASM, Baramati	Sandeep Adavi, B.
2.	Professional Attachment Training	28.8.23 to 30.11.23	ICAR-NIBSM, Raipur	Dr. Ravi Bhushan Prasad (ICAR-IARI, Assam) Mentor: Dr. S. K. Jain
3.	MaxEnt modeling for rice yellow stem borer under current and future climatic scenario	24.9.29 to 3.12.23	ICAR-CRIDA, Telangana	Shravani Sanyal
4.	A comprehensive study on the effects of <i>B. oryzae</i> on rice seed health, quality, location and transmission: Bridging research gaps	24.8.23 to 24.11.23	Seed Centre, TNAU, Coimbatore	Niranjan Prasad, H. P.
5.	Integrative data analysis in transcriptomics and proteomics with multifaceted software approach and transcriptome based expression profiling of cytochrome P450 under oxidative stress condition in sugarcane	24.8.23 to 29.11.23	ICAR-SBI, Coimbatore	Nunavath Aswini

Publications

Research and Review papers

Dash, S., M. Choudhary, R. Behera, A. Upadhyay, P. R. Shivhre and R. Rath. 2023. A review on genetic characterization of indigenous cattle breeds. 2023. *Biological Rhythm Research* doi:10.1080/09291016.2023.2282212

Dixit, S., P. N. Sivalingam, R. K. Murali-Baskaran, M. Senthil-Kumar and P. K. Ghosh. 2023. Plant responses to concurrent abiotic and biotic stress: unraveling physiological and morphological mechanisms. *Plant Physiology Reports*. doi.org/10.1007/s40502-023-00766-0

Saw, G., P. Nagdev, M. Jeer and R. K. Murali-Baskaran. 2023. Silica nanoparticles mediated insect pest management. *Pesticide Biochemistry and Physiology* 194: 105524. doi.org/10.1016/pestbp.2023.105524.

Verma, H. P., P. Mooventhan and P. K. Pandey. 2023. Farmers' uptake of oyster mushroom production through ADOPT model. *Indian Research Journal of Extension Education* 23 (2): 36-41.

Yele, Y., S. Chander, S.S. Suroshe, S. Nebapure, P. Tenguri, A.P. Sundaram. 2023. Ecological engineering in low land rice for brown plant hopper, *Nilaparvata lugens* (Stål) management. *PeerJ*. <http://doi.org/10.7717/peerj.15531>

Books and e-book

Choudhary, M., B. K. Choudhary and P.K. Ghosh. 2023. *Microbial Diversity in Agroecosystem of Bastar Plateau Zone of Chhattisgarh*, ICAR- National Institute of Biotic Stress Management, Raipur, Chhattisgarh, India, 126pp.

Murali-Baskaran, R. K., P. Mooventhan, P. K. Ghosh, K. Sai Maheshwari, S. Das and R. Kurapati. 2023. *Green technologies for sustainable management of invasive and transboundary pests* (e book), ICAR-NIBSM, Raipur & MANAGE, Hyderabad, 150p. ISBN: 978-93-91668-86-0.

Sivalingam, P. N., J. Sridhar, R. K. Murali-Baskaran, J. Mallikarjuna, P. Mooventhan, S. K. Jain, A. Dixit and P. K. Ghosh. 2023. *Good Agricultural Practices for biotic stress management in field crops*, ICAR-National Institute of Biotic Stress Management, Raipur, Chhattisgarh, India, 206p. ISBN: 978-93-5996-499-7.

Book Chapters

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बिनोद कुमार चौधरी, ममता चौधरी, सौम्या दास, महेंद्र कुमार. मत्स्य संसाधन, पालन, उनका संवर्धन एवं हमारे आहार में उपयोगिता. अर्पिष राजभाषा पुस्तिका प्रथम अंक -2023. भा.कृ.अनु.प.- राष्ट्रीय मांस अनुसंधान संस्थान, हैदराबाद.

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Video

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Awards and Recognition

S. No.	Awards/Recognition/Membership in Professional Societies	Year/Period	Offered by	Scientist (Dr.)
1.	Fellow of Indian National Science Academy	7.12.23	Indian National Science Academy	P. K. Ghosh
2.	Life time Achievement Award	22-24.11.23	Indian Society of Agronomy	
3.	Fellow of the National Academy of Agricultural Sciences	2023	NAAS, New Delhi	P. Kaushal
4.	RMSI Gold Medal (2022)	2023	Range Management Society of India, Jhansi	
5.	ISA Gold medal for outstanding contribution in the field of Agronomy	22-24.11.23	22 nd National Conference, Goa, Indian Society of Agronomy	Anil Dixit
6.	Lifetime Achievement Award 2023	29-30.12.23	International Conference on One Health and One World, RVSSKV, Gwalior	
7.	Best Oral Presentation Award	10-16.7.23	5 th International Conference on Innovative and Current Advances in Agriculture and Allied Sciences, Society for Scientific Development in Agriculture & Technology, Meerut, UP	J. Sridhar, R. K. Murali-Baskaran, P. N. Sivalingam
8.	Performance Excellence Award	28-30.11.23	Farmer FIRST National Review Workshop, Palampur, H. P.	P. Mooventhan
9.	Improved agroinoculation method for begomovirus infection in legumes	2023	ICAR, New Delhi (ICAR-CS-NIBSM-Technology-2023-015)	P. N. Sivalingam, A. Marathe, P. Kaushal, P. K. Ghosh
10.	Institute video film on "An Initiative of ICAR-NIBSM for enhancing farmers Income (15 Min.) on showcasing of NIBSM initiatives on outreach programmes for farmers welfare	2023	ICAR-NIBSM, Raipur	Vinay Kumar
11.	ASPB-ISPP Young Scientist Award	2023	IARI, New Delhi	Sandeep Adavi, B.
12.	Best Oral Presentation Award	22-24.11.23	ICAR-Central Coastal Agricultural Research Institute, Goa	Arkaprava Roy

Chairman/Co-chairman/Convener/Panelist etc.

S. No.	Awards/Recognition/Membership in Professional Societies	Year/Period	Offered by	Scientist (Dr.)
1.	Expert Panelist	20.10.23	National Dialogue on 'Threats of invasive insect pests in India: Challenges & Way forward, organized by ICAR-NBAIR, Bengaluru	R. K. Murali-Baskaran
2.	Convener for technical session on Characterization, Diversity and Evolution of Viruses in VIROCON-2023	1-3.12.23	Advancements in Global Virus Research Towards One Health, Trichirapalli, Tamil Nadu	P. N. Sivalingam
3.	Executive member	2023-2025	Asian PGPR Society, India Chapter, Executive Body	Sushil K. Sharma
4.	Secretary	2023-2024	Biotic Stress Management Society, ICAR-NIBSM, Raipur	

In-house Awards

S. No.	Awards/Recognition/Membership in Professional Societies	Year/Period	Offered by	Scientist (Dr.)
1.	Best Scientist Award	2023	12 th Foundation Day, ICAR-NIBSM, Raipur	P. Mooventhan
2.	Institute Recognition Award	2023	12 th Foundation Day, ICAR-NIBSM, Raipur	P. N. Sivalingam
3.	Best Research Paper Award	7.10.23	12 th Foundation Day, ICAR-NIBSM, Raipur	R. K. Murali-Baskaran, P. Pawar, K. C. Sharma, A. Marathe
4.	Best Student Award	7.10.23	12 th Foundation Day, ICAR-NIBSM, Raipur	Priyanshu Pawar, Swagata Thakur, Anik Basak
5.	First prize in Hindi Sodhapatralakhan competition	14-28.9.23	Hindi Pakhwada, ICAR-NIBSM, Raipur	Lata Jain
6.	Second prize in Hindi Sulekh (shrutlekh)	14-28.9.23	Hindi Pakhwada, ICAR-NIBSM, Raipur	Vinay Kumar

Special lecture delivered

S. No.	Awards/Recognition/Membership in Professional Societies	Year/Period	Offered by	Scientist (Dr.)
1.	Zoonotic diseases and their management	18.9.23	ATMA, Balaghat	Lata Jain
2.	Special lecture on Good Field Practices	18.9.23	ATMA, Balaghat	J. Sridhar
3.	Demonstration and visit to biocontrol laboratory	18.9.23	ATMA, Balaghat	R. K. Murali-Baskaran
4.	Demonstration and visit to biocontrol laboratory management	21.12.23	Funded by NABARD, Raipur	
5.	Lead lecture on Biotic Stress Scenario In Agriculture: Challenges And Way Forward	15-18.12.23	International Conference on Plant Health Management, Hyderabad	P. N. Sivalingam
6.	Role of GmIFS1 gene and its promoter in resistant and susceptible lines of soybean	1-3.12.23	VIROCON-2023 Advancements in Global Virus Research Towards One Health, Trichirapalli, Tamil Nadu	P. N. Sivalingam
7.	Molecular diversity of begomoviruses infecting Okra from Chhattisgarh			
8.	Potential of zinc solubilizing rhizobacteria from eastern Uttar Pradesh in improving yield and zinc biofortification of wheat	19-21.9.23	8 th Asian PGPR Society for Sustainable Agriculture. National Conference on Beneficial Microbes for Integrated Plant Health Management, GKVK, Bengaluru	Sushil K. Sharma

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