

ICAR-NATIONAL INSTITUTE OF BIOTIC STRESS MANAGEMENT

Baronda, Raipur - 493 225, Chhattisgarh

From The Director's Desk

Synthetic elicitors-induced defense in crops against herbivory

Alternative pest management strategies are receiving more attention as a result of the detrimental effects of conventional chemical pesticides as well as control failures. Chemical elicitors have been reported to either enhance or suppress volatile organic compounds (VOCs) emission, producing VOC that is similar to or less than that produced by herbivore-induced VOC or causing a favourable response in herbivores' natural enemies. Priming of plants with exogenous applications of chemical elicitors often referred to as 'Green vaccination', can induce 'Systemic Acquired Resistance' (SAR) and increase the readiness of plants to face the forthcoming danger of biotic and abiotic stresses.

Plant hormones including jasmonic acid, methyl jasmonate, salicylic acid, methyl salicylate, ethylene, ABA, polyamines, brassinosteroids, tricontinol etc., and synthetic chemicals including azelaic acid (AA), benzothiadiazole (BTH), gibberellic acid (GA), harpin, JA, polyamines, chitosan, brassinosteroids, tricontinol, linalool, 2,4 D etc., have been reported to elicit systemic acquired resistance in crops against herbivores. Synthetic elicitor molecules attach to the special receptor proteins located on plant cell membranes. The receptors are able to recognize the molecular pattern of elicitors, resulting the increased synthesis of secondary metabolites, phytoalexins which reduce the damage and increase the resistance to pests, diseases and environmental stresses.

Other benefits of chemical elicitors in the field of crop protection include: i) Reduced damage from insects, fungi, pests, and herbivores; ii) Reduced environmental hazards as elicitors interact directly with defensive pathway of the crop plant, and their acute toxicity to other organisms is lower than that of pesticides, and iii) As protective agrochemicals, elicitors can be applied with the current spraying technology. Although chemical elicitors provide a number of



benefits, some drawbacks include reports that they are less effective in crops, particularly in monocots. Secondly, synthetic chemical elicitors are typically not miscible in water and have been found to be phytotoxic in a few cases where they were not utilized in the right formulations. Finally, it was noted that the yield of elicitors' applied fields, particularly few crops, had decreased since the plant had to use a significant amount of its energy budget to produce various volatiles and defense chemicals. However, in the majority of previous study and literature, the aforementioned constraints of chemical elicitors have not been extensively reported.

According to reports, elicitor-based formulations have been gaining popularity worldwide, with 'Bion' in the Europe, 'Actigard' in the United States, 'Chitosan HYT-D' in the Bangladesh, and 'Chito-Stik' and 'Chito-power' in the Canada. Many such chemical elicitor-based formulations may come out in future for plant protection.


(P. K. Ghosh)
Director

Research Highlights

FLAGSHIP PROGRAMME

Estimation of biotic stress-induced yield losses in crop plant

(Pankaj Sharma, K. K. Mondal, Mallikarjuna, J., Sridhar, J., Shravani Sanyal, Arkaprava Roy)

Ground data on damages caused by yellow stem borer and single rice plant yields were collected in transplanted rice and direct sown rice (cv. Swarna) during *kharij* 2024. Arithmetic computation of yield losses in rice based on the single plant yield indicated that yield losses were 12.13%, 27.57%, 39.65% and 48.73% for transplanted rice and 31.76%, 36.59%, 35.95% and 47.32% for direct sown rice at different intensities of white ear damage of 1-25%, 26-50%, 51-75% and 76%-100%, respectively.

CHEMICAL ECOLOGY

Functional characterization of volatiles induced key insect pests

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

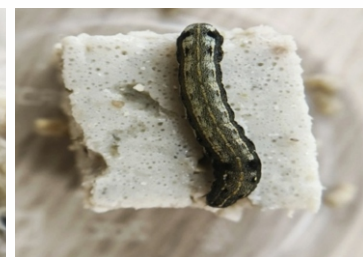
Tobacco cutworm, *Spodoptera litura*

The profiles of cowpea, green gram, black gram, and soybean infested

with *S. litura* showed noticeably more volatiles than those of the uninfested crops. Selected synthetic form of seven volatiles treated artificial diets at 500 ppm were evaluated against 2nd instar of *S. litura* to study their performance on growth indices. Diets treated with octadecane and eicosane significantly reduced the larval weight gained, diet ingested and frass produced by *S. litura*. Reduction in consumption and weight gained by *S. litura* reflected on growth indices, recording a reduction of 48.95% in relative growth rate (RGR), 73.92% in relative consumption rate (RCR) and 51.73% in approximate digestibility (AD) for octadecane treated diets and 31.35% in RGR, 62.22% in RCR and 36.70% in AD for eicosane treated diets. Eicosane and octadecane treated *S. litura* eggs that had washed with hexane were attractive and allowed the *T. japonicum* to parasitize more than 90% of eggs which was comparable with untreated eggs.



Dead *Spodoptera* larva treated with octadecane



Control larva

Synthetic form of six volatiles were applied topically at 200 ppm on aphid infested cowpea seedlings and observed the number of aphids settled for feeding on cowpea plants at 24 hr and 48 hr after treatment in a no-choice tests. Cowpea seedling treated with eicosane and octadecane significantly reduced the aphids, settled for feeding which were 44.61% and 37.59%, respectively while ethyl acetate treatment did not affect the feeding of aphids on cowpea seedlings, significantly. In a no-choice test, topical application of eicosane and octadecane at 500 ppm reduced the settlement of aphids on cowpea seedlings for feeding and the reduction in settlement for feeding were 43.53% and 40.79%, respectively.



Pulse aphids before treatment

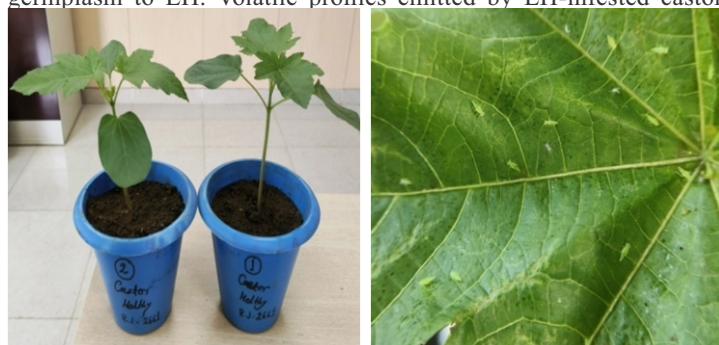
Pulse aphids after treatment

Dead pulse aphid

Detection of volatile profiles of castor germplasm induced by leafhopper (Collaboration with IOR, Hyderabad)

(P. Duraimurugan, R. K. Murali Baskaran, Yogesh Yele)

Volatile profiles of leafhopper (LH)-resistant castor germplasm (RG 2661) and LH-susceptible germplasm (DPC 9) at healthy condition were detected. There was no significant difference among the two at healthy condition with reference to number of volatiles, emitting 24 and 22 compounds, respectively. However nine compounds were detected in both the profiles of resistant and susceptible castor germplasm to LH. Volatile profiles emitted by LH-infested castor



Castor seedlings (RG 2661)

Castor seedling infested with leafhopper



Trapping of volatiles induced by leafhopper in castor seedlings

resistant germplasm (RG 2661) and LH-infested castor susceptible germplasm (DPC 9) were studied. LH infestation did not cause any significant changes in the number of volatiles appeared in both the profiles, yielding 20 and 19 compounds, respectively. However, 12 compounds have appeared in both the profiles. Leafhopper infestation on resistant and susceptible castor germplasm did not induce any profiles with new volatiles and were not significantly different from the profiles, yielded by healthy castor resistant and susceptible germplasm.

Predictive model for population dynamics of insect pests and diseases under climate change regime

(Shravani Sanyal, K. K. Mondal, Pankaj Sharma, Priyanka Meena, Sonali Deole)

Historical data on yellow stem borer, brown plant hopper, leaf folder, bacterial leaf blight and leaf blast of rice were collected to develop a regression equation for population dynamics of insect, pest and diseases, as detailed below.

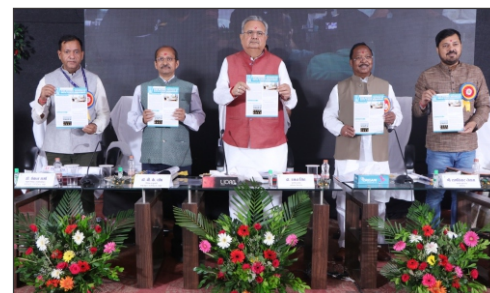
$Y = a + bX_1 + cX_2 + dX_3 + \dots + eX_n + \epsilon$; Where, Y: per cent infestation of YSB, BPH, leaf folder, BLB and leaf blast; $X_1, X_2, X_3, \dots, X_n$: predictor variables (e.g., temperature, relative humidity, rainfall, etc.); a, b, c, ...: regression coefficients (weights assigned to each independent variable); ϵ : Error term.

The equation developed for YSB prediction was: $Y = 4.550 + 0.017 \times Z24$; Where Z is weighted interaction of temperature and YSB infestation. Yellow stem borer infestation will continue to increase until favourable weather conditions and will reach 41.2% (2025-2026), 36.6% (2026-2027), 37.1% (2027-2028), 29.8% (2028-2029), 19.4% (2029-2030), 30.1% (2030-2031) in Janjgir-Champa, Bilaspur, Rajnandgaon, and Raigarh districts of Chhattisgarh.

Institute Activities

ICAR-NIBSM Hosts Beneficiary Farmers Meet (August 17, 2024)

ICAR-NIBSM, Raipur organized a Beneficiary Farmers Meet on 17.8.24. The event was presided by Dr. Raman Singh, Hon'ble Speaker of the Chhattisgarh Legislative Assembly; Shri. Ramvichar Netam, Hon'ble Minister of



Agriculture, Chhattisgarh; and Shri. Anuj Sharma, Hon'ble Member of the Legislative Assembly. The meeting was conducted to underscore the Government's steadfast commitment to supporting farmers and promoting advanced agricultural practices across the state. Dr. Raman Singh lauded ICAR-NIBSM's efforts in enhancing farmers' income and livelihoods and its critical role of biotic stress management in ensuring the economic security of the agricultural sector. He also admired institute infrastructure and research facilities created in a short period.

Shri. Ramvichar Netam and Shri. Anuj Sharma commended ICAR-NIBSM's initiatives in boosting farmers' incomes through integrated farming approaches and expressed their satisfaction for providing support to SCSP and TSP farmers' development. Dr. P. K. Ghosh, Director of ICAR-NIBSM, highlighted the importance of the event in fostering collaboration and innovation among the farming community, besides highlighting the institute's progress in research and development initiatives. Various inputs were distributed to beneficiary farmers. A total of 300 delegates including agricultural experts, state government officials, SAU officers, and progressive farmers participated in the meeting. Dr. Pankaj Sharma, Joint Director coordinated the programme.

Swachhata Hi Seva Programme (October 01, 2024)



The 'Swachhata Hi Seva' programme was organized on 1.10.24 by identifying and addressing a black spot area located behind the OTC area at the ICAR-NIBSM campus. This initiative was part of the nationwide

cleanliness drive, in line with the directives of ICAR, aiming to promote hygiene, sanitation, and environmental sustainability.

13th NIBSM Foundation Day (October 07, 2024)



ICAR-NIBSM celebrated its 13th Foundation Day on 7.10.24 in which Dr. Girish Chandel, Vice Chancellor of Indra Gandhi Krishi Vishwavidyalaya, Raipur as a Chief Guest delivered the foundation day lecture

on 'Agriculture for Tomorrow' and highlighted critical topics such as rice nutrition, the importance of bio-fortification, market-driven agriculture, educational needs in the industry, and the significance of participatory variety development and value addition. Dr. R. R. B. Singh, Vice Chancellor of Dau Sri Vasudev Chandrakar Kamdhenu University, Durg as a Guest of Honour discussed the relevance of the One Health Program in today's agricultural landscape. Dr. R. K. Mathur, Director, ICAR-IIOR, Hyderabad, another Guest of Honour, emphasized the importance of oilseeds and invited NIBSM to collaborate on developing ecologically viable bio-intensive pest management strategies for six key oilseed crops. Dr. P. K. Ghosh, Director of ICAR-NIBSM in his welcome address presented the annual progress report, showcasing the institute's achievements over the past year. During the event, notable publications were released, including those on NIBSM Bt 18 for managing the chickpea pod borer, the role of plant volatiles in pest management, and Geographical indications. Additionally, meritorious scientists were recognised for their contributions. Dr. Pankaj Sharma, Joint Director coordinated the event and the farmer-scientist interaction meet was organized on the afternoon session of foundation day.

Vigilance Awareness Week (October 28, 2024)



Vigilance Awareness Week was organized during 28th October to 3rd November 2024 with theme "Culture of Integrity for Nation's Prosperity". On 28.10.2024 integrity pledge to all the staff members was

administered by Dr. P. K. Ghosh, Director, ICAR-NIBSM. Shri Vampad Sharma, Director (Admin), ICAR, New Delhi delivered a lecture virtually on the Culture, Integrity and relation to Prosperity to ward-off corruption. An Awareness Gram Sabha in the Kurra village of Raipur in the presence of the Sarpanch Sh. Ravi Shankar Verma and villagers including women farmers was organized.

Meeting of National Strategic Crop Health Monitoring Network (NSCHMN) (November 06, 2024)

The meeting of NSCHMN was conducted on 06.11.2024 to discuss and finalize the network programme under the chairmanship of Dr. P. K. Ghosh,

Director, ICAR-NIBSM, Raipur. The meeting was attended by all the partner Institutes. Dr. Rajender Parsad, Director, ICAR-IASRI, New Delhi; Drs. Celia Chalam and Kavita Gupta, ICAR-NBPGR, New Delhi; Dr. Gundappa B., ICAR-NBAIR, Bengaluru; Dr. Rekha Balodi, ICAR-NCIPM; Dr. Sunita Pandey, JD (Entomology), DPPQS, Faridabad and Shri Niraj Kumar Singh, Assistant Director, Central IPM Center and NIBSM scientists participated. In the meeting it was decided to start activities and at the same time look for funding. Developing a separate website for the network, Annual Plan for monitoring and survey, and possibility of integrating it with NPSS issues were discussed.



Plant and Animal Health Camp (November 12, 2024)

As part of "Mera Gaon Mera Gaurav" (MGMG) initiative, ICAR-NIBSM in collaboration with Department of Animal Development, Chhattisgarh organized one day camp on Plant and Animal Health at Kevtara village, Tilda block, Chhattisgarh on 12.11.24.



Aim of the programme was to provide valuable insights and resources to local farmers for healthy maintenance of crop and livestock. Dr. P. K. Ghosh, Director presided over the function. Dr. Ramswaroop Verma, Veterinary Health Officer, Shri Rajni Verma, Sarpanch and Shri. Milan Sahu, Secretary have participated along with Dr. Daisy Basandrai, JD (SCRSR), Dr. Sridhar J., Dr. Soumya Dash, Dr. Lalit Kharbikar and Dr. Sandeep Adavi, B., distributed FMD vaccination and antibiotics for animals. A total of 120 farmers attended and benefited from the camp.

World Soil Day (December 05, 2024)

World Soil Day was celebrated on 5.12.24 at NIBSM, giving emphasis on the concept of "Caring for Soils: Measure, Monitor, Manage". Professor Mandal, former Vice-Chancellor, BCKV, West Bengal, delivered a lecture on "Soil is our Natural Ally, Keep it Healthy for Posterity" highlighting soil-centric agricultural practices, the urgent need for soil health preservation, and strategies for sustainable management of precious resources. The Director of ICAR-NIBSM delivered the concluding remarks, commending Professor Mandal's significant contributions to soil science. The celebration was convened by Dr. K. C. Sharma, Principal Scientist, and Mr. Arkaprava Roy, Scientist.



Institute Technology Management Committee (December 02, 2024)

An ITMC meeting was convened on 2.12.24 under the



Chairmanship of Dr. P. K. Ghosh, Director, NIBSM, Raipur in the presence of Dr. Das, member ITMC, ICAR-Central Citrus Research Institute, Nagpur and other members of NIBSM. During the meeting, two proposals one on 'Octadecane gel for enhancing biocontrol potential of *Trichogramma japonicum* against rice yellow stem borer' for technology transfer and another on Info on Kadaknath, foldscope and *Lathyrus* for copyright were presented and was approved by the committee.

11th Institute Management Committee meeting (December 05, 2024)



The 11th IMC meeting was held on 5.12.24 at ICAR-NIBSM, Baronda, Raipur in which the committee expressed satisfaction over the comprehensive implementation of the recommendations of the previous

meeting. Additionally, new agenda items were welcomed and the IMC gave its observations for the betterment of the institute.

9th Research Advisory Committee (RAC) Meeting (06-07 December, 2024)



The 9th RAC meeting of ICAR-NIBSM, Raipur was conducted during 06-07.12.2024 under the Chairmanship of Prof. A. N. Mukhopadhyay, Former Vice-Chancellor, Assam Agricultural University, Jorhat,

Assam accompanied by Dr. T. K. Adhya, Member, RAC & Former Director, ICAR-NRRI, Cuttack; Dr. Chandish R. Ballal, Member, RAC & Former Director, ICAR-NBAIR, Bengaluru; Dr. R. Srinivasan, Member, RAC & Former Director, ICAR-NIPB, New Delhi; Dr. P. K. Ghosh, Member, RAC & Director, ICAR-NIBSM, Raipur; Shri. Dwarikesh Pandey, Member RAC from Bilaspur, Chhattisgarh and Dr. P. N. Sivalingam, Member Secretary, RAC & Principal Scientist (Agricultural Biotechnology), ICAR-NIBSM. The other RAC members including Dr. V. K. Baranwal, National Professor, Division of Plant Pathology, ICAR-IARI, New Delhi and Dr. Poonam Jasrotia, Assistant Director General (PP & B), ICAR, New Delhi have attended the meeting in virtual mode. All Joint Directors attended the meeting physically while other scientists of NIBSM joined virtually. The meeting commenced with a welcome address by Dr. P. K. Ghosh and briefed the achievements of NIBSM for the period from December 2023 to November 2024. Dr. S. K. Jain, In-charge, PME presented the action taken report on recommendations of the 8th RAC meeting. Joint Director (Research) presented an overview of research progress of NIBSM, followed by the presentations of all the Joint Directors of the four schools on thrust areas and achievements of research projects. The progress made in Education was presented by Dr. B. K. Choudhary, UG Co-ordinator. The committee also visited the residential quarters, different laboratories, thereafter, RAC interacted with Scientists, Students and beneficiary farmers in afternoon session of the same day.

NEH Sub-Plan of ICAR-NIBSM

Nodal Officer: Dr. P. Mooventhan

During the year 2024, multiple training and extension activities were conducted under the NEH Sub-Plan by ICAR-NIBSM across various northeastern states. In Manipur, nine capacity-building and skill development trainings were conducted in the districts of Kangpokpi, Churachanpur, Chandel, Bishnupur (including displaced populations in relief camps in Imphal West and Imphal East), Imphal East, and Imphal West. Additionally, in Tripura, three trainings were conducted in Lembucherra,

West Tripura. Sikkim saw three such events in Namchi district and Pabong village. In Meghalaya, eight training programmes were organized in villages such as Darechikgre, Adugre, Botregre (West Garo Hills), and in areas of Nongthymmai, Umsning, Umtham, and Nalapara in Ri Bhoi district. Arunachal Pradesh also reported two training sessions in the Lower Dibang Valley district (Roing). Further, six Front Line Demonstrations (FLDs) were implemented in Arunachal Pradesh, covering East Siang, Lower Dibang Valley, and Upper Siang districts, including villages like Taki Lalung, Runne, Napit, Dambuk, Roing, and Mariyang. Awareness/vaccination camps, Kisan Melas, and exhibitions were also conducted, with two such events organized in Roing, Arunachal Pradesh. In Assam, one training and one awareness event were conducted in Narakanwa village, Golaghat district. Meghalaya hosted three trainings and one awareness/vaccination camp across West Garo Hills, East Garo Hills, and South West Khasi Hills districts in Tura, Williamnagar, and Mawkyrwat.



Input distribution was carried out in various states. In Manipur, seed distribution included 1.5 kg of watermelon (variety: Madhavi 10), 1.2 kg of pumpkin, 1.2 kg of bottle gourd, and 1 kg of cucumber in Imphal East and Imphal West for displaced persons. In Tripura, 0.72 quintals of mushroom spawn were distributed in Lembucherra. Meghalaya received 120 quintals of vegetable seed kits for Ri Bhoi district and 0.36 quintals of maize seeds in Lower Dibang Valley, Arunachal Pradesh, along with 1 kg of various seasonal vegetable seeds.

In terms of planting materials, 250 dragon fruit saplings were distributed in Tripura's Lembucherra. Fertilizer support included 26 liters of CAU Bioenhancer and 1.15 quintals of enriched compost for farmers in Meghalaya (Nongthymmai, Umsning, Umtham, and Nalapara). Plant protection materials such as five packets of Carbendazin were supplied to Khurai and Khongman villages in Imphal East, Manipur. Additional bioinputs included 52 liters of UmTricho for Meghalaya.

Several miscellaneous items were also distributed. In Meghalaya, 2.3 quintals of vermicompost, 30 kg of cocopeat, and 300 Tuberose bulbs were distributed in locations like CCS-Tura, Darechikgre, Adugre, Botregre, Nongthymmai, Umsning, Umtham, and Nalapara. In Manipur, 30 sprayer machines and 200 mushroom spawns along with 400 polythene bags were supplied to Khurai and Khongman villages. Moreover, 10 grinders, 10 papad making kits, 10 sealing machines, and 10 weighing balances were provided to beneficiaries from districts like Kangpokpi, Churachanpur, Chandel, Bishnupur, Imphal West, and Imphal East. In Assam's Narakanwa village, and Meghalaya's districts of West Garo Hills, East Garo Hills, and South West Khasi Hills, 100 uncapping knives, 250 silkworm rearing trays, and 50 honey collection tanks were distributed as support for allied activities.

During the year 2024, ICAR-NIBSM carried out extensive activities in the North Eastern (NE) region, covering a total of 20 districts and 26 villages across several states, including Manipur, Sikkim, Meghalaya, Tripura, Arunachal Pradesh, and Nagaland. The districts covered over the past five years include Imphal West, Imphal East, Thoubal, Bishnupur, Kakching, Ukhrul, Churachandpur, Tamenglong, Senapati, Kangpokpi, and Chandel in Manipur; East Siang in Arunachal Pradesh; Serchhip in Mizoram; South Tripura and West Tripura in Tripura; South Garo Hills, West Garo Hills, and Ri Bhoi in Meghalaya; Namchi, Gangtok, and Soreng in Sikkim; and several districts in Nagaland, namely Chumoukediam, Dimapur, Kiphire, Kohima, Mon, Peren, Phek, and Wokha, which were covered under the Agricultural Fair 2024.

In terms of capacity building, various programs were conducted in Manipur during 2024. These included a 3-day training programme, and two interventions related to Biofloc technology, which collectively covered 80 farm families, with 50 farmers directly benefiting from these capacity-building initiatives. Overall, across the states of Manipur, Meghalaya, Arunachal Pradesh, Mizoram, Sikkim, Nagaland and Tripura, a total of 54 capacity building programmes were organized. These comprised 16 programmes of 3-day duration, 6 programmes of 2-day duration, and 32 one-day programmes. These initiatives included 16

agricultural interventions and collectively reached 720 farm families, resulting in 644 farmers benefiting from the training and capacity-building exercises. All the above activities were implemented in collaboration with partner institutions, namely CAU, Manipur; NEHU, Meghalaya; and NRC on Mithun, Nagaland.

DPC conducted during July-December 2024

S. No.	Name and designation	Date of DPC
1.	Mr. Ashok Kumar, AAO	24.10.2024

List of webinars/seminars organized by NIBSM during July-December 2024

(Vinay Kumar)

S. No.	Topic of seminar	Date	Delivered by institute scientist/international scientist
1.	Targeting net-zero emissions and methane pledge- Global and Indian context	03.07.2024	Dr. Shravani Sanyal, Scientist (Environment Science)
2.	Speed Breeding	30.07.2024	Dr. Nunavath Aswini, Scientist (Genetics and Plant Breeding)
3.	Seed priming approaches for enhanced resistance against different pathogen	28.08.2024	Dr. Niranjana Prasad, H. P., Scientist (Seed Science and Technology)

Workshop/Symposia/Seminars/Trainings/Conference/other fora

Workshops/Symposium/Seminar/Conference/Training/other Fora organized

S. No.	Symposia/seminar/training organized	Period	Organized by	Scientist associate (Dr.)
1.	One day exposure visit of B. Sc Agriculture students of College of Agriculture Bemetara and Janjgir Champa	24.7.24	ICAR-NIBSM	Vinay Kumar
2.	One day exposure visit of B.Sc Agriculture students of Bharam Dev College of Agriculture, Kawardha	25.7.24	ICAR-NIBSM	Vinay Kumar
3.	One day exposure visit of Govt. High School Baronda	9.12.24	ICAR-NIBSM	Vinay Kumar, Sridhar, J.,
4.	Plant and Animal Health Camp	12.11.24		Lalit L. Kharbikar, Daisy Basandrai, Soumya Dash, Sandeep B. Adavi

Workshops/Symposium/Seminar/Conference/Training/other Fora attended

S. No.	Symposia/seminar/training attended	Period	Organized by	Scientist associate (Dr.)
1.	PAT on "Discrimination of Healthy and Insect-Infested Rice Crop Using Field Spectroscopy and Machine Learning"	15.7.24-1.11.24	Indian Space Research Organization, Ahmedabad	Arkaprava Roy
2.	PAT on Immobilizing Cadmium in Contaminated Soil using Different Phosphate Amendments in Mustard under Ambient and Elevated CO ₂ and Temperature Conditions	15.7.24-1.11.24	Indian Space Research Organization, Ahmedabad	Priyanka Meena
3.	PAT on Next generation sequencing (NGS) techniques and its application in crop improvement	15.7.24-14.11.24	ICAR-NIPB, New Delhi	Vinay, N. D.
4.	Three days online training programme on 'Metagenomics Data Analysis	22-24.7.24	ICAR-IASRI, New Delhi	Lata Jain
5.	Hands-On Training on Remote sensing and GIS applications in agricultural water management	19-30.8.24	Indian Institute of Remote Sensing, Dehradun, Uttarakhand	Shravani Sanyal
6.	31 st Annual group meeting of Rapeseed-Mustard workers (AICRP-RM)	19-20.8.24	ICAR-DRMR & AAU, Guwahati	Pankaj Sharma
7.	Executive Development Programme on Leadership Excellence	26-31.8.24	NAARM, Hyderabad	Pankaj Sharma, A. Amarendra Reddy, Daisy Basandrai, K. K. Mondal, A. Dixit
8.	International conference on Plant protection in Horticulture	25-27.9.24	ICAR-IIHR Bengaluru	Mallikarjuna, J.
9.	2 nd Biocontrol Expo 2024	19.10.24	ICAR-NBAIR, Bengaluru	R. K. Murali Baskaran
10.	Demonstration of NIBSM technologies at National Farmers Fair 2024	22-25.10.24	IGKV, Raipur	Soumya Dash, Sandeep B. Adavi Niranjana Prasad, H. P.
11.	Global Soils Conference on "Caring Soils Beyond Food Security: Climate Change Mitigation & Ecosystem Services"	19-22.11.24	Indian Society of Soil Science, New Delhi, International Union of Soil Sciences, Italy, Indian Council of Agricultural Research, New Delhi and National Academy of Agricultural Sciences, New Delhi	Arkaprava Roy

12.	Annual Review Meeting of AICRP Nematodes	26-27.11.24	AICRP Nematodes at CSHAU, Hisar	Mallikarjuna, J.
13.	State level workshop for the Development of Chhattisgarh Action Plan for Containment of AMR	26-27.11.24	Department of Health and Family Welfare, Govt. of Chhattisgarh in collaboration with NCDC (National Centre for Disease Control), DGHS, MoHFW, Govt. of India and USAID RISE.	Binod K. Choudhary, Mamta Choudhary, Soumaya Dash
14.	Attended 32 nd Annual Conference of Agricultural Economics Research Association (AERA)	11-13.12.24	IGKV, Raipur	All Scientists

Publications

Research and Review papers

Amarender Reddy, Anindita Sarkar, Ch Radhika Rani, Abhispita Das, C. Papi Reddy and Anjani Vajrala Sneha 2024. Mapping Welfare and Development Schemes to SDGs at Village Level in India. SAARC Journal of Social Science, 2(1): 27-59.

Lathal, K. N., V. S. Rao, C. Sarada, A. A. Reddy, and K. N. Sreenivasulu. 2024. Enhancing Forecasting Accuracy of Palm Oil Import to India Using Machine Learning Techniques Indian Journal of Agricultural Economics 79 (2): 214-230.

Mooventhan, P., P. N. Sivalingam, H. K. Singh, M. K. Sahu, Y. Dhimar, U. Singh, P. Kaushal and P. K. Ghosh. 2024. *In Situ* Diagnosis and Digital Cataloguing of Plant Pathogenic Fungi Through Mobile-Based Foldscope Microscopy. Journal of Phytopathology 172:e13422. <https://doi.org/10.1111/jph.13422>

Narsimlu, B., J. V. N. S. Prasad, A. A. Reddy, G. R. Chary, K. A. Gopinath, K. B. Sridhar, J. K. Balyan, A. K. Kothari and V. K. Singh. 2024. Catchment Storage Command Relationship for Sustainable Rainfed Agriculture in Semi-arid Regions of Rajasthan, India, Sustainability 16, x. <https://doi.org/>

Reddy, A. A., T. Maraseni, S. Lahiri, S. Karki, U. Koju, A. Shrestha and T. Cadma. 2024. Perspectives on Forest governance among the indigenous communities of India's Eastern Ghats. Forest Policy and Economics 169: 103350.

Samuel, J., C. A. Rama Rao, C. N. Anshida Beevi, B. M. K. Raju, A. Amarender Reddy, R. Nagarjuna Kumar and R. G. Teggelli. 2024. Enhancing farm income resilience through climate smart agriculture in drought-prone regions of India. Frontiers in Water 6: 1327651.

Sharma, M., J. Sridhar, D. Akanand, P. N. Sivalingam and A. K. Bhowmick 2024. Morphological and molecular characterization of cryptic and invasive thrips species in Central India. International Journal of Tropical Insect Science, pp.1-10. 10.21203/rs.3.rs-4353671/v1

Sanyal, S., A. V. M. Subba Rao, K. Timmanna, G. Baradevanal, S. K. Bal, M. A. S. Chandran, P. R. Shashank, V. K. Singh and P. K. Ghosh. 2024. The global invasion risk of rice yellow stem borer, *Scirpophaga incertulas* Walker (Lepidoptera: Crambidae) under current and future climate scenarios PLoS One 20(3):e0310234. doi.org/10.1371/journal.pone.0310234.

Sridhar J, K. Meghalatha, B. S. Rajpoot, L. L. Kharbikar, T. K. Das, G. Rishi Raj, A. Prabhu, A. Dixit and P. K. Ghosh. 2024. Emergence of Bihar hairy caterpillar (*Spilosoma obliqua* Walker) in green gram in long-term conservation agriculture system. Current Science 127: 1-3.

Book Chapters

Marathe, A., D. V. Pawar, S. K. Muthusamy, P. N. Sivalingam and J. Kumar. 2024. Small RNA: Understanding and Prospects in Crop Protection. In Advances in Plant Disease Management, CRC Press, 87-98pp.

Technical Bulletin

Murali Baskaran, R. K., Lata Jain, J. Sridhar and K. C. Sharma. 2024. Technical Bulletin on NIBSM *Bacillus thuringiensis* 18 (1% talc formulation) for chickpea pod borer management. ICAR-NIBSM, Raipur, Chhattisgarh, India, 1-26pp.

Abstracts

Roy, A., S. P. Datta, and K. M. Manjaiah. 2024. Silicon-enriched sugarcane bagasse ash remediating rice-arsenic hazard. Paper presented in Global Soils Conference 2024 on Caring Soils Beyond Food Security: Climate Change Mitigation & Ecosystem Services, NASC Complex, New Delhi, Indian Society of Soil Science, New Delhi, International Union of Soil Sciences, Italy, Indian Council of Agricultural Research, New Delhi, and National Academy of Agricultural Sciences, New Delhi.

Roy, D. B., J. Mallikarjuna, M. Pitchaimuttu, J. Sridhar, S. K. Jain and P. N. Sivalingam. 2024. Phenotyping and characterization of diverse okra germplasm against yellow vein mosaic disease transmitted by whitefly (*Bemisia tabaci* Gennadius), International Conference on Plant Protection in Horticulture, ICAR-IIHR Bengaluru, 25-27.9.2024, 147p.

Reddy, A. A. and K. V. Praveen. 2024. Biopesticide market and regulatory landscape with determinants of farm-level use in India, Indian Economic Journal, 107th Annual Conference issue, 27th-29th December, 2024.

Popular articles

Dash, S., M. Choudhary, B. Choudhary, B. Sahu, L. Jain, Yogita and S. K. Sharma. 2024. Antimicrobial Resistance in Pathogens Associated with Mastitis in Bovines. Food and Scientific Reports, 5(2): 14-19.

Mooventhan, P., Uttam Singh and Suman Singh 2024. गोभीवर्गीय फसलों में बीज उत्पादन तकनीक (Seed Production Techniques in Cole Crops), Ropan magazine 5(4), 2180675/2024/O/o Dir. NIBSM

Mooventhan, P., Uttam Singh and Suman Singh 2024. कद्दू की वैज्ञानिक उत्पादन प्रौद्योगिकी (Scientific pumpkin Cultivation), Ropan magazine, 5(4), 2180675/2024/O/o Dir. NIBSM

Mooventhan, P., Uttam Singh and Suman Singh 2024. करेला: एक गुणकारी और स्वास्थ्यवर्धक सब्जी (Bitter gourd: A beneficial and healthy vegetable).

Ropan magazine 5(4), 2180675/2024/O/o Dir. NIBSM

Mooventhan, P., L. K. Verma, Uttam Singh, P. K. Ghosh and K. K. Mondal. 2024. Village hatchery unit: A successful model, Indian Farming 74 (11): 28-31, 2180675/2024/O/o Dir. NIBSM

Extension folder

Basandrai Daisy, Vinay Kumar and P. K. Ghosh. 2024. Geographical indications of Goods, NIBSM, Raipur, 1-4p.

Mooventhan, P., Uttam Singh and Suman Singh 2024. कृषि प्रसंस्करण केंद्र: ग्रामीण अर्थव्यवस्था में सकारात्मक प्रभाव (Agro Processing Centers: Positive Impact in Rural Economy). PME No. ICAR-NIBSM, NIBSM/EF/2024/75.

Mooventhan, P., Uttam Singh and Suman Singh 2024. ग्रेविटी ड्रिप सिंचाई प्रणाली: जल संरक्षण में एक कदम (Gravity Drip Irrigation System: A Step in Water Conservation). PME No. ICAR-NIBSM, NIBSM/EF/2024/76.

Mooventhan, P., Uttam Singh and Suman Singh 2024. बाजरा: आधुनिक जीवनशैली में एक किफायती और स्वस्थ भोजन विकल्प (Millets: An affordable and healthy food option in modern lifestyle). PME No. ICAR-NIBSM, NIBSM/EF/2024/77.

Mooventhan, P., Uttam Singh and Suman Singh 2024. सरसों की वैज्ञानिक खेती (Scientific Mustard Cultivation). PME No. ICAR – NIBSM, NIBSM/EF/2024/78.

Mooventhan, P., Uttam Singh and Suman Singh 2024. हल्दी का प्रसंस्करण एवं मूल्यवर्धन (Processing and value addition of Turmeric). PME No. ICAR-NIBSM, NIBSM/EF/2024/79.

Murali Baskaran, R. K., Yogesh Yele, K. C. Sharma and Pankaj Sharma. 2024. Scope of plant volatiles in pest management, p. 4.

Others

Mooventhan, P. and P. K. Ghosh. 2024. Consolidated video documentation of NIBSM establishment and achievements was developed and released during the Beneficiary Farmers Meet on 17.08.2024.

Mooventhan, P. and P. K. Ghosh. 2024. Video documentation of NIBSM's research achievements was developed and released during the National Conference held during 28-29 February 2024.

Mooventhan, P. and P. K. Ghosh. 2024. Video documentation of NIBSM's technology leads was developed and released during the ICAR 96th Foundation and Technology Day, 2024.

GeneBank Submission

S. No.	Detail of submissions	Accession Nos.	Authors
1.	<i>Brevibacillus formosus</i> KS-14	PP814840	S. G. Merugu, S. K. Sharma
2.	<i>Bacillus paramycooides</i> BEMS -9-1	PP814843	S. G. Merugu, S. K. Sharma
3.	<i>Bacillus tequilensis</i> BS-2	PP814857	S. G. Merugu, S. K. Sharma
4.	Mitochondrial COI gene sequences of thrips species (16 sequences)	OQ197495, OQ197492-OQ197494, OQ197489, OQ197482, OQ197486, OQ197485, OQ197481, OQ197487, OQ197488, OQ197491, OQ197490, OQ197484, OP106989, OQ197483	Sridhar J., Manish Sharma, P. N. Sivalingam
5.	Mitochondrial COI gene sequences of <i>Amrasca biguttula</i> (85 sequences)	PP911539, PP951734, PP930919-PP930924, PP935747-PP935772, PP951735, PP951891-PP951892, PP951736-PP951746, PP951893, PP951747-PP951748, PP951894-PP951895, PP951749-PP951762, PP951896-PP951899, PP951763-PP951775, PP951900	Sridhar J., Sneha Sharma, Akanand Dhimar
6.	NADPH quinone oxidoreductase gene subunit 2 from <i>Vigna radiata</i> cv Maha Gujarat (total nucleotide length-1476)	PQ273798	R. Kumari, S. Dixit, A. Marathe, V. Kumar, P. Kaushal, P. N. Sivalingam
7.	Reveille-1-like gene from <i>Vigna radiata</i> cv Maha Gujarat (total nucleotide length-1305)	PQ273799	
8.	16S rDNA sequences of bacterial endophytes from <i>Rauvolfia serpentina</i> L. (14 nos.)	PQ361904-PQ361917	Anisha Shrivastava, Lata Jain, Vinay Kumar
9.	16S rDNA sequences of 24 bacterial endophytes of chickpea	PQ394997-PQ395020	S. Subramanian, V. Kumar, Lata Jain, S. Srivastava

Awards and Recognition

Awards and Recognition received by NIBSM Scientists

S. No.	Awards/Recognition/Membership in Professional Societies	Year/Period	Offered by	Scientist (Dr.)
1.	Member	2024	Global Council for Innovation in Rapeseed and Canola (GCIRC), France	Pankaj Sharma
2.	Expert member	8-9.9.24	Institute Research Committee (IRC), ICAR-DRMR	
3.	Co-Chairman, Plant Pathology session in 31 st Annual group meeting of Rapeseed-Mustard workers	19-20.8.24	ICAR-DRMR & AAU, Guwahati	

4.	IPA Medal for Best Research Paper Award	2024	Indian Potato Association	Sridhar, J.
5.	Reviewed DBT project as an Expert Member	17.11.24	DBT, New Delhi	R. K. Murali Baskaran
6.	Member in Selection Committee of 'Consultant'	27.11.24	Food and Agricultural Department, GoI, New Delhi	R. K. Murali Baskaran
7.	Panelist in Shastrarth 2.0	19.11.24	Amity University, Raipur	Shravani Sanyal
8.	Recipient of first prize for the article "Fish resources, farming, their promotion and importance in our diet" in Hindi	2024	ICAR-NRC Meat Hyderabad	B. K. Choudhary Mamta Choudhary Soumya Dash Mahendra Kumar
9.	ICAR Technology Certification for Android-based dynamic mobile application on "Kadakhnath Info"	2024	ICAR, New Delhi	P. Mooventhan and his Team
10.	Rising Star Environmentalist Award	21.12.24	AVIAN Trust and Insect Environment, Bengaluru	Mallikarjuna, J.
11.	Associate Editor	2024	Frontier in Microbiology	Vinay Kumar
12.	Review Editor	2024	Frontier in Genetics	
13.	Reviewer of peer reviewed journals	2024	Microbiological Research, Physiology and Molecular Biology of Plants, PLoS, Genetic Resources and Crop Evolution, Environment Quality Management, Frontiers in Plant Sciences	
14.	Young Scientist Award	10-12.12.24	Society for Scientific Development in Agriculture and Technology	Shravani Sanyal
15.	Rising Star Environmentalist Award	21.12.24	Insect Environment by Avian Trust	

In-house Awards

S. No.	Awards/Recognition/Membership in Professional Societies	Year/Period	Offered/organized by	Scientist (Dr.)
1.	3 rd prize in Hindi <i>Nibandh Lekhan</i> competition	14-28.9.24	Hindi Pakhwada	Vinay Kumar
2.	Appreciation Award for FFP	7.10.24	13 th NIBSM Foundation Day	P. Mooventhan
3.	Best Research Paper award	7.10.24	13 th NIBSM Foundation Day	Binod K. Choudhary, Mamta Choudhary
4.	Best Livestock IFS model	7.10.24	13 th NIBSM Foundation Day	Binod K. Choudhary, Sridhar, J., Vinod Kumar Wasnik
5.	NIBSM SCSP Award	7.10.24	13 th NIBSM Foundation Day	Mamta Choudhary
6.	Best scientific contribution on new initiative	7.10.24	13 th NIBSM Foundation Day	Ashish Marathe
7.	Institute Recognition Award	7.10.24	13 th NIBSM Foundation Day	K. C. Sharma

Special lecture delivered

S. No.	Title of lecture	Date/Year	Delivered in	Delivered by (Dr.)
1.	Integrated pest management and Solid and Liquid Waste Management	21-22.9.24	Salepani village, Mandla district, MP	Shravani Sanyal

Joining and Relieving of Staff

New joining in the institute - ICAR-NIBSM, Raipur

S. No.	Name	Designation	Date of Joining
1.	Sh. Nikhil Pandey	Assistant	10.09.2024
2.	Ms. Swarika Srivastava	Assistant	11.09.2024
3.	Sh. Ravi Shekhar Kumar	Assistant	13.09.2024
4.	Sh. Pawan Kumar Gupta	Assistant	09.10.2024
5.	Sh. Shah E Alam	Assistant	13.11.2024

Obituary

Dr. Nunavath Aswini joined the School of Crop Resistance System Research at the ICAR-National Institute of Biotic Stress Management in Raipur, Chhattisgarh state, as a Scientist (Genetics and Plant Breeding) on July 21, 2023. She received numerous accolades for her research work in her doctoral research at ICAR-Indian Agricultural Research

Institute, Pusa, New Delhi. She worked on the institute-funded project "Unravelling and validating soybean genes conferring resistance to yellow mosaic" at SCRSR. She died on September 1, 2024, as a result of a natural calamity. NIBSM has expressed its sincere condolences for her passing. May her soul rest in peace.



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