



भाकृअनुप - राष्ट्रीय जैविक स्ट्रेस प्रबंधन संस्थान

ICAR - NATIONAL INSTITUTE OF BIOTIC STRESS MANAGEMENT

Baronda, Raipur - 493 225, Chhattisgarh



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From the Director's desk

ICAR NIBSM is gradually stepping forward on its mandatory path carrying a rationale to create novel mitigation strategies of biotic stresses in agriculture. In the present scenario of agriculture, it is quite pertinent to strive for novelties of plant protection since traditional methods of pest management stand languished due to several reasons. Substantially these being scarcity of conventional plant protection measures as attributable to broken qualitative resistance of cultivars due to injudicious use of major genes paving way for emergence new pathogenic strains with aggravated virulence, provoking zoonotic health concerns and hazardous environmental risks of using chemical pesticides, anecdotal bio-control measures leading to farmers' distrust, emerging unforeseen biotic stresses in the era of climate change etc. It is a matter of great satisfaction that proposals of manpower, infrastructure and equipments in the forthcoming SFC/EFC of this institute has been approved with adequate budgetary provisions. This benevolent gesture of council inspires the team of scientists at NIBSM to enthusiastically pursue research on biotic stresses using modern frontier scientific tools of molecular biology, proteomics/genomics, bioinformatics, bio-security, climatic resilience while incorporating biotic stress resistance genes for robust host resistance in the crops to be grown in future. Institute expresses its deep sense of gratitude to the hon'ble Secretary, DARE and DG, ICAR, Dr. T. Mohapatra to accord generous sanction of Rs. 52.7 crores for construction of administrative building with library and auditorium facilities, boys and girls hostel buildings, campus developmental works on eco-friendly network of campus roads, paths and landscape avenues. CPWD has successfully completed the process of tendering and construction work is quite imminent.

I also take herewith an opportunity to profusely thank team of fourteen scientists belonging to the disciplines of entomology, pathology, biotechnology, agronomy (weed science), veterinary, fisheries and extension who successfully put their hard efforts in formulating in-house research projects for elucidating the preemptive, causative and epidemiological enigmas of pernicious pestilence putting severe restraint on agricultural production and productivity. As of now, experiments have been carried out for two consecutive seasons. Tangible scientific outputs are in the offing as has been revealed during internal IRC meetings held on 11-12 July and 09 August, 2017.

Under dynamic leadership of Dr. Pankaj Kaushal, Joint Director (Research), a vibrant research programme on weed management in DSR, management of stem borers, prevalence and epidemiology of plant viral diseases, identification of endosymbionts with potential for serving as PGPR and PGPF, fish diseases, animal vaccines specifying zoonotic diseases, new fungal pathogens in climate change, stress induced promoters, collection and maintenance of super donors are being addressed as active research agenda of the institute. Also, ICAR's Farmers FIRST project and farmer advisory activities in form of "Mera Gaon Mera Gaurav" are in progress with full eagerness and enthusiasm by the scientists of this institute. NIBSM is now fairly adapted to conduct basic, strategic and adaptive research on various facets of biotic stresses in agriculture. The institute has also established linkages with several national institutes to complement the ongoing R&D in the field of biotic stresses in agriculture under National Agricultural Research System (NARS). Continuous efforts are in progress to develop affiliations with all modern laboratories, centers of excellence, regional centre, regional research units in the country as well as abroad. NIBSM also looks forward to develop linkages with private entrepreneurs and industry for technology development.

A bunch of old buildings handed over by IGKV, Raipur have been spruced up and are being used as laboratories and administration blocks. Simultaneously, the entire campus has been subjected to a facelift after establishing tree avenues, lush green lawns outlined with hedges/edges and seasonal flower beds. Ample laboratory space has been further created for independent housing of Entomology, Plant Pathology, Biotechnology, Extension units as full fledged sections. For smooth scientific administration and judicious usage of resources, each section is now being headed by individual in-charge under the overall leadership of Joint Director (Research). We had a bumper harvest of *kharifrice* from our well managed farm expected to give a turnover of about Rs. 40 lakhs as resource generation in the current financial year.



Jagdish
(Jagdish Kumar)
Director (Acting)

Dear Readers,

Greetings from NIBSM, Raipur.

I feel delighted to share progress made by the NIBSM in research front during the second semester of 2017. In fact, being involved rigorously in institute building activities at this newly establishing institute, our scientists could logically and wit-fully maintain an appreciable balance between research and other responsibilities. A brief outcome of 11 ongoing institute funded projects as well as 3 external funded projects during 2017 has started yielding good results. We had our first batch of technologies generated (four, in weed management) as well as seven research publications (total NAAS impact 37.44) and 8 bulletins published this year. Nine projects for external funding as well as six concept notes in various fields of agriculture have also been submitted. Comprehensive surveys were conducted covering 41 districts representing nine states in order to collect pest and pathogen samples and disease incidences. In fact, field crops cultivation in our experimental farm has been diversified and raised more than 30 crops species have been raised this year that includes cereals, pulses, vegetables, dual purpose crops, fodder crops, and their wild relatives. This diversification has allowed us to observe the occurrence of 68 biotic stresses (pest and pathogens) in 21 crops, 27 diseases in live stocks and six in fishes were also observed in areas nearby. Concerted efforts on disease surveillance led to generate first reports on root-knot nematode infestation in rice in Chhattisgarh, Pigeon pea yellow mosaic disease in CG, *Leclercia adecarboxylata* from animal clinical case, blue tongue disease in sheep and goat and MDR strain of *Rouletella ornithinolytica* from fishes. We are also in process to prepare a national status report on major diseases and pests of crop plants, livestock and fisheries including their epidemiology in past 50 years. In order to briefly comprehend the occurrence of various biotic stresses in germplasm of important crop plants and profiling the gene pool for identification of desirable biotic stress tolerance alleles, plant genetic resources activities has been initiated. 2006 accessions representing core, minicore and/ or wild species in fourteen crops have been introduced from various National and International Genebanks. Of these, 978 accessions representing six crops were evaluated during *kharij* 2017. Molecular and microbial analysis of various stress causing organisms led to deposition of three samples in ITCC and 66 in VTCC, including GenBank submissions of 87 sequences and six libraries representing various endophytes and bacteria. We have reoriented our research endeavours into program mode till all the four constituent schools of the institute become functional, during meeting of the IRC 2017. These programs include; Pest and pathogen genetic resources (PPGR) and their management, Molecular biology of biotic stress

reaction, Genetic and Genomic resources for stress tolerance, Strategic and adaptive research in biotic stress management.

These programs will run in close linkage with the sectional reorientation, as we have formulated following sections for effective management: Analytical and weed science, Entomology and Nematology, Pathology, and Biotechnology. New research initiatives have been undertaken to address issues such as developing super donors in major crops, identification of novel stress induced promoters, nano-biosensors and agroecology-pathogen-host-environment interplay for emergence and re-emergence of diseases, with appropriate linkages with institutes such as NBAIR, NRRI, NAISM, IARI, NBPGR, etc. In fact, presently research collaboration is being negotiated with thirteen national and international institutes. Under the mandate of adaptive research we have conducted nine farmers trainings including capacity building in Farmer FIRST project with a total of 3766 beneficiaries. NIBSM also had a privilege to conduct three meetings/trainings including one short course on doubling farmers' income.

With the final approval of master-plan and initiation of works at NIBSM, and the finalisation of the SFC/EFC for 2017-20, whereby NIBSM is likely to be strengthened in infrastructure and manpower, I am sure the research efforts by the scientists of this institute will yield substantial results in the field of basic, strategic and adaptive research in Agriculture with an ultimate mandate to mitigate biotic stresses.

The efforts of scientists of this institute are worth acknowledging to gear up the research activities within the limited facilities in infrastructure and laboratory logistics at NIBSM. Specifically, I would record my sense of gratitude and thankfulness to various high level committees including the RAC, the authorities from ICAR and Directors of various institutes to whom we contacted for collaborations, for imparting guidance in deciding our research endeavours at times. We all are thankful to the Director (Acting), NIBSM Raipur for his able guidance at all times and to PME cell- NIBSM for all their support in materializing the research management ideas and proposals that came along throughout the year. Heartfelt acknowledgements are also due to members of all the committees working at NIBSM for providing administrative, logistics and scientific supports to accomplish the responsibilities in time.

Wishing you all a very happy and prosperous New Year 2018.

Sincerely,



(P. Kaushal)
Joint Director (Research)

Research Highlights

Efficacy of various commercially available formulations of bispyribac sodium for controlling weeds in rice field

(Anil Dixit)

Weeds are major concern in rice cultivation, resulting yield reduction up to 80% in direct seeded and 30 to 50% in transplanted rice. Information generated so far on weed control by bispyribac-sodium, cyhalofop-butyl, ethoxysulfuron, fenoxaprop, and 2,4-D were only under low land rice and it is in infancy in upland condition. The study conducted at ICAR-NIBSM during *kharij* 2017 to evaluate three brands of bispyribac-sodium *i.e.* Nominee Gold, Takila and Green label in upland rice revealed that Nominee Gold performed excellent to record the highest weed control efficiency (78%), followed by Green label (64%) and Takila (58%). Nominee Gold was the best brand from Pesticide India in achieving the highest yield of 49.50 q/ha.

Isolation of native bio-control agents for management of lepidopteran pests

(R. K. Murali Baskaran, K. C. Sharma, Lata Jain, J. Sridhar)

Native bio-control agents are efficient in management of lepidopteran pests of crops. Native population of egg parasitoid collected from low land rice of Baronda farm and Ballod district of Chhattisgarh were identified as *Trichogramma japonicum* and *T. chilonis*, respectively. A total of 67 soil samples were collected from various agro and forest eco-systems of Chhattisgarh, Tripura, Meghalaya, Odisha and Assam for isolation of *Bacillus thuringiensis*.

Optimization of time and number of release of *Trichogramma* spp. for management of rice yellow stem-borer

(R. K. Murali Baskaran, K. C. Sharma, Lata Jain, J. Sridhar)

Sequential release of egg parasitoid @ 6.25 cc/ha at weekly interval *ie.*,

three releases of *T. japonicum* on 32nd, 39th and 46th day after transplanting of Swarna rice during *kharif* 2017, followed by three releases of *T. chilonis* on 46th, 53rd and 60th DAT was the suitable time and number of releases to manage rice yellow stem-borer, resulting 1.25% dead heart and 1.09% white ear, in contrast to control with 2.29 and 2.25%, respectively.

Estimation of crop losses in rice due to various biotic stresses

(J. Mallikarjuna, S. K. Jain, K. C. Sharma)

The crop loss estimation in Swarna rice under field condition during *kharif* 2017 indicated that there was low incidence of yellow stem-borer and leaf-folder while the brown spot and leaf blast incidence were 6.8 to 13.8% and 3 to 5%, respectively. Significantly highest yield of paddy was recorded in T₄ (8.11 t/ha) in which, all biotic stress like insects, diseases and weeds were kept free, followed by T₃ (7.46 t/ha) where disease and weeds were free. The insect and disease scenario for past 50-100 years had shown the increase of insect species from three (1965) to 15 (2015). Some of the pests like leaf folder, brown planthopper, gall midge have attained major pest status over the years. Yellow stem borer was the major monophagous pest till date in all the rice ecosystems. Over 20 years of data on diseases revealed that sheath blight, leaf blast and bacterial blight have shown variable incidence in different agro climatic zones of India.

In vitro screening of promising germplasm lines of crops against root-knot nematode

(J. Mallikarjuna)

A total of 77 germplasm lines of rice were screened against root-knot nematode, *Meloidogyne graminicola* during *kharif* 2017 under *in vitro* condition. Among them, 36, 26 and 14 germplasm were designated as susceptible, highly susceptible and moderately resistant to root knot nematode, respectively. In another *in vitro* screening, one pigeonpea line (LRG-133-33), five mungbean lines and six urdbean lines were found to be moderately resistant to *M. incognita*.

Generation of data base on viral diseases affecting crop plants of Chhattisgarh

(P. N. Sivalingam, K. C. Sharma, Vinay Kumar, P. Moventhan, Yogesh Yele)

Information on the prevalence of virus and virus-like diseases and vectors were collected by surveying in the farmer's fields of 22 districts belonging to Northern hill, Chhattisgarh plain and Bastar plateau of Chhattisgarh state. No viral disease has been observed in rice, wheat and maize. Mungbean, urdbean and cowpea were found to be infected with 5 to 90 % yellow mosaic disease. Vegetable crops such as bhendi (4-100% yellow vein mosaic; 78-100% leaf curl disease), sponge gourd (10-98% leaf crinkle disease), bitter gourd (12-100% leaf crinkle and mosaic disease), pumpkin (50% yellow vein mosaic), tomato (4-90% leaf curl), chilli (8-70% leaf curl) and fruit crop like papaya (20-83% leaf curl) were found likely to be infected with whitefly transmitted *Begomovirus*. Other viral diseases such as leaf crinkle disease in mung bean (5-98%), ring spot disease in papaya (20-97%) and mosaic disease in cucumber (3-5%) also noticed in this region. *Begomovirus* is the most important, causing huge economic losses to the growers in vegetable and pulse crops of Chhattisgarh.

Bacterial and fungal endophytes against diseases of pigeonpea and lathyrus

(Vinay Kumar, Lata Jain, S. K. Jain)

Endophytes are the microbes that live inside the plant tissues which are known to play a crucial role in the functioning of plants by influencing their physiology and development. A total of 34 bacterial endophytic microbes were isolated from pigeonpea (20) and lathyrus (14), using the suitable culture media. Out of them, three endophytes showed ability to solubilise the phosphate. Bacterial endophytes showed variable inhibition of pathogen growth of stem rot fungi, *Sclerotium rolfsii* and *Rhizoctonia solani* (Fig. 1, 2).



Fig 1. Bacterial endophyte (46L) showing inhibition zone against *S. rolfsii*; endophyte (7P) showing inhibition zone against *R. solani*



Fig 2. Bacterial endophytes (48R & 63R) showing inhibition zone against *R. solani*

A total of 72 fungal endophytes isolated from pigeonpea and lathyrus is in the process of characterization and their antagonistic potential against fungal pathogens. The isolated endophytic microbes were characterized using 16S rDNA and their gene sequences were submitted to NCBI gene bank.

Metagenomics analysis of bacterial endophytes using NGS approach

Metagenomics study of bacterial endophytes associated with different parts of lathyrus is conducted using next generation illumina sequencing approach and the same is registered with NCBI with bio-project ID PRJNA392219.

Epidemiology and economic loss assessment of Haemorrhagic Septicaemia in cattle and buffaloes

(Mamta Choudhary, S. B. Barbuddhe, B. K. Choudhary, Lata Jain)

Characterization of *Pasteurella multocida* isolated from cattle and buffaloes in different districts of Chhattisgarh and pathological changes in various vital organs caused by Haemorrhagic Septicaemia were studied during year 2016-17. In the present study, eight representative isolates of *P. multocida* were tested by species specific PM-PCR which was carried out using *P. multocida* specific primer to amplify the KMT1 gene fragment. A total of 450 post vaccination serum samples from cattle and buffaloes were randomly collected from different districts of Chhattisgarh at different time interval. The serum samples were subjected to ELISA for detection of antibodies against HS vaccine. The protective efficacy of vaccines in the field condition confers protection against HS for 8 months. Therefore there is great risk of animals to acquire infection during rest 4 months of the period.

Microbes associated with reproductive biotic stress in bovine

(Lata Jain, Vinay Kumar, S. B. Barbuddhe, Mamta Choudhary)

Total genomic DNA was extracted from 218 blood samples collected from cattle and buffaloes of different district of Chhattisgarh [Kanker (22), Raigarh (40), Rajnandgaon (40), Surguja (14), Raipur (30), Jashpur (34), Bastar (10), Mahasamud (28)] for detection of bovine brucellosis, leptospirosis and IBR. PCR was conducted for presence of DNA of these three infectious pathogens. Out of 218 samples, 20 (9.17%), 46 (21.1%) and 61 (27.98%) samples were positive for brucellosis, leptospirosis and IBR, respectively.

Molecular confirmation of blue tongue disease in sheep and goat

(Lata Jain and Vinay Kumar)

The blue tongue is an infectious disease, caused by orbivirus, resulting high morbidity and mortality in sheep and goat. There was an outbreak of blue tongue disease in goat and sheep flocks in village Chatod and Barjito of Balod district, Chhattisgarh during July-August 2016. The samples from apparently healthy and dead animals due to blue tongue disease

including spleen (3) and liver tissues (3) collected were processed for extraction of RNA and cDNA synthesis and subsequent detection of BTV by RT-PCR and nested PCR using OIE recommended primers for NS1 gene of BTV. Blue tongue disease was confirmed by production of approximately 274 bp amplicons with NS1 gene specific primers (Fig. 3) and nested PCR with an amplicon of expected 101bp size from the 7 blood samples (Fig.4). The results of PCR confirm the presence of blue tongue disease virus from the sample of outbreak. There is an urgent need to go for vaccination of blue tongue disease in this region.

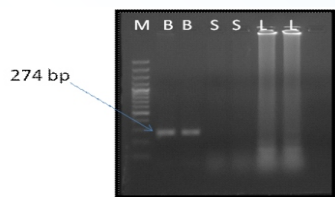


Fig 3. Agarose gel electrophoresis of BTV specific NS1 gene PCR amplicon of 274 bp

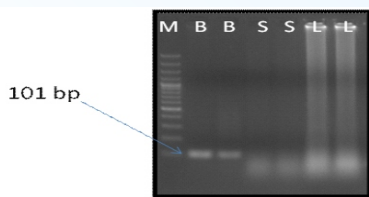


Fig 4. Agarose gel electrophoresis of BTV specific NS1 gene nested PCR amplicon of 101 bp

Studies on immune response of Indian major carps to biotic stress in Integrated Farming System

(B. K. Choudhary, S. B. Barbuddhe, Mamta Choudhary)

All the *Aeromonas* species isolated from Indian carps were subjected to Antibiotic sensitivity test. The Antibiogram showed that 91.30% isolates were found resistant to vancomycin, 56.52% for rifampicin, 47.82% for kanamycin, 21.73% for colistin, 91.30% for amoxycillin clavulanic acid, 17.39% for pefloxacin, 100% for ampicillin and 30.43% isolates were intermediate for trimethoprim and gentamicin. Whereas, 100% isolates were found sensitive to levofloxacin, oxytetracycline, cefotaxim, streptomycin, tetracycline, cefixim, ofloxacin and doxycycline.

Digital initiatives for e-Extension in rice and lathyrus

(P. Mooventhan, Anil Dixit, R. K. Murali Baskaran)

Interview schedule has been developed to collect information on socio-economic profiling, crop farming details, chemical usage pattern and information need and social issues components from the study area. Documentary on mass-production of bio control agents, pheromone technology, weedy rice and registration process in farmer SMS portal have been completed. The editing and production are in progress. Primary data were collected and analysed to develop interactive educational multimedia module.

Farmer FIRST Programme

(P. Mooventhan, Anil Dixit, K. C. Sharma, P. N. Sivalingam, Amit Kumar Gupta, Amit Dixit)

Participatory Rural Appraisal (PRA) techniques, video conferencing and surveys were employed to identify major crop wise research gaps and prioritized and accordingly technology assemblage in different modules was done. Various capacity building programme like low-cost Azolla production unit for sustainable feed production to cattle, goat

and kadaknath chicks, backyard poultry farming with kadaknath chicks, goat farming with Sirohi, Jamnapari and Barbari breeds, farmers interest groups, nutritional security garden, pheromone traps for the monitoring and effective control of yellow stem borer in rice were conducted. Custom Hiring Centre (CHCs) was established in project site with variety of drudgery reduction farm implements. Various inputs like kadaknath chicks, goat, improved seed materials like lathyrus (Mahateora), chick pea (JAKI 74), black gram (Azad - 03), mustard (FS), lentil (KLS - 218), tomato (Arka Rakshak) F1, chilli (Arka Meghna) F1, brinjal (Arka Anand) F1, okra (Arka Anamika) TFL seeds and Arka Mega Seed Kit (Vegetable) etc were supplied. Happy seeder was demonstrated to the tribal farmers and used to sow the pulses. Two Farmer Communication Centre (FCCs) was established in FFP project site to reach the unreached and discussed with tribal farmers through video conferencing. Totally, ten capacity building programme were conducted under this project and 1084 tribal farmers got benefitted from the cluster of five villages.



Azolla production



Farmers Communication Centre

Germplasm of major crops procured by NIBSM for screening against biotic stresses

S. No.	Crop	Accessions	Differentials	Wild species	Control	Total	Donor institutes
1.	Rice	008	29	--	01	38	IRRI, Philippines, IIRR, Hyderabad
2.	Chickpea	236	--	--	04	240	NBPGR, New Delhi, ICRIASAT, Hyderabad
3.	Millet	706	--	--	--	706	IIMR, Hyderabad
4.	Mung bean	002	--	--	--	002	NIBSM, Raipur
5.	Pearl millet	238	--	23	03	264	ICRIASAT, Hyderabad, IGRI, Jhansi
6.	Brinjal	192	--	--	--	192	NBPGR, New Delhi
7.	Pigeonpea	146	--	23	04	173	IARI, New Delhi, ICRIASAT, Hyderabad
8.	Lathyrus	110	--	--	--	110	IGKV, Raipur
9.	Wheat	244	69	--	--	313	IARI-RS, Wellington, Tamil Nadu
Total		1882	98	46	11	2038	

Status of Biotic Stresses and New Reports in Crops in Chhattisgarh (2016-17)

The status of pests and diseases on various agricultural and horticultural crops, prevailed during *rabi* 2016-17 Chhattisgarh were documented and tabulated hereunder.

Crop	Biotic Stress	Scientific Name	Intensity
Rice	Yellow stem-borer	<i>Scirpophaga incertulas</i>	Medium
	Brown plant hopper	<i>Nilaparvata lugens</i>	Medium
Wheat	Pink stem-borer	<i>Sesamia inferens</i>	Medium
	Foot rot	<i>Sclerotium rolfsii</i>	Low
Mung bean	Tobacco caterpillar	<i>Spodoptera litura</i>	Low
	Aphids	<i>Aphis craccivora</i>	Medium
	Leaf crinkle	Virus associated disease	42.9%

	Cercospora leaf spot	<i>Cercospora cruenta</i>	Low
	Leaf spot	<i>Cercospora canescens</i>	Low
	Yellow mosaic	<i>Begomovirus [Bemisia tabaci (vector)]</i>	2.86
	Vein necrosis	Thrips (vector)	16.3%
	Powdery mildew	<i>Erysiphe polygoni</i>	Low
	Anthraxnose	<i>Colletotrichum lindemuthianum</i>	Low
Urd bean	Yellow mosaic disease	<i>Begomovirus [Bemisia tabaci (vector)]</i>	5 to 90%
Chickpea	Gram podborer	<i>Helicoverpa armigera</i>	Medium
	Wilt	<i>Fusarium oxysporum f.sp. ciceris</i>	Low
	Collar rot	<i>Sclerotium rolfsii</i>	Low
Lathyrus	Thrips	<i>Thrips tabaci</i>	High
Sunflower	Cut worm	<i>Spodoptera litura</i>	Low
	Stem/Collar rot	<i>Macrophomina phaseolina</i>	20%
Okra	Shoot and fruit borer	<i>Earias spp</i>	High
	Whitefly	<i>Bemisia tabaci</i>	High
	Jassids	<i>Amrasca devastans</i>	High
	Yellow vein mosaic	<i>Begomovirus [Bemisia tabaci (vector)]</i>	High
	Leaf curl	<i>Begomovirus [Bemisia tabaci (vector)]</i>	Moderate
Bitter gourd	Leaf crinkle	<i>Begomovirus [Bemisia tabaci (vector)]</i>	High
	Mosaic	Cucumovirus	High
	Red pumpkin beetle	<i>Aulacophora foveicollis</i>	High
	Fruit fly	<i>Dacus cucurbitae</i>	High
Sponge gourd	Leaf crinkle	<i>Begomovirus [Bemisia tabaci (vector)]</i>	High
Brinjal	Shoot & fruit borer	<i>Leucinodes orbonalis</i>	High
Tomato	Fruit borer	<i>Helicoverpa armigera</i>	Low
	Wilt	<i>Pseudomonas solanacearum</i>	Low
	Leaf curl	<i>Begomovirus [Bemisia tabaci (vector)]</i>	Low to moderate
	Blight disease	<i>Phytophthora infestans</i>	Moderate
Chilli	Leaf curl	<i>Begomovirus [Bemisia tabaci (vector)]</i>	8 to 70%
Pumpkin	Yellow vein mosaic	<i>Begomovirus [Bemisia tabaci (vector)]</i>	50%
Bottle gourd	Red pumpkin beetle	<i>Aulacophora foveicollis</i>	High
	Fruit fly	<i>Dacus cucurbitae</i>	High
	Mosaic	Cucumovirus	Low
Papaya	Ring spot virus	Polyvirus [Aphid (Vector)]	Medium
	Leaf curl	<i>Begomovirus [Bemisia tabaci (vector)]</i>	23 to 80%
Cucumber	Mosaic	Cucumovirus	3 to 8%

Institute Activities

3rd Research Advisory Committee (December 20, 2017)

The 3rd meeting of Research Advisory Committee (RAC) of ICAR-NIBSM, Raipur was held on December 20, 2017 at ICAR-NCIPM, New Delhi under the Chairmanship of Prof. Anupam Varma, former ICAR-National Professor, IARI, New Delhi. The RAC was started with brief presentation of Dr. Jagdish Kumar, Director (Acting), NIBSM on the



background, genesis and synthesis, development, organizational set-up (revision of cadre strength) and finalizing mandate befitting the novel theme of creating ICAR-NIBSM as a deemed university".

Dr. P. Kaushal, Joint Director (Research) comprehended the salient achievements of ongoing research projects (institute and externally funded), made by project team, future research plan, publications made during the year, recognitions by the scientists *etc.* The RAC has offered some of the important recommendations including, necessary effort to post an administrative and finance officer at NIBSM, efficient utilization of available human resources, biotic stress for bio-security significance to the country, mapping of pests and pathogens horror to the country, revising the list of pest and pathogen of quarantine importance *etc.*

3rd Institute Research Council (July 11-12, 2017) and supplementary IRC (August 09, 2017)

The 3rd IRC meeting was held in two session *i.e.*, main IRC from July 11-12, 2017 and supplementary IRC on August 09, 2017 in the committee room of ICAR-NIBSM under the Chairmanship of Dr. Jagdish Kumar, Director (Acting) and stressed upon the scientists to concentrate on scientific activity especially on new frontiers in biotic stress management as per mandate in spite of their engagement in various institute developmental activities. Thereafter, Dr. P. Kaushal, Joint Director (Research) presented research projects, programme, scientific activities and establishment. The supplementary IRC was conducted mainly to discuss on new project proposals, programme

mode approach of research, enrichment of germplasm for profiling biotic stress tolerance, collaborations, establishing section/laboratory and work load of scientists.

Interactive Session on Biological Control (August 10, 2017)

The Director, National Bureau of Agricultural Insect Resources, Bengaluru delivered a lecture on 'Biological control: Achievements & novel approaches' at NIBSM, Raipur on August 10, 2017 and interacted with the scientists of National Institute of Biotic Stress Management, Raipur and IGKV, Raipur. During the interaction between Entomologists and Joint Director (Research), NIBSM, Raipur and the Director, NBAIR, Bengaluru, three possible areas of collaboration were identified as 1) Insect biodiversity: Collection, preservation and characterization 2) Chemical profiling in non-host plants and 3) Adaptive Research to validate and demonstrate the technologies among the farmers of Chhattisgarh. In addition, four novel areas including, genetic manipulation and induced mutagenesis in insects, phylogeny of insect vectors; population dynamics, new pheromones (eg. Thrips) and molecular entomology (RNAi) to initiate collaborative research were suggested during the discussion.



Independence Day (August 15, 2017)

Independence day was celebrated at ICAR-NIBSM on August 15, 2017 by unfurling the National flag and disbursed sweets to all staff and labourers.

Parthenium Awareness Week (August 16-22, 2017)

ICAR-NIBSM celebrated the *Parthenium* awareness week during August 16-22, 2017. Director and Joint Director (Research) highlighted the ill-effects of *Parthenium* on human, animal and plant health. As part of the programme, all scientific and supporting staff and labourers participated in uprooting and discarding and spraying of herbicide for effective management of *Parthenium* in campus premises. All the MGMG groups, village youths and school children were educated on the importance of *Parthenium* awareness week. The programme was co-ordinated by Dr. Anil Dixit and Dr. J. Mallikarjuna.



ICAR-Short Course (September 11-20, 2017)

An ICAR sponsored short course on 'New Frontiers of biotic stress management for doubling of farmers income' was organized by ICAR-NIBSM during September 11 to 20, 2017. Dr. K. Subramaniam IFS, Director General, Chhattisgarh Council of Science and Technology inaugurated the training course as a chief guest in the presence of Dr. M. P. Thakur, Director of Extension, IGKV, Raipur as a guest of honour, Dr. Jagdish Kumar, Director (Acting), and Dr. P. Kaushal, Joint Director (Research) ICAR-NIBSM, Raipur presided over the inauguration ceremony. The dignitaries sensitized the participants about the current statistics on huge losses of agricultural produce due to all possible kinds of biotic stresses



and the dire need of doubling of farmers income by 2022. A total of 21 trainees from various Agricultural Universities and ICAR Institutes belonging to the disciplines of Agricultural Entomology, Pathology, Weed Science, Plant Breeding and Genetics etc. participated and benefitted in this training programme.

Hindi Pakhwada (September 14-28, 2017)

On the occasion of *Hindi Diwas* 2017, *Hindi Pakhwada* was organized during September 14-28, 2017 and inaugurated by Dr. P. Kaushal, Joint Director (Research), ICAR-NIBSM, followed by a guest lecture, delivered by Dr. Seema Srivastava, Principal, Government higher secondary school, Saragaon, Raipur on September 19, 2017. Two competitions such as *sundar lekh* and *shruti lekh* were conducted on September 23, 2017 while essay writing on 'Doubling farmers income by 2022'. The *Hindi Pakhwada* was concluded on September 28, 2017 in the august presence of Dr. Jagdish Kumar, Director (Acting), ICAR-NIBSM.

Swachhta Hi Seva Abhiyan (September 15-October 02, 2017)

On the first day of *Swachhata Hi Seva Abhiyan*, Dr. Jagdish Kumar, Director (Acting) and Dr. P. Kaushal, Joint Director (Research) highlighted the importance to the staff, followed by *Swachhta* pledge observance. The *Seva Diwas* was celebrated on September 17, 2017 in which all staff actively participated in cleaning of premises of campus. On the occasion of celebration of *Samagra Swachhata Diwas* on September 24, 2017, *shramdaan* were involved in cleaning of the campus. Farmers and village youths of MGMG villages were also sensitized on cleanliness.

6th Foundation Day (October 07, 2017)

The 6th foundation day of the ICAR-NIBSM was celebrated with an emphasis on the theme of 'Agriculture based Women Empowerment'. Dr. U. K. Mishra, Vice- Chancellor, CGKV, Durg was the chief guest and Shri S. R. Verma, Director State Agricultural Management Extension Training Institute (SAMETI) and Registrar IGKV, Raipur were the guest of honour. The celebrations began with the plantation of saplings to mark the New India movement *Sankalp se Siddhi*, followed by the main function, in which Dr. Jagdish Kumar, Director (Acting) welcomed the esteemed guests, employees of NIBSM and women farmers. Dr. P. Kaushal, Joint Director (Research) highlighted the major achievements of institute during last one year. Over 100 farm women and farmers benefitted in this programme. All the dignitaries visited the campus and appreciated the efforts of institute in addressing the problems of biotic stress in a comprehensive way. On this occasion, Dr. R. K. Murali Baskaran and Dr. K. C. Sharma were awarded for their contributions in the best publication. Later the farmers-scientists interface was held and problem with solution of women farmers were addressed on the spot.



NIBSM Newsletter release

NIBSM Scientists in AICRIP-Rice Monitoring Team

Three scientists from NIBSM, Raipur participated in the team of AICRIP for monitoring rice trials in different centres in the Eastern region during 2017 *kharif* season with a motive to collect samples from East and North East regions.



Participation of NIBSM Scientists in AICRIP trial monitoring

Participating Scientist	Centres visited	Date of visit	Remarks
Dr. S. K. Jain, Principal Scientist (Plant Pathology)	OUAT Bhubaneswar	11.10.17	Collected BLB samples from all the locations
	OUAT Reg. Res. Stn. Chiplima	12.10.17	
	OUAT Reg. Res. Stn., Jeypore	14.10.17	
	ICAR-NRRI, Cuttack	16.10.17	
Dr. P.N. Sivalingam, Senior Scientist (Biotechnology)	State Dept. of Agriculture farm, Mohanbhog, Nalchar	24.10.17	Collected rice leaf samples with BLB symptoms
	State Agricultural Research Station, Arundhatinagar	24.10.17	
	ICAR Research Complex for North Eastern Hill Region, Lembucherra, Agarthala		
	College of Agriculture, CAU, Lembucherra, Agarthala		
	AAU, Guwahati		
Sh. Yogesh Yele, Scientist (Agril. Entomology)	ICAR-NEI-Research complex, Umiam, Shillong	31.10.17	Collected BLB samples from all the stations
	ICAR-NEI-RC, Umiam (Upper Shillong trials)	31.10.17	
	NRRI-Regional Rainfed Lowland Rice Research Station, Cierua	1.11.17	
	AAU Regional Agricultural Research Station, Titabor	3.11.17	

Vigilance Awareness Week (October 30-November 04, 2017)

The vigilance awareness week was observed by ICAR-NIBSM during October 30 to November 04, 2017. With the theme of 'My Vision-Corruption Free'. Pledge was administered and banners and posters were displayed at prominent places of NIBSM. Various activities like integrity pledge, distribution of pamphlets and banners, conducting sensitizing programme at various MGMG Villages and nearby schools were performed.



Vigilance week observance

Crop Harvesting Day (November 01, 2017)

ICAR-NIBSM, Raipur celebrated the commencement of paddy harvest for the season *kharif* 2017 as Crop Harvesting day on November 01, 2017. Dr. Jagdish Kumar, Director (Acting), Dr. P. Kaushal, Joint Director (R), Dr. Anil Dixit (Chairman, Farm Operations and Management Committee) and other scientists of NIBSM attended the rituals to initiate the harvesting of 60 acres of paddy (Cv. Swarna, Mahamaya, IR 64).

ICAR Sports Meet (November 10-13, 2017)

ICAR-NIBSM participated in ICAR Sports Meet (Central) at Bhopal during November 10-13, 2017 under the Chief-de-Missionship of Dr. Anil Dixit.

Validating ITKs and innovations from progressive farmers of Chhattisgarh

ITK for Rice Yellow Stem Borer Management (Kaushal Prasad Patel, Tarapur, Raigarh)

A botanical decoction and organic manure developed by Mr. Kaushal Prasad Patel, farmer of Raigarh were tested on rice cultivars Swarna and Silky, against yellow stem-borer in Baronda farm, ICAR-NIBSM during



Treated rice crop

Control rice crop

kharif 2017. The botanical decoction treated Swarna seeds coupled with application of organic manure and Silky rice variety were demonstrated. The incidence of yellow stem-borer on Silky variety and Swarna imparted with botanical and manure was negligible when compared to control.

Kopar Technology for Biotic Stress Management with special reference to weed

(Anil Dixit, K.C. Sharma, P. Mooventhan)

Kopar is a traditional method of farm practice in Chhattisgarh. Mr. P. C. Agarwal a progressive farmer of Kharora has used this technology for the management of biotic stresses (weeds, insect pests and diseases) in his own farm at Kharora and found very encouraging results over chemical control measures. As per Mr. Agarwal, the technology could increase the yield by 20-30 per cent depending upon the variety, stage of the crop and number of Kopar operation in the crop. The Kopar technology has been demonstrated at farmers field, Jaroda (Mr. Santosh Sahu farm) and ICAR-NIBSM farm in the paddy crop during *kharif* 2017. Mr. Sahu has used Kopar technology thrice (20, 30 and 40 DAT) in the paddy crop for the management of weeds in paddy (Cv. Swarna). The number of tillers was more (14-15/paddy plant) and the level of insect pests and diseases were negligible as compared to non-Kopared crop (8-10 tillers/ paddy plant). He recorded 26 q/1.5 acre in Kopared crop as compared to non-Kopared crop (20 q/1.5 acre). Whereas at ICAR-NIBSM farm, the yield was 21.36 q/acre (Cv. Swarna) and 19.82 q/acre (Cv. Mahamaya) in Kopared crop as compared to non-Kopared crop (16 q/acre in Mahamaya and 17.5 q/acre in Swarna).



Collaborations in progress

S. No.	Participating Institutes	Purpose
1.	AICRP networks	Ne-natodes, other crops
2.	NRRI, Cuttack	Rice pest repository and characterization, pyramiding and stacking of genes in rice
3.	IIVR, Varanasi	Germplasm screening for biotic stress tolerance Interspecific hybridization Developing differentials sets
4.	NIASM, Baramati	Stress tolerance/Stress tolerance/(core) germplasm collections Interspecific hybridization Nano-biosensors for stress induced molecules
5.	NBPGR, New Delhi	Screening for biotic tolerance in core collections
6.	IARI, Pune	Collection of virus and vectors, alternative hosts, molecular virology
7.	MANAGE, Hyderabad	Extension for technology transfer
8.	IARI, New Delhi	Introgression of alien genes for enhanced pigeonpea resistance/tolerance to pod borers
9.	Navsari Agricultural University, Rajasthan TNAU, Coimbatore Indian Institute of Millet Research, Hyderabad	Germplasm screening for biotic stress tolerance in minor millets
10.	National Bureau of Agricultural Insect Resources, Bengaluru Indira Gandhi Vishwavidyalaya, Raipur	Microbial and Insect Bio-systematic and Adaptive research

Extension and Outreach Activities

Mera Gaon Mera Gaurav Programme

The *Mera Gaon Mera Gaurav* (MGMG) teams of ICAR-NIBSM scientists provided information to the farmers of selected villages (15) on various aspects in a time frame through monthly visit, demonstrations, meetings and mobile advisory and literature support every month. The selected villages (15) were visited for 27 times repeatedly in 11 visits and benefitted 220 farmers. Three farmers meetings were organized in which 22 beneficiaries participated and benefitted. A total of five demonstrations were organized in which 14 farmers participated and benefitted. Scientific



advisory on crop rotation, rice false smut and brown plant hopper (BPH) management and scientific method of paddy storage and rat control were also suggested in which 10 farmers benefitted.

Farmer FIRST Programme

Hands-on-training on oyster mushroom production (October 13, 2017)

Hands-on-Oyster mushroom production training was conducted at Kharaha village, Kasdol block, Chhattisgarh for tribal farmers on October 13, 2017 and 67 farmers benefitted.



Workshops/Symposia/Seminars/Trainings organized

- ICAR-NIBSM organized an ICAR-Short Course on “New Frontiers of biotic stress management for doubling the farmers income” during September 11-20, 2017.
- Organized Hands-on-Oyster mushroom production training at Kharaha village, Kasdol block, Chhattisgarh for tribal farmers on October 13, 2017 under Farmers FIRST project.

Workshops/Symposium/Seminar/Conference/other fora attended

- J. Mallikarjuna attended '7th International conference on Silicon in Agriculture' during October 24-28, 2017, held at UAS GKVK Bangalore.
- P. N. Sivalingam attended '3rd International Conference of Bio-resources and Stress Management', during November 08-11, 2017, held at Jaipur.
- P. Mooventhan, attended workshops on 1) Good Practices in Quantitative Social Science Research during August 7-12, 2017 at ICAR - CTCRI, Trivandrum 2) Methodological framework for implementation of FFP during 18th to 21st September 2017 at IISS, Bhopal. 3) The progress of FFP during 2016-17 and 2017-18, Rabi 2017-18 (physical & financial) on November 14, 2017 at ICAR-ATARI, Zone IX, Jabalpur.
- B. K. Choudhary attended '11th Indian Fisheries and Aquaculture forum', organised by ICAR-CIFT, Kochi and Asian Fisheries Society (Indian Branch) during November 21-24, 2017, held at Kochi.
- R. K. Murali Baskaran attended one day Intellectual Convention on “Doubling of Farmers Income through Citrus Cultivation” and delivered a lecture in brain storming session on 'Challenges of biotic stress in citrus cultivation' on November 23, 2017, held at Central Citrus Research Institute, Nagpur.
- K. C. Sharma attended and presented papers on 1) Seasonal Incidence and Response of wheat genotypes against pink stem borer (*Sesamia inferens*) in Chhattisgarh, India in '3rd International conference on Bio-resource and stress Management' during November 8-11, 2017 at Jaipur, Rajasthan 2) Population dynamics of whitefly, a sucking pest and vector in Chhattisgarh, India in 'Indo-US symposium on “Curbing whitefly-plant virus pandemics-the departure from pesticides to genomic solutions' during December 4-5, 2017 at PAU, Ludhiana, Punjab.

Training attended

- Yogesh Yele attended an ICAR sponsored 10 days short Course on 'New frontiers in biotic stress management for doubling farmers income' organized by ICAR-NIBSM, Raipur during September 11-20, 2017, held at IGKV, Raipur.
- Lata Jain attended an ICAR sponsored 21 days winter school on 'Recent approaches in animal disease diagnostics and vaccinology' from September 26-October 16, 2017, organized at School of Animal Biotechnology, GADVASU, Ludhiana.
- M. Choudhary attended 21 days CAFT training course on 'Microbial Genomics and Proteomics in Diagnosis and Control of Diseases of Veterinary Importance during November 07-27, 2017, organised by Lala Lajpat Rai University of Veterinary & Animal Sciences, Hisar-

125004, Haryana.

- J. Sridhar attended a training on 'Identification, mass production and utilisation of parasitism, predators and entomopathogens for sustainable insect pest management' during December 4-10, 2017, held at NBAIR, Bengaluru.

Publications

Research Paper

- Choudhary, M., B. K. Choudhary, S. Bhoyar, S. B. Kale, S. P. Chaudhari, B. C. Bera, A. Jain and S. B. Barbuddhe. 2017. First isolation of *Leclercia adecarboxylata* from Animal clinical case. Letters in Applied Microbiology, DOI: 10.1111/lam.12811

Review paper

- Murali-Baskaran, R. K., K. C. Sharma, P. Kaushal, J. Kumar, P. Parthiban, S. Senthil-Nathan and R. W. Mankin. 2017. Role of kairomone in biological control of crop pests-A review. Physiological and Molecular Plant Pathology, DOI: <http://dx.doi.org/10.1016/j.pmpp.2017.07.004>

Training Manual

- Resource manual on 'New Frontiers of biotic stress management for doubling of farmers income' (Anil Dixit and R. K. Murali Baskaran, eds.), organized by ICAR-NIBSM, during September 11-20, 2017, 276p.

Repository Deposition

- S. K. Jain, Vinay Kumar, Lata Jain and P. Kaushal deposited isolates of *Sclerotium rolfsii* one each from rice (ITCC No. 8218), wheat (ITCC No. 8219) and chickpea (ITCC No. 8220) in Indian Type Culture Collection, IARI, New Delhi during 2017.
- Kumar, V., L. Jain, S. Chaturvedi, S. K. Jain and P. Kaushal deposited 20 bacterial endophytes from pigeonpea (*Cajanus cajan* L.) and nine bacterial endophytes from lathyrus (*Lathyrus sativus* L.) in Genbank, National Center for Biotechnology Information (NCBI) during 2017, <https://www.ncbi.nlm.nih.gov/Genbank/update.html>

Awards/Recognition/Membership in Professional Societies

- R. K. Murali Baskaran and K. C. Sharma received 'Best Research Paper Award' as corresponding author and co-author in the publication of 'Role of kairomone in biological control of crop pests' from Vice-Chancellor, CGKV, Durg during 6th Foundation Day of NIBSM celebrated on October 07, 2017.
- P. N. Sivalingam received “Distinguished Scientist Award” from 3rd International Conference of Bio-resources and Stress Management during 08-11th November 2017, held at Jaipur.
- J. Sridhar received a certificate of merit for the best presentation in the capacity building programme on 'Identification, mass production and utilization of parasitoids, predators and entomopathogens for sustainable insect pest management', organized by ICAR-National Bureau of Agricultural Insect Resources, Bengaluru from December 4-10, 2017.



Dignitaries Visits

- Dr. Chandish Ballal, Director, National Bureau of Agricultural Insect Resources, Bengaluru visited on August 10, 2017 and interacted with Entomologists to establish research collaboration.
- Dr. I. S. Solanki, ADG (FFC), ICAR visited NIBSM, Raipur (CG) on September 09, 2017.

New Staff/Promotion/Transfer/Joining/Additional Charges

- Dr. J. Sridhar joined as Scientist (Agric. Entomology) at NIBSM on 06.07.2017
- Dr. Lalit Kharbikar joined as Scientist (Biotechnology) at NIBSM on 31.07.2017