संस्थान प्रबन्धन समिति

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छठवीं बैठक

6th Meeting of Institute Management Committee

March 18th, 2019

भाकृअनुप–राष्ट्रीय जैविक स्ट्रैस प्रबन्धन संस्थान, रायपुर,
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ICAR-NATIONAL INSTITUTE OF BIOTIC STRESS MANAGEMENT,
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AGENDA ITEMS

AGENDA No.-A

CONFIRMATION OF THE PROCEEDINGS OF THE 5th MEETING OF THE INSTITUTE MANAGEMENT COMMITTEE HELD ON 17/03/2018

निदेशक
डायरी संख्या 05/1937
दिनांक 12/06/2018

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भारतीय कृषि अनुसंधान परिषद
INDIAN COUNCIL OF AGRICULTURAL RESEARCH
कृषि भवन, डॉ० राजेन्द्र प्रसाद मार्ग, नई दिल्ली–110 001
Krishi Bhawan, Dr. Rajendra Prasad Road
New Delhi-110 001

F. No. CS.19/10/2013-IA-III **Dated the: 31 May, 2018**

To

The Director,
ICAR-National Institute of Biotic Stress Management (NIBSM),
Baronda,
Raipur-493225 (Chhatisgarh).

Sub: Proceedings of IMC Meeting (5th) of NIBSM, Raipur held on 17.03.2018-regarding.

Sir,

This has reference to your letter No.7-11/NIBSM/2014/24 and 78, dated 07.04.2018 and 19.05.2018 respectively, on the subject cited above.

The approval of the Competent Authority is hereby conveyed with the observations of the ICAR on items as mentioned against each as under:-

Sl. No.	Agenda Items	Council's Comments
1.	Confirmation of the proceeding of the 4th IMC meeting held on 15.3.2017.	Information only.
2.	Action taken reports on the recommendations of 4th IMC meeting.	Information only
3.	Important Events and Activities 2017-18.	Information only
4.	Research/Extension / training activities	Information only.
5.	Year –wise allocation and annual budget allocation	Information only.
6.	Plan & Non Plan Budget allocation and expenditure.	
7.	Revenue Generation	
8.	Position of Outstanding advances.	
9.	List of equipment approved in SFC 2017-20 proposed to be procured during 2017-18.	Action may be taken as per the delegation of power subject to the provisions made in the approved list of SFC 2017-20 and availability of funds & following all codal formalities as per the GFR 2017 and instructions issued by Govt. of India and Council from time to time in this regard.

10.	Proposal for approval for expenditure towards entertainment and light refreshment charges at NIBSM, Raipur.	Approved. Within the delegated power to the Director of the Institute and Instruction issued by council vide office order No. 12(4)/2007-CDN (A&A), dated 29.09.2015, subject to the availability of funds and the economy instructions issued by GOI/ Council from time to time.
11.	The construction work for Administrative building, schools and Boys and Girls hostel has been initiated on 4.1.2018.	Information only.
12.	Creation of sanction posts under SFC, 2017-20.	Information only.
13.	New Staff/ promotion / probation. Confirmation / transfers/ joining resignation/ superannuation/ deputation/ obituary.	Information only.
14.	Any other items with permission of chair.	Information only.

It is also informed that those proposals on which Administrative & Financial approval of the Council is required, the same may be submitted by the Institute on case to case basis, which are not under the delegated powers of Director/IMC.

Your's faithfully,

(Rajeshwar Dayal)
Under Secretary (CS)
Telephone No. 23046422

Agenda No.-B

ACTION TAKEN REPORT ON THE RECOMMENDATION OF 5TH IMC MEETING

S. No.	Agenda Items	Council's Comments	Action Taken Report
1.	Confirmation of the proceeding of the 5th IMC meeting held on 17.03.2018	Information only	No action required
2.	Action taken reports on the recommendations of 5th IMC meeting held on 17.03.2018	Information only	
3.	Important activities during 2017-18	Information only	
4.	Research/ Extension/ training activities	Information only	
Financial matter			
5.	Year wise allocation and annual budget allocation	Information only	No action required
6.	Plan and Non plan budget allocation and expenditure		
7.	Revenue generation		
8.	Position of Outstanding advances		
Administrative Matters			
9.	List of equipment's approved in SFC 2017-20 proposed to be procured during 2017-18	Approved. Action may be taken as per the delegation of power subject to the provision made in the approved list of SFC 2017-20 and availability of funds and following all codal formalities as per the GFR 2017 and instructions issued by GOI and council from time to time in this regard.	Complied
10.	Proposal for approval for expenditure towards entertainment and light refreshment charges at NIBSM, Raipur	Approved: Within the delegated power to the Director of Institute and instruction issued by the council vide Office Order No. 12 (4)2007-CDN (A&A) dated 29.05.2015 subject to the availability of fund and the economy instruction issued by GOI/council from time to time.	Complied
11.	The construction work for administrative building, schools and boys and girls hostel has been initiated on 4.1.2018	Information only	No action required
12.	Creation of sanction post under SFC 2017-20	Information only	
13.	New staff/promotion/probation/confirmation /transfer/joining/ resignation/superannuation/deputation/obituary	Information only	
14.	Any other items with permission of chair	Information only	

Agenda No.-C

IMPORTANT EVENTS AND ACTIVITIES DURING 2018-19

5th Institute Management Committee Meeting (March 17, 2018)

The 5th Institute Management Committee (IMC) Meeting of the institute was held on March 17, 2018 under the Chairmanship of Dr. Jagdish Kumar, Director (Acting) in the committee room of institute. The IMC members *viz*., Dr. K. N. Mohanta, Principal Scientist, ICAR-CIFA, Bhubaneswar (Odisha), Dr. A. K. Mukharjee, Principal Scientist, ICAR-NRRI, Cuttack (Odisha), Dr. D. K. Ghosh, Principal Scientist, ICAR-CCRI, Nagpur (Maharashtra) and Sh. R. K. Chandrawanshi, Deputy Director of Agriculture, Chhattisgarh, Dr. P. Kaushal, Joint Director (Research), ICAR-NIBSM, Raipur, Dr. Anil Dixit, Principal Scientist and Dr. B. K. Choudhary, Scientist as special invitee, Dr. K. C. Sharma, Sr. Scientist (Nodal Officer, 5th IMC) and Sh. A. A. Goswami as Member Secretary, IMC and Dr. Anil Dixit, Principal Scientist, ICAR-NIBSM as special invitee attended the meeting. Dr. Jagdish Kumar welcomed the gathering. Dr. P. Kaushal presented brief report on research highlights and research collaborations and extension and outreach activities of ICAR-NIBSM, Raipur. Dr. B. K Choudhary presented the salient findings of the research paper, recently published in journal of repute. The member secretary presented the action taken report of 4th IMC. The proposed agendas items as per the council's guidelines were discussed in the meeting.

Visit of Special Secretary (DARE) and Secretary (ICAR) (April 13, 2018)

Shri. Chhabilendra Roul, Special Secretary (DARE) and Secretary (ICAR) visited ICAR-NIBSM on April 13, 2018 to monitor the progress of new building construction. He visited the construction site and discussed with CPWD officials on the progress made as per time schedule and financial management *etc*. Thereafter, the secretary inaugurated newly established Biotechnology Laboratory, a central facility in the auspicious presence of the Dr. Jagdish Kumar, Director (Acting) and Dr. Pankaj Kaushal, Joint Director (Research) and scientists and staff of the institute and also interacted with Section In-charges and scientists on the research programme of the respective section and the adoption of various initiatives taken by ICAR.

3rd Research Advisory Committee meeting (June 07-08, 2018)

The second part of 3rd RAC meeting was held on June 07-08, 2018 at ICAR-NIBSM, Raipur, under the Chairmanship of Prof. Anupam Varma, former ICAR National Professor & INSA Senior Scientist, IARI, New Delhi. The meeting was attended by Prof. Dr. R. J. Rabindra, Ex Director, ICAR -NBAIR, Bengaluru; Dr. S. M. S. Tomar, Principal Scientist (Genetics) (retd.), ICAR-IARI, New Delhi; Dr. P. K. Chakrabarty, ADG (PP&B), ICAR; Dr. Jagdish Kumar, Director (Acting), Dr. Pankaj Kaushal, Joint Director (Research), ICAR-NIBSM, Raipur and Dr. P. N. Sivalingam, Senior Scientist cum Member Secretary (Acting), RAC, ICAR-NIBSM, Raipur. Before on-set of meeting, RAC members inaugurated newly established Insect Rearing and Screening facility and planted tree sapling. The RAC meeting started with welcome address by Dr. Jagdish Kumar, Director (Acting), followed by brief presentation about the background, genesis and synthesis of the ICAR-NIBSM Dr. Pankaj Kaushal, Joint Director (Research) presented a comprehensive account on the ongoing research projects, salient achievements, future research plan, publications made during the year, recognitions earned by the NIBSM scientists *etc*.

3rd RAC meeting

Inauguration of Insect Screening Facility

International Yoga Day (June 21, 2018)

ICAR-National Institute of Biotic Stress Management, Raipur, (C.G) celebrated 'International Yoga Day' on 21st June 2018. All the scientists and staff members of the institute participated in the event and Yoga sessions organized as per the Common Yoga Protocol provided by Ministry of AYUSH, Government of India.

Demonstration of Yoga to Scientists and Staff of ICAR-NIBSM

4th Institute Research Committee (July 22-24, 2018) & Supplementary IRC (October 22, 2018)

The 4th Institute Research Committee meeting was held during July 22-24, 2018 including visit to experimental fields and section laboratories on July 22, 2018, followed with discussion on research projects from July 23 to 24, 2018 and supplementary IRC on October 22, 2018 at ICAR-NIBSM, Raipur. The progress of 11 institute funded and four external funded projects was discussed. Six new projects were also approved during IRC 2018.

4th IRC 2018 discussion session


Visit to field experiments during 4th IRC 2018

Independence Day (August 15, 2018)

The Independence Day was celebrated in ICAR-NIBSM along with scientist, staff and farm workers.

***Parthenium* Awareness Week (August 16-22, 2018)**

The Director and Joint Director (Research) emphasized the ill effects of *Parthenium* on human, animal and plant health while celebrating *Parthenium* awareness week during August 16-22, 2018 at ICAR-NIBSM. As a part of the programme, all scientific and supporting staff and labourers were involved in uprooting and spraying of herbicide for effective management of *Parthenium*.

<u>हिन्दी पखवाड़ा</u> (सितम्बर 14–28, 2018)

संस्थान में दिनांक 14–28 सितम्बर, 2018 के दौरान हिन्दी पखवाड़ा डॉ. पंकज कौशल, संयुक्त निदेशक (अनुसंधान) ने 14 सितम्बर, 2018 को शुभारंभ किया। डॉ. कौशल ने सभी वैज्ञानिकों से कृषि तकनीकी और अपनी शोध उपलब्धियों को आम जनता/किसानों तक हिन्दी में पहुँचाने का अनुरोध किया। हिन्दी पखवाड़ा के दौरान विभिन्न प्रतियोगिताओं जैसे निबन्ध, सुलेख व श्रुतिलेख आदि प्रतियोगिताओं का आयोजन किया गया। हिन्दी पखवाड़ा का

समापन एवं पुरस्कार वितरण समारोह 28 सितम्बर, 2018 को निदेशक महोदय की उपस्थिति में सम्पन्न हुआ। मुख्य अतिथि, निदेशक, संयुक्त निदेशक (अनुसंधान) द्वारा प्रतियोगिताओं में विजेता कर्मचारियों को नकद पुरस्कार व प्रशस्ति पत्र देकर पुरस्कृत किया गया। निदेशक ने सभी अधिकारियों एवं कर्मचारियों को हिन्दी के प्रयोग को बढ़ावा देने एवं शासकीय कार्य हिन्दी में करने पर जोर दिया। इस अवसर पर निदेशक महोदय ने पन्द्रह दिन चले विभिन्न कार्यक्रमों में उत्साहपूर्वक भाग लेने के लिए अधिकारियों एवं कर्मचारियों को बधाई दी। हिन्दी पखवाड़ा के सफल आयोजन के लिए राजभाषा समिति के सभी सदस्यों की सराहना करते हुये राजभाषा के और अधिक प्रयोग के लिए सतत् प्रयास पर बल देने को कहा। अन्त में धन्यवाद प्रस्ताव के साथ कार्यक्रम सम्पन्न हुआ।

MANAGE off campus Training (August 27-September 05, 2018)

The MANAGE sponsored off-campus collaborative training programme on "Eco-friendly Pest Management Technologies and Novel Strategies: An Update" (27th August-5th September 2018) was conducted at ICAR-NIBSM, Raipur with an objective to create awareness among the extension functionaries on eco-friendly crop protection technologies. Twenty five trainees (including extension officers and Associate Professor) representing 25 districts of Chhattisgarh attended this programme and benefitted.

Release of resource materials

Demonstration of eco-friendly pest management tools

Quinquennial Review Meeting (September 24-25, 2018)

The First Quinquennial Review Team (QRT) meeting of the ICAR-National Institute of Biotic Stress Management, Raipur was held during September 24-25, 2018 under the Chairmanship of Dr. S. M. Paul Khurana, Ex-VC, RDVV Jabalpur & Ex Director ICAR-CPRI, Shimla with the members, Dr. V. S. Thakur, Ex VC, Solan, Dr. T. P. Trivedi, Ex Director DKMA, Dr. P. S. Naik, Ex Director IIVR Varanasi, Dr. Rajesh Rana, ATARI Ludhiana and Dr. Anil Dixit, ICAR-NIBSM as a Member Secretary. Dr. J. Kumar, Director (Acting), ICAR-NIBSM explained briefly on budget utilization, staff position and construction work at NIBSM. Dr. P. Kaushal, Joint Director (Research), ICAR-NIBSM presented the research highlights of the institute. The chairman emphasized to establish better linkages and networking through suitable research programme in achieving the mandate of NIBSM. Dr. Anil Dixit, Member Secretary coordinated the QRT meetings held at NIBSM.

Swachchata Hi Sewa Ahiyaan (September 15 to October 02, 2018)

The Swachhata Hi Sewa Pakhwara was inaugurated by Dr. P. Kaushal, Joint Director (Research) by taking *Swachhta* pledge. All scientists and *MGMG* teams conducted meetings, discussions and cleanliness drives in the respective adopted villages as well as in the NIBSM campus. The women cell of

the institute conducted meetings with self help groups, school students and women NGO's of the Adsena village and stressed upon importance of Swachchata and pressed to avoid open defecation. On the closing ceremony of SHSA and 150th birth anniversary of Mahatma Gandhi on 2nd October 02, 2018, essay writing competition was held on the topic "Vision and Contribution of Mahatma Gandhi on Swachchta" to scientists and other staff members.

7th Foundation Day (October 07, 2018)

The 7th foundation day of the ICAR-NIBSM was celebrated on 7th October 2018 under the theme of 'Doubling the farmers income through management of major biotic stress in agriculture'. Dr. T. P. Rajendran, former Assistant Director General (PP&B) and former OSD, ICAR-NIBSM, Raipur and Ex-staff, Dr. S. B. Barbuddhae, Dr. Vijay Choudhary and Shri. Saguni Paswan graced the occasion. Dr. J. Kumar, Director (Acting), ICAR-NIBSM delivered welcome address. Dr P. Kaushal, Joint Director (Research) highlighted the major achievements of Institute during last one year. A farmers-scientists interaction was also held for the benefit of 150 farmers.

7th Foundation Day inauguration

NIBSM Extension bulletin release

Launch and First meeting of National Agricultural Science Fund (NASF) Funded project (October 10, 2018)

Launch and first meeting of NASF funded project "Identification of host factors responsible for infection and development of nano-particle based dsRNA delivery system for imparting resistance to begomoviruses" was organized on 10th October 2018 at ICAR-NIBSM, Raipur. During the launching programme, Dr. P. N. Sivalingam, Senior Scientist (Agril. Biotechnology), ICAR-NIBSM, Raipur and Principal Investigator of the project gave an overview of the project. Dr. Bikash Mandal, Principal Scientist, ICAR-IARI, New Delhi presented on molecular plant virus diagnosis, Dr. Senthil-Kumar Muthappa, Staff Scientist-IV, NIPGR, New Delhi presented on non-host resistance to plant pathogens and Dr. Neetu Singh, Assistant Professor, IIT Delhi, New Delhi presented on nano-particle development and utilization in crop sciences.

National Unity Day (October 31, 2018)

Celebration of Rastriya Ekta Diwas/National Unity Day was celebrated by taking pledge on October 31, 2018 to mark the occasion of Birth Anniversary of Shri. Sardar Vallbh Bhai Patel ji (Ex. Deputy PM of India).

Vigilance Awareness Week (October 29-November 03, 2018)

Vigilance Awareness Week was observed at ICAR-NIBSM during October 29-November 3, 2018 to create awareness on the theme 'Eradicate Corruption-Build a New India'. An integrity pledge was administered by the Director, Dr. J. Kumar to the officers, staff members and contractual workers of the Institute. Various activities were undertaken during the week such as visit to schools of villages to spread the messages against corruption among school children and teachers.

ICAR Sports Meet (November 12-15, 2018)

Dr. K. C. Sharma and Dr. Binod Chowdhary participated in ICAR-Central Zone Sports Tournament organized by ICAR-IISS, Bhopal during November 12-15, 2018

PM Kishan Samman Nidhi Scheme (24.2.2019)

On the occasion of launching of Pradhan Mantri KisanSamman Nidhi Scheme, a programme of farmers and public representatives (from villagesBangoli, SaragaonKeontra and Baronda)has been organized at ICAR-NIBSM, Raipur (CG) on 24.02.2019.Dr. J. Kumar, Director (Acting), ICAR- National Institute of Biotic Stress Management, Raipur (CG) welcomed the public representatives, farmers and scientists and explained the PM Kisan Scheme to farmers and public representatives. Dr. Pankaj Kaushal, Joint Director (Research) discussed about the PM-KisanSamman Nidhi Scheme with participants. The ***Mann Ki Baat***by Hon'ble PM was broadcasted to participants at 11.00-11.30 am and PM Kisan Samman Nidhi Scheme launching programme and speech was live telecasted to participants. All the farmers were advised to take benefit of scheme. Dr. Anil Dixit briefed about the institute activities to the gatherings. Dr. J. Sridhar coordinated the event and the formal vote of thanks proposed by Dr K C Sharma. In this event, more than hundred farmers, five public representatives, Scientists and institute staffs were participated.

Farmers-Scientists interface on biotic stresses

Farmers – Scientists interaction was organized at ICAR-NIBSM, Raipur on 02.03.2019, to mark this occasion all scientists from NIBSM,Raipur and the wheat trial (AICW&BP) monitoring team from IIWBR, Karnal and IARI, Regional Station, Indore have also participated in the event. Earlier Dr. J. Kumar, Director, ICAR-NIBSM, Raipur greeted and welcomed all farmers and officials and spoke about various types of biotic stresses in agriculture and their management. Dr.P.Kaushal, Joint Director (Research) emphasised about diversification in agriculture and integrated farming system. As a part of interaction all farmers and scientists visited NIBSM farm and seen various trials on Wheat, Lathyrus,

chick pea etc. Wheat trials planted under AICRP on Wheat and Barley trials (03 nos) viz., AVT- restricted irrigation- timely sown (06varieties), AVT- timely sown- irrigated (13 varieties) and AVT- late sown – irrigated (10varieties) during Rabi 2018-19 at ICAR-NIBSM, Raipur were monitored by IIWBR, Karnal and IARI regional station, Indore team (Dr KC Sharma, Dr. Lokendra Kumar, Dr AP Agarwal, Dr Gopala Reddy, Dr. Prakash). About Forty farmers including progressive farmers from Jaroda, Baloda Bazar, Baronda and Saragaon participated and visited various trails (Wheat, Lathyrus, chick pea etc.) planted in the NIBSM field and got benefitted in the farmer's scientist interface meeting. (Interface meeting was coordinated by Dr. K.C .Shrama, Dr. P. Mooventhan, and Dr.Anil Dixit, ICAR-NIBSM, Raipur).

International Women's Day 2019 celebration at ICAR-NIBSM, Raipur

On the occasion of International Women's Day on 8th March, 2019, Director (Acting) ICAR-NIBSM, Raipur inaugurated the function with his brief address. Various Scientists of the institute addressed the gathering on this occasion. Dr. Binod, Scientist, briefed the audience about celebration of International Women's day on 8th March every year and its importance. He also delivered vote of thanks.

FIELD EXPERIENCE TRAINING (FET)

Five Scientist Probationers belongs to 109th FOCARS, NAARM undergone the Field Experience Training (FET) at Kharri Village of Kasdol Block, Baloda Bazar district under the supervision of ICAR-NIBSM. The team reported on 19.02.19 and relieved on 11.03.19 from ICAR-NIBSM. Total 21 days training module executed with special reference to Farmer FIRST programme. The scientist team given the village seminar on 06.03.19 and the institute seminar completed on 08.03.19.

RESEARCH/EXTENSION/ TRAINING ACTIVITIES

Mera Gaon Mera Gaurav (MGMG)

The *Mera Gaon Mera Gaurav* teams of ICAR-NIBSM, Raipur 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) visited 25 times repeatedly in 12 visits and benefitted 873 farmers. Two farmers meeting and nine demonstrations were organized.

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Cleaning community pond</td>
<td> 
Weed management technology</td>
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<td> 
Rice yellow stem borer sex pheromone trap demo</td>
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Stored grain inesct probe trap demo</td>
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One day training cum field/lab visit for Rural Extension Officers (REOs)/State Agriculture Development Officers (June 01, 2018)

One day training cum field/laboratory visit for 49 Rural Extension Officers (REOs)/State Agriculture Development Officers from various districts of Chhattisgarh was organized on June 01, 2018 at ICAR-NIBSM, Raipur (CG). Dr. S. K. Jain and Dr. R. K. Murali Baskaran delivered lectures with special emphasis on the role of eco-friendly methods in IPM. The importance and management of zoonotic diseases was narrated by Dr. Lata Jain, Scientist (Vet. Microbiology) Dr. P. Mooventhan, Scientist (Extension) delivered a lecture on different modules (Crop, horticulture, livestock and NRM based) helpful in doubling farmer's income.

One-day training to REO/RDO

Observing live telecast on Hon'ble Prime Minister's Interaction with farmers (June 20, 2018)

The Hon'ble Prime Minister Shri Narendra Modi interacted with the farmers across the country on June 20, 2018 between 9.30 and 11.00 am which was telecasted by the Doordarshan, DD Kisan and Aakashavaani as live programme. During this event, the Prime Minister briefed the agricultural scenario and developmental schemes, followed by interaction with farmers gathered at different centres across the country. In this connection, ICAR-National Institute of Biotic Stress Management, Baronda, Raipur (CG) organized events at Bangoli, Adsena and Baronda village with 50 farmers to witness the live interaction of Prime Minister with farmers.

ICAR-NIBSM, Raipur organized one day training cum field/Lab visit for DAESI (Diploma in Agricultural Extension Services for Input Dealers) on 25th and 28th January, 2019)

One day training cum field visit for 80 DAESI (Diploma in Agricultural Extension Services for Input Dealers) trainees from Raipur, Bhamtari, Mahasamund and Gariaband districts was organized on 25th and 28th January, 2019 at ICAR-NIBSM, Raipur (CG). The training started at 11.30 AM in the chairmanship of Dr. Pankaj Kaushal, Joint Director (Research). Dr. D. J. Pophali facilitator welcomed Dr. Pankaj Kaushal, Joint Director (Research) in the training programme. Dr. Kaushal delivered a lecture on role of input dealers in biotic stress management. In this lecture he emphasized on strengthening role of input dealers in dissemination of technology effectively and in eco-friendly manner. He also emphasized that the input dealers must act as a bridge between farmers and scientists to solve the biotic stress related issues. Dr Anil Dixit, Principal Scientist delivered lecture on spraying technology in biotic stress management with special reference to weeds. Dr. Mamta Choudhary, Scientists delivered lecture on various zoonoses/rodent borne diseases and their management. Dr. Mallikarjuna J. Scientist (Entomology) demonstrated the bait preparation methods for the management of rodents both in field and godowns. Dr. R.K. Murali Baskaran, Principal Scientist (Entomology) delivered talk on eco-friendly management with special reference to pheromones in insect pest management. A lecture on light traps in safe management of insect pests was delivered by Dr. Sridhar J. Scientist (Entomology). Dr Baskaran & Dr. Sridhar also demonstrated the insect diversity and various traps to the participants. Dr. P. Mooventhan, Scientist (Extension) delivered lecture on various expert system/apps available for farmers, producers and input dealers for solving various biotic stress related problems. The training was arranged & coordinated by Dr. K.C. Sharma, Sr. Scientist (Entomology) & I/c Extension & Outreach prohramme. The training programme was ended with vote of thanks propose by Dr P. N. Sivalingam, Senior Scientist (Biotechnology).

Summary of Research Results (Programme wise)

Institute Funded Project

Programme 1: Pest and pathogen genetic resources (PPGR) and their management

1.1.Characterization of viruses and virus-like-organisms affecting economically important crops

Understanding the begomovirus occurrence and distribution among pulses and vegetables

Surveys conducted in 23 districts of Chhattisgarh during the period of report clearly revealed that begomoviruses affecting pulses and vegetables were the most important in this region followed by potyvirus causing ring spot disease in papaya (> 90 %). Based on these results, experiment was conducted during *kharif* 2017 to understand the occurrence and distribution of begomoviruses and vectors among the crops belonging to Leguminaceae (mungbean, urdbean, cowpea,), Malvaceae (okra), Solanaceae (tomato, chilli, brinjal) and Cucurbitaceae (bitter gourd, ridge gourd, cucumber, bottle gourd). The preliminary results showed that leaf crinkle disease of ridge gourd (28 DAS) appeared first followed by bitter gourd. Bottle gourd and cucumber did not show any phenotypic symptoms. Leaf curl disease in tomato and chilli appeared late (> 55 DAT). Interestingly yellow mosaic disease noticed only on urdbean and cowpea not on mungbean. This variation might be due to speciation/strains in virus or plant host/varietal preference by vectors.

1.2.Isolation and characterization of pathogens causing various diseases in animals and fishes

Studies on immune responses of Indian major carps to biotic stresses in Integrated farming system

In Chhattisgarh, fish farming system diseases management are major concern and threat to the successful aquaculture particularly with high density fish farming. Thus study was conducted to control for each individual disease of economic importance. Survey and sampling work were conducted during last year for prevalence, pathological and molecular characteristics of aquatic pathogens from integrated fish farming system of all three agro climatic zones of Chhattisgarh.

A total of 560 fish samples were collected and processed for recovery of *Aeromonas* and other bacterial pathogens. The samples were drawn from diseased pungas, rohu, common carp, catla, mrigal, big head, slime, sediments and pond water samples. Moribund fishes showing haemorrahage on the body and having swollen abdomen were selected for sampling. Isolation of fish bacterial pathogen from ailing fishes, sediments and fish slime were performed on *Aeromonas* selective media. The dark green smooth colonies of 1-1.5mm size were picked up for further purification and characterization. The pure colonies of *Aeromonas* yielded pale colonies on MacConkey agar and off white colonies on brain heart infusion agar plates. Recovered *Aeromonas* and other bacterial pathogens were purified, characterized and cryopreserved at -80˚C for further use.

Extended Phenotypic studies

All nearly 250 *Aeromonas* and other bacterial strains were tested for 26 morphological and biological characteristics, 31 biochemical characteristics and 24 carbohydrate fermentation tests.

Antibiotic sensitivity test

All the *Aeromonas* spp. were subjected to antibiotic sensitivity test. The antibiogram shows the remarkable public health hazards due to presence of these pathogens in food chain. Isolates of 91.30% were found resistant for Vancomycin, 56.52% for Rifampicin, 47.82% for Kanamycin, 21.73% for

Colistin, 91.30% for Amoxycillin and clavulanic acid, 17.39% for Pefloxacin and 100% resistance was recorded for Ampicillin while 30.43% isolates showed intermediate resistance for Trimethoprim and Gentamicin. All isolates were found sensitive to Levofloxacin, Oxytertracycline, Cefotaxim, Streptomycin, Tetracycline, Cefixim, Ofloxacin and Doxycycline.

MALDI-TOF MS (Matrix Assisted Laser Desorption/Ionization-Time of Flight Mass Spectrometry) analysis

Approximately 200 *Aeromonas* and other bacterial pathogens were confirmed with MALDI-TOF MS ("Matrix Assisted Laser Desorption/Ionization-Time of Flight Mass Spectrometry) analysis at Department of Veterinary Public Health, Nagpur Veterinary College, Nagpur. The pure culture of the isolate was subjected to various biochemical test reactions. Further, sample preparation for MALDI-TOF MS was done as cells from individual colonies were transferred from agar media into a stainless steel template. To each sample, 0.5 Lit matrix solution (10 mg/mL 2, 5-dihydroxybenzoic acid in acetonitrile: ethanol: water (1:1:1) with 0.3% trifluoro acetic acid) was added. Evaporation of the solvent and crystallization was performed at room temperature. All strains were analyzed in duplicate.

Molecular characterization of Aeromonas hydrophila

In the present study, DNA from 35 representative isolates of *A. hydrophila* was isolated. PCR was carried out in thermal cycler using *A. hydrophila* specific primer pairs targeting various virulent genes. PCR product was electrophoresed on 2 percent agarose gel. Isolates of *A. hydrophila* showed amplified product of approximately 331 bp confirming the presence of heat stable toxin producing *ast* gene and 596 bp size amplicon confirming the presence of haemolysin producing *hly* gene.

In-vivo pathogenicity (LD_{50}) determination

In-vivo pathogenicity (LD_{50}) of the *A. hydrophila* isolates was evaluated in rohu (*Labeo rohita*). In order to determine the LD_{50}. The experiment was conducted in 100 L plastic tanks. The bacterial isolates were sub-cultured in 5 mL BHI broth and the suspension was static-incubated at 28 °C for 18 h. The bacterial count was determined by standard dilution and plating methods. The suspension was 10-fold serially diluted to obtain the bacterial concentration of 10^4 to 10^6 CFU/mL. The fish in group (A-B) were injected with 0.1 ml of 18 h old broth culture intra-peritoneally and observed for mortality pattern. The control group was injected with 0.1 mL of PBS. Fish mortality was recorded on every 24 h for 7 d. The injected bacterial isolates as a pathogen were re-isolated from the kidney and other tissues of moribund fish to satisfy Koch's postulates. Dead fish were subjected to bacteriological examination immediately after death. Following Reed and Munch (1938), LD_{50} was calculated as 1.85×10^5 CFU using the cumulative mortalities.

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

Characterization of *Pasteurella multocida* isolated from cattle and buffaloes in different districts of Chhattisgarh were subjected to pathological changes in various vital organs caused by HS during 2017-18. *P. multocida* tested by PM-PCR using *P. multocida* specific primer to amplify the *KMT1* gene fragment. The causative agent of HS was identified as *P. multocida* showed an amplified product of approximately 460 bp size and the capsular type identifies as cap B showing amplified product of approximately 590 bp. 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 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. The pathological lesions were most consistently observed in heart, lungs, liver, lung, spleen and kidneys which were of diagnostic significance, characterized by variable degree of congestion, haemorrhages and necrosis.

Studies on microbes associated with reproductive biotic stress in bovine

Brucellosis

For detection of bovine brucellosis, DNA was extracted from 218 blood samples of cattle and buffaloes from eight districts of Chhattisgarh [Kanker (22), Raigarh (40), Rajnandgaon (40), Sarguja (14), Raipur (30), Jashpur (34), Bastar (10) and Mahasamund (28)] and was processed for PCR based detection of brucellosis using primers of *bcsp31* gene having product size of 636 bp. Out of these, 20 were positive for presence of *Brucella* DNA with an overall prevalence of 9.17%.

Leptospirosis

For detection of bovine leptospirosis, out of 218 blood samples from eight districts of Chhattisgarh [Kanker (22), Raigarh (40), Rajnandgaon (40), Sarguja (14), Raipur (30), Jashpur (34), Bastar (10) and Mahasamund (28)], 46 samples were found positive for leptospira using *LipL32* gene based PCR primers having product size of 422bp with an overall prevalence of 21.1%.

Infectious bovine rhinotracheitis (IBR)

On *gB* gene based PCR diagnosis of bovine herpes virus (BoHV-1) of 218 blood samples from eight districts of Chhattisgarh [Kanker (22), Raigarh (40), Rajnandgaon (40), Sarguja (14), Raipur (30), Jashpur (34), Bastar (10) and Mahasamund (28)], 61 samples were found positive for IBR having product size of 478bp with an overall prevalence of 27.98%.

Isolation of causative agent

Attempted for isolation of *Brucella, Leptospira and Campylobacter* spp. from 135 blood samples (stored at -80°C) and 16 clinical samples. A total of 4 isolates of *Brucella spp.* were isolated and confirmed by *bcsp31* gene PCR. Apart from *Brucella spp*., many isolates of *Staphylococcus, Esherichia coli, Salmonella, Klebsiella, Enterobacter, Bacillus spps* were also isolated and identified from blood and clinical samples.

Programme 2: Molecular biology of biotic Stress reaction

2.1. Exploring endophytes in legume crops (Pigeon pea and *Lathyrus*) for enhanced nutrition and biotic stress management

Endophytes are the microbes that live inside the plant tissues without causing any apparent harm to the host. These microbial communities 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 pigeon pea (20) and Lathyrus (14), respectively using the suitable culture medium. The isolated endophytic microbes were characterized using 16S rDNA and their gene sequences were submitted to NCBI gene bank. Bacterial endophytes isolated from Pigeonpea and Lathyrus and Rice and their 16S rDNA sequences charecterized and submitted to NCBI 34 Nos and detail is mentioned in Table 1. The bacterial endophytes from legume and cereal crops have been isolated, characterized for potential plant growth promoting activities and antimicrobial activities against plant pathogens. The major group of bacterial endophytes includes: *Bacillus cereus, Bacillus subtilis, Bacillus stratosphericus, Klebsiella pneumonae, Bacillus toyonensis, Brevibacillus brevis, Enterobacter xiangfangensis, Enterobacter tobacai, Enterobacter* spp*, Pantoea, Serretia* spp*. etc.*

Table 1. Detail of 16S rDNA and ITS sequences submitted to NCBI and their accession numbers

S. No.	Bacterial/Fungal endophytes	NCBI Accession Numbers
1.	16S rDNA sequences of bacterial endophytes isolated from pigeonpea (20 Nos)	MF445139-MF445140 MF445129-MF445133

		MF449413-MF449416 MF449407-MF449412 MF407478 -MF407480
2.	16S rDNA sequences of bacterial endophytes isolated from *Lathyrus* (14 Nos)	MF445141-MF445144 MF445134-MF445135 MF445136-MF445138 MG722863-MG722864 MG722707;MH393318 MG722791
3.	ITS sequences of fungal endophytes of pigeonpea	MG738277 - MG7382788
4.	ITS sequences of fungal endophytes of *Lathyrus*	MG7382789- MG7382795
5.	ITS sequences of fungal endophytes of rice	MG7382796- MG7382797

Internal transcribed spacer (ITS) of fungal endophytes isolated from Pigeonpea, Lathyrus and Rice were characterized and submitted to NCBI (Table 1). The major group of fungal endophytes identified as *Fusarium fujikuroi, Talaromyces pinophilus, Fusarium proliferatum, Aspergillus nomius etc*. Bacterial endophytes were also screened for their efficacy against the stem rot causing pathogenic fungi *Scleratium rolfsii,* and *Rhizoctonia solani* showed variable antimicrobial effect.

Plant Growth promoting activities of bacterial endophytes

Bacterial endophytes were characterized for plant growth promoting activities such as Phosphate solubilising, Indole acetic acid production, DNase assay and other biochemical activities. Phosphorus is an essential macronutrient for growth and development of plants involved in important metabolic pathways like photosynthesis, biological oxidation, nutrient uptake and cell division. Worldwide soils are supplemented with inorganic P as chemical fertilizers to support crop production but repeated use of fertilizers deteriorates soil quality. Application of phosphate-solubilizing bacteria increases soil fertility due to their ability to convert insoluble P to soluble P by releasing organic acids, chelation and ion exchange. Isolated endophytes were screened for their activity as phosphate solublizing agent and found that three isolates found to have potential PSA.

Metagenomics analysis of bacterial endophytes of *Lathyrus sativus* using NGS approach (Illumina platform)

Metagenomics study of bacterial endophytes associated with different parts of *Lathyrus sativa* is conducted using next generation illumina sequencing approach and the bioproject entitled "Metagenomics study of bacterial endophytes in *Lathyrus sativus"* registered with NCBI with Bioproject ID PRJNA 392219. Genomic data/reads of generated by illumina sequencing of six tissues/ samples were deposited to NCBI and accession numbers were obtained (Table 2).

Table 2. Bio-project accession number of PRJNA 392219

S. No.	Biosample ID with tissue name	Sequence Read Archive (SRA) Accession number
1	SAMN08156969- Pod	SRP126515(Six libraries); SRR6366354
2.	SAMN08156971-Flower	SRR6366355
3.	SAMN08156972-Stem	SRR6366356
4.	SAMN08156973-Leaf	SRR6366357
5.	SAMN08156974-Root	SRR6366358
6.	SAMN08156975-Rhizospheric soil	SRR6366359

For metageomics analysis of bacterial endophytes of *Lathyurus sativus* five plant tissues/ parts namely root, stem, leaf, flower, pod rhizospheric soil was used for sequencing using illumina sequencer. The V3-

V4 region of the 16S were amplified and sequenced. The detail of reads generated using illumina sequencing is given in Table 3. The read were stitched and used for bioinformatics analysis using QIIME for analyzing 16s metagenome data from NGS platforms. Sequences aligned and to make Operational Taxonomic Unit (OTU) Representative sequences of each OTU were annotated for taxonomic assignment (Table 4). A total of 352460 sequences generated 172 OTUs in Flowers, 326615 sequences generated 82 OTUs in Leaf, 349327 sequences generated 152 OTUs in Pod, 239565 sequences generated 95 OTUs in Root, 319244 sequences generated 209 OTUs in Stem and 459803 sequences generated 6558 OTUs in Soil sample. The predominant phylum in flower, leaf, pod and stem is Cyanobacteria while in root and soil sample has Proteobacteria as predominant phylum. The measure of alpha diversity shows 294, 283, 158, 360, 157 and 6631 observed species in flower, pod, leaf, stem, root and soil samples, respectively.

Table 3. NGS statistics of *Lathyrus sativus* samples

Sample ID	Reads (R1)	Reads (R2)	Total reads (R1+R2)	Total Data (Mb)	Total Reads (stitched)
Root	258314	258314	516628	129.16	239565
Leaf	369152	369152	738304	184.58	326615
Flower	435835	435835	871670	217.92	352460
Stem	362976	362976	725952	181.49	319244
Pod	408680	408680	817360	204.34	349327
Rhizopheric Soil	504315	504315	1008630	252.16	459803

Table 4. OTU assignment of *Lathyrus sativus* stitched reads

Sr. No.	Sample name	Number of OTUs	Number of OTUs with taxonomic assignment
1.	Flower	172	172
2.	Leaf	82	82
3.	Pod	152	151
4.	Root	95	95
5.	Stem	209	207
6.	Rhizospheric Soil	6558	6551

2.2. Identification of biotic stress induced promoters from resistance source plants

In-silico identification of common promoter motifs from Fusarium graminearum xylanases and wheat xylanase inhibitor proteins

Xylanase (Endo-1,4-β-Xylanases) is an enzyme which degrades the linear polysaccharide beta-1, 4-xylan into xylose, thus breaking down hemicellulose, one of the major components of plant cell walls. Xylanase inhibitor is a molecule that binds to xylanase and decreases its activity. Since blocking the xylanase's activity can kill a pathogen or correct a metabolic imbalance, many plants produce xylanase inhibitors. Wheat (*Triticum aestivum* L.) is vulnerable to a xylanase producing devastating pathogen, *Fusarium graminearum*, therefore its xylanase inhibitor (TAXI) plays an important role in the defence strategy. In order to identify the common promoter motifs from *F. graminearum* xylanases and wheat xylanase inhibitor proteins, a comparative analysis of eleven wheat TAXI sequences with twelve *F. graminearum* Endo-1,4-β-Xylanases sequences was conducted.

An extensive search of the motifs and their positions was executed by MEME software, which identified seven common promoter motifs in both the sequences. The obtained results identified highly conserved promoter motifs in both the sequences. BAD72880, BAD72881, BAD72882, BAD72883, CAD27730, CCX28654, and CCX28656 contain similar motifs arranged in identical order. Gene ontology (GO) analysis revealed that all the identified motifs are performing certain molecular functions in biological processes as the cellular components. Most motifs represented the GO terms for a structural constituent of ribosomes; however, the motifs identified from BAD72881, BAD72883, CCX28654 and CCX28656 also

represented the GO terms for helicase activity. Interestingly, a motif identified from CAH10283 represented a GO term for DNA-directed RNA polymerase activity. The identified common promoter motifs may be involved in the interaction between wheat TAXI proteins and *F. graminearum* Endo-1,4-β-Xylanases.

2.3. Development of super donors in rice carrying tolerance to multiple stresses (Bacterial Leaf Blight, Brown Plant Hopper and Blast)

Research programme initiated for the development of super donor of rice for multiple biotic stress resistance genes *viz;* Bacterial Leaf Blight, Brown Plant Hopper and Blast. In order to procure resistance genes introgressed lines of rice, standard material transfer agreement (SMTA) was signed with International Rice Research Institute (IRRI), Philippines and procured seven IRBB lines containing *Xa* gene resistance to the BLB disease (*Xanthomonas oryzae*). Seed obtained from NRRI and IRRI were multiplied in the field conditions as well as in pots and their physiological characteristics like, flowering time, disease appearance was observed along with the local varieties of Chhattisgarh namely Mahamaya, MTU 1010. Total genomic DNA was extracted from IRBB lines and local varieties MTU 1010, IR64 and Mahamaya. The gene specific primers for BLB resistance genes, Xa21-pTA248; Xa13- SG-136; Xa13-Xa13-prom; Xa5-Xa5S; Xa5- RM-13; and Xa7-M5 were synthesized and used for the PCR based confirmation of resistance genes in the introgressed lines. After molecular markers based screening and conformation of resistance genes in the rice lines, crosses were made between MTU 1010 and rice line having five genes (IRBB66) for BLB resistance and about 35 seeds were developed. Furthermore, procurement of introgressed rice lines having genes for bacterial leaf blight, Blast and Brown Plant Hopper (BPH) along with seven wild species of rice from IRRI, Philippines is in process.

In order to develop repository, isolation of *Xanthomonas oryzae* from BLB suspected samples collected from different parts of country were used, BLB suspected samples representing five states of India viz., Chhattisgarh, Odisha, Assam, Tripura and Meghalaya. The isolated bacterial stains preliminary screened for *Xanthomonas* spp. And stored as glycerol stock for further confirmation and characterization. Whereas, standard reference of *Xanthomonas oryzae* strain obtained from IIRR was sub-cultured, maintained and preserved as glycerol stock.

Programme 3: Genetic and Genomic resources for stress tolerance

3.1. Genepool profiling in crop plants for tolerance to biotic stresses

Due to intensification and changes in agricultural practices, new biotic stress problems have emerged in different crops and severity of such stresses increased. Thus, re-assessing the resistance levels and searching for newer sources of resistance in cultivated crops and their wild-relatives against major biotic stresses of different crops needed to be undertaken. Therefore, screening of a core and mini-core collections of major crops and their wild relative species against major biotic stresses in crops like pigeon pea, pearl millet, minor millets, *Vigna* spp., wheat, chickpea, *Lathyrus*, brinjal *etc*. has been undertaken at NIBSM.

Germplasm/mini core/wild species accessions procured

Nearly 2038 germplasm accessions of different crops were procured during 2017-18 from national and international institutions.

Evaluation of minor millets germplasm for pest and disease tolerance

Core collections of finger millet (429 accessions), barnyard millet (61 accessions), foxtail millet (94 accessions) and little millet (50 accessions) received from ICAR-Indian Institute of Millets Research, Hyderabad were screened against various insect-pests and diseases under natural field condition at the NIBSM experimental farm, Baronda, Raipur during *kharif* 2017 season. Germplasm were planted in augmented design in a 2 m row line. The pest and disease observations were recorded following standard evaluation system for small millet as per recommendation of AICRP on small millets.

Maximum insect pest activity was found in finger millet lines than other millets. The early stage of finger millet lines were infested with the aphid, *Hysteroneura setariae.* Among finger millet lines screened, 29 (7% of total lines) were free from aphid infestation in vegetative and flowering stage, 314 (72% of total lines) with very low infestation, 89 (20% of total lines) with medium infestation and 03 (1% of total lines) with high aphid infestation. During the flowering and head formation stage, finger millet lines were infested with the earhead caterpillars, *Cryptoblabes angustipennella* and *Eublemma silicula*. No

infestation of earhead caterpillar was recorded in 152 lines (35% of total lines) till maturity, low infestation in 37 lines (9% of total lines), 158 line (37% of total lines) with medium and 82 lines (19% of total lines) with high infestation. In rest of the minor millets, crop was healthy and devoid of pests throughout their life span.

In finger millet screening, diseases such as neck blast, finger blast and banded sheath blight were observed with moderate to high severity under natural conditions.

Out of 429 accessions of finger millet screened, 113 (27%) and 127 (30%) accessions were found resistant or moderately resistant to neck blast and finger blast, respectively, (Fig.) of which 51 accessions showed resistance to both the phases of blast disease. Eleven accessions namely, GEC 5, GEC 34, GEC 76, GEC 107, GEC 122, GEC 164, GEC 166, GEC 345, GEC 505, GEC 506, and GEC 507 have shown no neck and finger blast symptoms (0 score). Higher percentage of accessions *i.e.* 46% for neck blast and 36% for finger blasts showed susceptible and highly susceptible responses indicating good development of disease .

Among the finger millet accessions screened, banded sheath blight resistance was observed in 177 accessions with 51 accessions showed no symptom of the disease (0 score) which will be confirmed in the second season screening. Remaining 252 accessions were found to be either moderately susceptible of susceptible.

Sixty one accessions of barnyard millet were screened during the *kharif* 2017. Mainly brown spot disease was observed and most of the accessions showed moderately susceptible to susceptible response. Only 15 (GECH 5, GECH 22, GECH 407, GECH 486, GECH 642, GECH 643, GECH 646, GECH 664, GECH 667, GECH 692, GECH 708, GECH 713, GECH 714, GECH 721 and GECH 722) accessions were found to be moderately resistant with 5% leaf area affected due to the disease. These accessions are. Grain smut incidence was very low in 38 accessions showed less than 1% severity.

Among foxtail millet accessions (94), moderately resistance response against leaf spot disease was observed in only 13 accessions *viz*., GS 219, GS 256, GS 260, GS 419, GS 432, GS 498, GS 512, GS 515, GS 678, GS 763, GS 792, GS 956 and GS 1500 whereas remaining accessions showed moderately susceptible to susceptible reactions. Seven accessions were found to be highly susceptible while 34 accessions were found to be resistant against sheath blight with the score of 3 in the 0-9 scale including one accession GS 260 with the score of 1 indicating good resistance.

All the little millet accessions were free from diseases except for very low sheath blight incidence in a few lines.

Field Screening of *Lathyrus* mini-core subsets for tolerance to biotic stresses

Field screening of 110 mini-core subsets of *Lathyrus* for tolerance to thrips, during Rabi 2017-18 was carried out during *rabi* 2017-18. Data were recorded on population of thrips and aphids and their damage using standard protocols. Aphids appeared two weeks earlier than thrips on *Lathyrus* germplasm. Two different thrips species were recorded on *Lathyrus*. The results revealed that 13 out of 110 accessions were found to be moderately resistant to thrips based on the incidence. In addition, the leaf damage by thrips was also found to be moderate.

Field Screening of wheat germplasm for tolerance to biotic stresses

Field screening of 218 mini-core subsets of wheat for tolerance to aphids and pink stem borer during Rabi was carried out during *rabi* 2017-18. The number of aphids per ten plants, and number and percentage of white-ears were recorded as per standard protocols. Results revealed that 28 and 43 accessions were found to be highly resistant and moderately resistant to aphids, respectively. With respect to pink stem borer, 20 and 40 accessions were highly and moderately resistant, respectively based on white ear-infestation. Four accessions showed very high resistance to pink stem-borer.

Screening of chickpea germplasm accessions for biotic stress

A total of 241 chickpea germplasm accessions including control were screened during 2017-18 *rabi* season. No foliar disease was observed in any of the line as dry weather prevailed during the entire *rabi* season (Fig 30). Only root rot and wilt incidence was recorded. Promising accessions viz., ICC708, ICC1205, ICC1923, ICC3946, ICC4495, ICC7441, ICC9402, ICC9755, ICC9942, ICC10399, ICC11664, ICC12928, ICC12947, ICC14595, ICC14831, ICC4973, ICC12968, ICC16915, ICC15567, ICC8950, ICC15610, ICC15612 were identified as not a single plant with root rot or wilt symptoms was observed in these accessions. Further evaluation will be undertaken in next season with more plant population to

ascertain the results. The same set of chickpea germplasm accessions was screened against pod borer, *Helicoverpa armigera* (Fig 31). Ten plants per line were sown and observations on number of healthy and damaged pods due to pod borer were recorded at the time of crop maturity and per cent pod damage was calculated. Accessions were categorized on 1-9 scale for different responses. None of the accessions has shown highly resistant reaction to pod borer whereas 122 lines were found to be moderately susceptible (6-7 score), 53 lines least susceptible (3-5 score) and 67 lines highly susceptible (9 score).

4: Programme

Strategic and adaptive research in biotic stress management

4.1. Development of methodologies for estimation of crop losses due to different biotic stresses in rice (*Oryza sativa* L.)

Relationship between yield and various biotic stresses in rice

Experiments were conducted to estimate the crop losses due to various biotic stresses *viz*., insect pests, diseases and weeds in transplanted and direct seeded Swarna during *kharif* 2017. The treatments were T1-insect and disease free, T2- Insect and weed free, T3-Disease and weed free, T4-insect + disease + weed free and T5-untreated control. In transplanted paddy, the major insect pest observed was yellow stem borer with 6.45 to 22.54 % white ear damage. Among diseases, brown spot was major with 20-50% incidence. Weed density was in the range of 10 to 85 per sq. m. Maximum yield of 4.8 t/ha was recorded in T4-insect + disease + weed free followed by 4.3 t/ha in both T2 and T3 treatments. In direct seeded paddy, the brown spot disease was severe with 60 to 75% incidence. Relationship between all biotic stresses and yield was established by fitting multiple regression analysis to pooled data of three experimental years. The results revealed that the regression model was statistically significant ($P<0.0001$) with R^2 value of 0.96 and coefficient of 3.76 (Table 5).

Table 5. The parameter estimates and test statistics of regression analysis

Variables	Parameter statistics	Std. error	F value	P>F	R square	CoV
Intercept	6.31529	0.22504	66.84	<.0001	0.9616	3.76
Disease incidence (DI)	-0.00897	0.01234				
Insect pest incidence (IP)	-0.09278	0.01634				
Weed density (WD)	-0.01752	0.00245				

The regression model developed for estimating the yield losses due to various biotic stresses is: Yield=6.315-0.00897(DI)-0.0927(IP)-0.01752(WD).

4.2. Bio-ecology and management of the pink stem borer in wheat

Surveys were conducted to understand the status of wheat pink stem borer infestation in northern part of Chhattisgarh (viz., Sarjuga, Korba, Raigarh, Raipur Ambikapur, Mainpat, Korba, Pathalgaon, Aarang and Baloda bazaar). The pink stem borer infestation on wheat ranged from 5-10%. Out of 64 germplasm and 20 cultivars of wheat screened under field condition during *rabi* 2017-18, early maturing accessions were found to be highly susceptible to pink stem-borer and aphids. The wheat plots received basal application of K_{60} + foliar application of Si @ 4 mL/L was less preferred by pink stem-borer and recorded the minimum infestation of 14 per cent.

4.3. Developing and testing the effectiveness of interactive educational multimedia module on biotic stress management in rice and *Lathyrus*

The collection of primary data like socio-economic profiling, crop farming details, chemical usage pattern, information need and social issues components required for developing interactive educational multimedia module was completed. Further, benchmark surveys were completed on technology gap and adoption status. As a part of e-extension approach, ICAR-NIBSM activity platform was created in Facebook and YouTube social media for mass reach of scientific information and institute activities. Digitalization of mass production of bio control agents and pheromone technology instructional videos in post-production stage.

4.4. Sustainable weed management in direct seeded rice

Weeds are the major constraint in direct seeded rice (DSR) production system. DSR improves water use efficiency, and its widespread adaptation has eliminated time and edaphic conflicts in wheat-rice cropping systems in India, DSR is vulnerable to weed competition, and timely weed management is indispensable. In DSR, weeds emerge simultaneously with rice seedlings and compete with rice plants at an early growth stage, when rice is particularly susceptible to competition. Proper row spacing plays a considerable role in increasing crop yield through regulating weed growth at very early stage of crop development, besides assisting in intercropping and reducing seed rate, wide row spacing facilitates inter-cultural operations and convenient herbicide usage without any effect on grain yield However, narrow-spaced rows are thought to be effective in weed control through enhancing crop competitiveness with weeds, as well as through limiting light transmittance to the soil surface. Available studies on row spacing, although limited, revealed that narrow rows inhibit weed growth through reducing the light interception and spectral composition of weeds under the crop canopy. Although narrow-spaced crop planting has been widely adopted worldwide, this technique has been implemented in different cropping systems as a major eco-friendly approach.. Planting major crops in narrow rows would be an economically viable option for small landholders to increase their crop productivity with minimal weed control.

Row spacing and weed management practices on weed suppression and productivity in direct seeded rice

Proper row spacing plays a considerable role in increasing crop yield through regulating weed growth at very early stage of crop development. In direct seeded rice, sowing the seeds at appropriate row spacing provides the opportunity to plant for better utilization of resources. Seed sown with closer spacing (15 cm) recorded 34% reduction in grasses, 40% broadleaved weeds, and 24% sedges over wider row spaced crop (25 cm). Hand weeded plots with 25 cm spaced plots has less efficient because of concurrent growth of weeds and remains with crop till harvest. Plots sown with 20 and 22.5 cm spacing had also noticed the suppression of different group of weeds than 25 cm spaced plots irrespective of weed management. Wider spacing may helps in producing better yield attributes, but, optimum panicle density is essentially required to obtain substantial yield, owing to this increased the grain yield in closer spaced crop over wider spaced crop.

Seed rate and weed management practices on weed competitiveness and productivity in direct seeded rice

Seeding rate is an important cultural practice that influences the crop-weed competition, thereby influencing weed management. In direct seeded rice, the optimum seed rate is an important aspect that affects crop micro-climate by manipulating the degree of inter-plant competition. Therefore, crop should neither be planted densely nor sparsely to better utilization of inputs available at site. However, 100 kg/ha sown plots reduced the weed biomass of grasses, broadleaved and sedges than the 40 kg/ha. Reduction in seed rate significantly increases the weed dry biomass accumulation. Increasing the rice-seeding rate from 60-100 kg/ha reduced weed interference and increased rice yield by 32%.

Weed management in direct seeded rice using pre- and post-emergent herbicides

The effective weed control is pre-requisite in order to minimize the weed menace, where timing, method of application and effectiveness of herbicides and the combined effect of herbicides and hand weeding are important. Therefore, an attempt was done in order to develop suitable integrated weed management modules for direct seeded rice. The highest weed control efficiency was recorded with three hand weeding (20, 40 and 60 days after sowing) followed by two hand weeding (20 and 40 days after sowing) over control. Among the herbicides, pendimethalin @ 1.0 kg/ha followed by (fb) chlorimuron + metsulfuron @ 22.5 g/ha, and pendimethalin @1.0 kg/ha fb bispyribac sodium @ 25 g/ha was the next best set of treatment in dry direct seeded rice.

Efficacy of different brands of bispyribac sodium for controlling weeds in rice

The study conducted at ICAR-NIBSM during 2017 to evaluate the differences in three brands of bispyribac sodium *i.e*. Nominee Gold, Takila and Green label. All the brands reduced the weed density and dry weight as compared to non treated control. However, the Nominee Gold performed excellent to record the highest weed control efficiency 78% followed by Green label 64% and Takila 58%

respectively. In respect to yield indicator again Nominee Gold was the best for achieving the highest yield 49.50 q/ha of paddy.

4.5. Isolation and evaluation of native bio-control agents for management of lepidopteran pests

Seasonal abundance of yellow stem-borer in low-land rice during summer 2017

Light and pheromone trap-catches of yellow stem-borer were monitored in low-land rice (Cv. MTU 1010) during summer 2017 in Baronda farm. High catches of males and females in light trap started during March 05 to 11th, 2017, in association with 8.5% dead-heart symptom, indicative of YSB damage to the central shoot, which continued during May 14 to 20th, 2017 and, thereafter declined. The two peak catches of adults of YSB in light traps were indications for the presence of broods, one at 10th MSW (104/trap) and another at 16th MSW (74/trap). Male moth catches in pheromone traps started during the same time as in light trap and peaked from May 07 to 13th, 2017. White ear, due to YSB causing empty panicles in the ear-bearing stage, appeared during April 23rd to 29th, 2017 and reached a peak of 22.8% during May 21stto 27th, 2017. Increase of temperature coupled with reduction of relative humidity and scanty rainfall were favourable to the multiplication of yellow stem-borer and trap catches during summer rice. These data are helpful for planning biological control against YSB in rice during the Chhattisgarh summer.

Kairomonic activity of extracts of rice yellow stem-borer and its by-products

Host insects produce characteristic hydrocarbons, fatty acids and proteins which stimulate natural enemies to intensify their search in the near vicinity of the host. Various hexane extracts of yellow stem-borer and its by-products were evaluated during first fortnight of April 2017, in a choice test under *in vivo* to study their kairomonic efficiency in enhancing the foraging activities of *Trichogramma chilonis* and *T. japonicum*. Hexane washed and untreated eggs were used as negative and positive check, respectively. The parasitization rate of *T. chilonis* was enhanced from naught to 12.34%, 6.80 to 65.44% and 11.66 to 87.84% on 3rd, 5th and 7th day after exposure to parasitoids, respectively when eggs were treated with hexane extract of whole body female yellow stem-borer (1000 ppm) while they were naught to 10.94, 11.66 to 77.30% and 15.02 to 95.96% for the same period of exposure in *T. japonicum*.

Table 6. Per cent parasitization by *Trichogramma chilonis* and *T. japonicum*, as influenced by hexane extracts of rice yellow stem-borer and its by-products

Hexane extract of insect sample*	% parasitisation by *T. chilonis* (DAI)			% parasitisation by *T. japonicum* (DAI)		
	3	5	7	3	5	7
Whole body of YSBF	12.34 (20.56)^{a}	65.44 (53.99)^{a}	87.84 (69.58)^{b}	10.94 (19.53)^{a}	77.30 (61.40)^{a}	95.96 (78.08)^{a}
Whole body of YSBM	3.76 (11.17)^{f}	41.34 (40.01)^{e}	62.43 (52.41)^{e}	4.84 (12.75)^{e}	57.74 (49.52)^{e}	70.80 (57.22)^{e}
Wing scale of YSBF	9.11 (17.56)^{d}	54.04 (47.31)^{c}	74.39 (59.38)^{d}	10.92 (19.44)^{a}	62.29 (51.98)^{d}	85.20 (67.28)^{c}
Egg wash	10.53 (18.93)^{c}	52.35 (46.31)^{d}	76.03 (60.65)^{c}	9.71 (18.23)^{b}	64.26 (53.22)^{c}	87.31 (66.35)^{d}
Larva of YSB	5.73 (13.83)^{e}	42.22 (40.52)^{e}	47.82 (43.72)^{f}	6.99 (15.53)^{d}	40.65 (39.63)^{f}	52.13 (46.30)^{f}
Hexane washed eggs	0.00 (0.29)^{g}	6.80 (15.10)^{f}	11.66 (19.83)^{g}	0.00 (0.29)^{f}	11.66 (20.29)^{g}	15.02 (22.70)^{g}
Untreated eggs	11.18 (19.53)^{b}	62.63 (52.32)^{b}	89.02 (70.65)^{a}	8.65 (16.98)^{c}	70.30 (56.84)^{b}	92.22 (73.74)^{b}
SEd	0.1630	0.3090	0.2728	0.4206	0.3433	0.4267
CD (0.05)	0.3496	0.6628	0.5852	0.9023	0.7363	0.9153

YSBF: yellow stem-borer female; YSBM: yellow stem-borer male; DAI: Days after inoculation

* Mean of three replication

Isolation of native bio-control agents

Native bio-control agents are efficient in management of lepidopteran pests of crops. An egg parasitoid, *Trichogramma* spp. and a gram positive soil bacterium, *Bacillus thuringiensis* are versatile bio-control agents with potentiality in management of lepidopteran pests of crops.

***Egg parasitoid*, *Trichogramma* spp.**

The sentinel cards with UV irradiated *Corcyra* eggs were tied @ 30 cards/acre in low-land rice (Cv. Swarna) at 45 days after transplanting during *kharif* 2017 in Baronda farm. The cards were collected 48 h after exposure and contained for three days to locate the cards with eggs, turning in to black colour. Such cards were isolated to pick-up native eco-types. Similarly, sentinel cards were tied in low-land rice of Ballod district. During examination, eight and two parasitized cards were recovered from Baronda farm and Ballod which were identified as *Trichogramma japonicum* and *T. chilonis*, respectively though NBAIR, Bengaluru (Table 7).

Table 7. List of native *Trichogramma* spp. collected and identified

Sample No.	Location	Crop	Species
1.	Baronda Farm, NIBSM, Raipur, 11.08.2017 (3 samples)	Rice (Cv.Swarna) Field No.71	*Trichogramma japonicum*
2.	Baronda Farm, NIBSM, Raipur, 11.08.2017 (one sample)	Rice (Cv.Swarna) Field No.71	*Trichogramma chilonis*
3.	Baronda Farm, NIBSM, Raipur, 22.08.2017 (Four samples)	Rice (Cv.Swarna) Field No.83	*Trichogramma japonicum*
4.	Balloda Bazar, Chattisgarh dist. 24.08.17 (Two samples)	Rice (Cv.Swarna)	*Trichogramma chilonis*

Bacillus thuringiensis

A total of 67 soil samples were collected from various agro and forest eco-systems of Chhattisgarh, Tripura, Meghalaya and Assam for isolation of *Bacillus thuringiensis* and were under process to isolate *Bt* (Table 8). Thirteen promising *Bt* slants *ie*. two from VPKSA, Almora (VLBt 3, VLBt 6), one from NBAIR (HDI-LB) and ten from NBAIM, Mau (NAIMCC-B-00186, NAIMCC-B-00143, NAIMCC-B-01557, NAIMCC-B-00185, NAIMCC-B-00173, NAIMCC-B-00150, NAIMCC-B-00193, NAIMCC-B-00204, NAIMCC-B-01391, NAIMCC-B-00182, NAIMCC-B-00192 and NAIMCC-B-00189) were procured for comparison with native isolates. All isolates were revived through sub-culturing and stored as glycerol stock culture in – 80.

Table 8. List of soil samples collected for isolation of *Bacillus thuringiensis*

S. No.	Name of the State	Place	Eco-systems	Number of soil sample
1.	Chhattisgarh	Dhamtari	Rice, vegetable, urd	04
2.	Chhattisgarh	Raipur	Up and low land rice, pigeonpea, pond, poultry	07
3.	Chhattisgarh	Ballod	Vegetable, forest, low land rice, pulses, oilseeds	36
4.	Chhattisgarh	Kanker	Urd, forest, mung	04
5.	Chhattisgarh	Jagdalpur	River, forest	02
6.	Chhattisgarh	Kondagaon	Barren land, bamboo, forest, brinjal	04
7.	Odisha	Koraput	Wild turmeric	01
8.	Tripura	--	Rice, barren, forest	04
9.	Mehalaya	Shillong, Umiam	Forest, soyabean	02
10.	Assam	Jorhat, Gerua	Forest, orchard	03
			Total	67

The soil samples (21 numbers) collected from different location of Chhattisgarh were subject to standard protocol with slight modifications for isolation of *B. thuringiensis*. A total of 60 *Bacillus* like organisms were isolated, purified and preserved as glycerol stock for further identification and characterization .

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

A field experiment was laid in a RBD to optimize the time and number of release of *Trichogramma* spp. for the management of yellow stem-borer in low-land rice (Cv. Swarna) during *kharif* 2017. The seedlings were transplanted on 18.7.17 and three schedules of releases of *Trichogramma* spp. were made and compared with untreated check. Three schedules of releases comprising of T1 (four releases of *T. japonicum* on 25th, 32nd, 39th and 46th day after transplanting, followed by two releases of *T. chilonis* on 46th and 53rd day after transplanting @ 6.25 cc/ha); T2 (three releases of *T. japonicum* on 32nd, 39th and 46th day after transplanting, followed by three releases of *T. chilonis* on 46th, 53rd and 60th day after transplanting @ 6.25 cc/ha); T3 (two releases of *T. japonicum* on 39th, 46th day after transplanting, followed by three releases of *T. chilonis* on 46th, 53rd, 60th and 67th day after transplanting @ 6.25 cc/ha) on the damage caused by YSB were compared with untreated check and an isolation distance of 25 feet was maintained between two treatments to prevent the movement of parasitoids from one treatment to another. Each treatment was replicated for five times and each plot measured 5 x 4 m. The per cent dead-heart (10th August to 27th September) and white-ear (27th September to 14th November) were recorded at weekly interval and plot-wise yield was recorded at the time of harvest (18.11.17). 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 (DAT), followed by three releases of *T. chilonis* on 46th, 53rd and 60th DAT was optimum to manage rice stem-borer, resulting 1.25% dead heart and 1.09% white ear, in contrast to control with 2.29 and 2.25%, respectively.

Externally funded projects

1. **All India Co-ordinated Research Project on nematodes in cropping systems**

Diversity and distribution mapping of economically important nematodes in Chhattisgarh

Surveys were carried out for identification, population estimation, biodiversity and nematode-pest free areas of economically important plant parasitic nematodes infecting important crops in Kanker, Janjgir Chapa, Bastar, Rajnandagaon, Sarguja and Kondagaon districts of Chhattisgarh state during *kharif* and r*abi* seasons of 2017-18. A composite sample comprising rhizospheric soil of 200 cc along with 5 g root were collected randomly based on at least 5 cores from a field (one acre). Nematodes were extracted from soil and root samples by Cobb sieving and decanting method. The major crops surveyed were rice, pulses, okra, brinjal, bottle gourd, bitter gourd, tomato, chilli, field bean and *Coccinia*. The major nematode species identified during the survey were *Meloidogyne graminicola* in rice and *M. incognita* and *Helicotylenchus* spp. in vegetables.

***Screening of rice genotypes for resistance against rice root-knot nematode* (*M. graminicola*)**

During *kharif* 2017, 77 germplasm lines of rice were received from PC cell, AICRP (N), IARI New Delhi for screening against root-knot nematode in respective seasons under pot culture experiments. An experiment was conducted in plastic pots of size 10 × 10 cm arranged in CRD design with five replications in an open area. Seeds were sown in pots filled with steam sterilized soil One week after germination, one seedling was maintained per pot. Fifteen-days-old seedlings were inoculated with 200 freshly hatched second stage juveniles of *M. graminicola*. Forty-five-days after sowing, the plants were uprooted carefully and roots were washed with running tap water and stained with lactophenol-acid fuchsin. Among 77 lines screened, 36 were susceptible, 26 highly susceptible and 14 moderately resistant in reaction (Table 9).

Table 9. Moderately resistant rice genotypes to *M. graminicola* based on Egg mass Index during *kharif* 2017

S. No.	Genotypes	Mean egg mass index	Reaction
1.	IVT-2016-2	1.97	MR
2.	IVT-2016-3	1.95	MR
3.	IVT-2016-5	1.54	MR
4.	IVT-2016-7	1.12	MR
5.	IVT-2016-10	1.87	MR
6.	IVT-2016-22	1.10	MR
7.	IVT-2016-26	1.15	MR
8.	IVT-2016-32	1.14	MR
9.	IVT-2016-40	1.12	MR
10.	GP 7999	1.10	MR
11.	GP 8520	1.18	MR
12.	GP 8641	1.19	MR
13.	GP 8803	1.25	MR
14.	GP 9381	1.14	MR
15.	GP 9472	1.22	MR
16.	GP 9501	1.87	MR

Screening of promising germplasm lines of pulses against M. incognita

A total of 16 (pigeonpea), 29 (mungbean) and 31 (urdbean) germplasm lines received from PC cell, AICRP (N), IARI New Delhi during *kharif* 2017 were screened under pot culture condition. Fifteen-days-old seedling was inoculated with 1000 freshly hatched second stage juveniles of *M. incognita.* Forty-five-days after sowing, the plants were uprooted carefully and gall index and number of egg masses per 5 g of root was worked out and categorized based on 1-5 scale. Among 16 pigeonpea germplasms lines screened, LRG-133-33 was found moderately resistant and remaining all were susceptible. Among 29 mungbean germplasm lines, five were moderately resistant and remaining all were susceptible in reaction (Table 10). Among 31 urdbean germplasm lines, six germplasm were moderately resistant and remaining 25 were susceptible in reaction with respect to both gall index and number of egg masses per 5 g of roots (Table 11).

Table 10. Moderately resistant lines of mungbean to *M. incognita* based on Gall Index and egg masses/5 g of root during *kharif* 2017

Genotypes	Gall Index	Genotypes	No. of Egg masses per 5 g of root	Reaction
ML 818	22.75	ML 818	23.94	MR
MH 1142	23.00	MH 1142	24.29	MR
PUSA 1771	22.25	PUSA 1771	23.46	MR
MH 1323	23.00	MH 1323	24.40	MR
NMK 1508	21.25	NMK 1508	22.36	MR

Table 11. Moderately resistant lines of urdbean to *M. incognita* based on Gall Index and egg masses/ 5 g of root during *kharif*2017

Genotypes	Gall Index	Genotypes	No. of Egg masses per 5 g of root	Reaction
PU 10-23	24.50	PU 10-23	27.33	**MR**
KPU 12-1730	26.25	KPU 12-1730	29.25	**MR**
LBG 645	22.00	LBG 645	24.50	**MR**
LBG 888	22.00	LBG 888	24.50	**MR**
TU 98-14	20.25	TU 98-14	22.46	**MR**
NUL 242	32.00	--	--	**MR**

Determination of host races of rice root-knot nematode

The pot culture experiment was carried out during *kharif* 2017 for determination of host races of rice root-knot nematode. The seeds of following host plants were received from PC cell: *Sorghum* (HJ 541), rice (Century Patna, PB 1121), wild rice (*Oryza glaberrima*), pearl millet (HHB 67), brinjal (BR 112), tomato (Sel. 120), *Dactyloctenium aegyptium, Leptochloa chinensis,* and onion (Pusa Madhavi). The seeds were sown in sterilized loamy soil in 10 cm pots @ 3 seeds per pot. One plant per pot attaining the age of seven days were inoculated with 1000 J2. Forty-days after inoculation, number of galls per plant was recorded. Then galls were dissected to release eggs and J2 and counted the number of eggs and J_2 per plant. Rf value (Pf/Pi) was calculated and categorized the test plants as hosts (Rf >1) and non-hosts (Rf <1). Among the plants tested, rice (PB 1121) and *bajra* (HHB 67) recorded highest Rf value of 4.94 and 4.07, respectively followed by rice (Century patna) (3.94), *Leptochloa chinensis* (3.23)*, Dactyloctenium aegyptium* (3.17). All the tested plants except onion, tomato and brinjal were recorded as hosts of *M. graminicola*.

2. Socio-economic upliftment of tribal farmers through biotic stress management strategies in rice fallow pulse cropping system- A integrated farming approach

The Farmer FIRST Programme (FFP) is an ICAR initiative to move beyond the production and productivity, to privilege the smallholder agriculture and complex, diverse and risk prone realities of majority of the farmers through enhancing farmers-scientists interface. There are concepts and domains that are new in emphasis like resource management, climate resilient agriculture, production management including storage, market, supply chains, value chains, innovation systems, information systems, etc. The Farmer FIRST as a concept of ICAR is developed as farmer in a centric role for research problem identification, prioritization and conduct of experiments and its management in farmers' conditions. The focus is on farmer's Farm, Innovations, Resources, Science and Technology (FIRST).

Table 12. Major achievements under FFP

S. No.	Interventions / achievements	Farm families covered	Area /units covered	Additional income generated per farm family (in Rs.)
1.	Rice fallow pulse production system introduced with *Lathyrus* (Prateek), chick pea (JAKI 6218), black gram (Azad - 03), mustard (Indira), lentil (KLS - 218) crops	180	90 acres	30, 000
2.	Goat farming established with (*Sirohi, Jamnapari* and *Barbari* breeds) - 40 animals increased in F1 generation	83	83 animals	27,000
3.	Backyard poultry farming established (Kadaknath): Birds attained the weight of 1.5 - 2 kg and egg production started	100	4000 chicks	37,500
4.	Oyster Mushroom Production - Four model units established and production started	40	4 units	Nutritional security 25,000 from four units
5.	Farmer Communication Centre (Two centres established at village)	500	Two centres	Knowledge gained
6.	Low cost *Azolla* production units established (45 units) - cattle, goat and poultry	45	45 units	Feed cost reduced by 30%
7.	Drudgery reduction equipments for women farmers through Custom Hiring Centre (CHC) - Four centres established	500	4 units	Cost of cultivation reduced by 10 %
8.	Nutritional home garden and vegetable cultivation through IIHR F1 hybrid	110	30 acres	6000
9.	Capacity building through training and demonstrations (Protected cultivation, goat/kadaknath farming, mushroom production, pulse production, vegetable cultivation and Plant protection	580	5 villages	Knowledge and skill enhanced

	technologies)			
10.	Pheromone trap (for rice, pulses and vegetables)	30	30 acres	Input cost reduced by 1500/acre
Knowledge management systems (Web portal, social media and mobile application) used for technology dissemination and feedback				

3. **Identification of host factors responsible for infection and development of nano-particle based dsRNA delivery system for imparting resistance to begomoviruses (NASF Funded project)**

To understand replication and movement of begomovirus in host and non-host plants, DNA A and DNA B of begomovirus infecting mungbean were cloned and identified as Mungbean yellow mosaic India virus (MYMIV) and DNA A of begomovirus infecting tomato was cloned and identified as Tomato leaf curl Karnataka virus, from Raipur associated with betasatellite. Technique to identify whitefly transmission and PCR test on the inoculated spot in host and non-host plants was standardized.

AGENDA No.- F

FINANCIAL MATTERS

AGENDA No.- F-1

YEAR-WISE ALLOCATION

NIBSM, Raipur (₹ in Lakh)

IMC may note the following information on the SFC 2017-20 outlay of NIBSM. SFC 2017-20 outlay (₹ cr)

Part F : ICAR- National Institute of Biotic Stress Management, Raipur

F.1 Research programme

The objective, targets/measureable deliverables (2017-2020) and activities for NEH/TSP Region have been given in the proceedings of SFC and this may be followed to fulfil the mandate of the Institute.

F.2 The SFC has approved total outlay of **Rs.5453.00** (Rupees Five Thousand Four Hundred Fifty Three Lakhs only) for scheme ICAR –NIBSM, Raipur as detailed below: -

Head	Year-wise allocation (Rs. in crores)									ICAR Share	State Share	Total
	2017-18			2018-19			2019-20					
	Other than NEH & TSP	NEH	TSP	Other than NEH & TSP	NEH	TSP	Other than NEH & TSP	NEH	TSP			
A) Grant in-Aid: Capital												
Works	15.29	0.00	0.00	15.29	0.00	0.00	15.29	0.00	0.00	45.87	0.00	45.87
*Equipment	0.54	0.00	0.00	0.56	0.00	0.00	0.55	0.00	0.00	1.65	0.00	1.65
Furniture & Fixture	0.50	0.00	0.00	0.50	0.00	0.00	1.50	0.00	0.00	2.50	0.00	2.50
Vehicles	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Library & books	0.05	0.00	0.00	0.05	0.00	0.00	0.10	0.00	0.00	0.20	0.00	0.20
Others	0.20	0.00	0.00	0.25	0.00	0.00	0.50	0.00	0.00	0.95	0.00	0.95
Total (A)	16.58	0.00	0.00	16.65	0.00	0.00	17.91	0.00	0.00	51.17	0.00	51.17
B) Grant in-Aid: Establishment												
Pay & allowance	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Wages	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OTA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total (B)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C) Grant in-Aid: General												
Pension & Other Retirement Benefits	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

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Travelling Allowances												
Domestic TA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Foreign TA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Travelling Allowances	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Research & Operational Expenses												
Research	0.44	0.00	0.00	0.54	0.00	0.00	0.56	0.00	0.00	1.54	0.00	1.54
Operational Expenses	0.50	0.00	0.00	0.54	0.00	0.00	0.57	0.00	0.00	1.61	0.00	1.61
Total Research and Operational Expenses	0.94	0.00	0.00	1.08	0.00	0.00	1.13	0.00	0.00	3.15	0.00	3.15
Administrative Expenses												
A. Infrastructure	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B. Communication	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C. Repair & Maintenance	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
i. Equipment, Vehicles & Others	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ii. Office Buildings	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
iii. Residential building	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.00
iv. Minor works	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D. Others (Excluding TA)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total- Administrative Expenses	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Miscellaneous Expenses												
A. HRD	0.02	0.00	0.00	0.02	0.000	0.00	0.03	0.00	0.00	0.07	0.00	0.07
B. Other items	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00	0.00
C. Publicity & Exhibitions	0.02	0.00	0.00	0.02	0.00	0.00	0.03	0.00	0.000	0.07	0.00	0.07
D. Guest house Maintenance	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00	0.00
E. Other Miscellaneous	0.02	0.00	0.00	0.02	0.00	0.00	0.03	0.00	0.000	0.07	0.00	0.07
Total - Miscellaneous Expenses	0.06	0.00	0.00	0.06	0.00	0.00	0.08	0.00	0.00	0.21	0.00	0.21
Total Grants in Aid - General	1.00	0.00	0.00	1.15	0.00	0.00	1.21	0.00	0.00	3.36	0.00	3.36
Total Revenue (Grants in Salaries + General)	1.00	0.00	0.00	1.15	0.00	0.00	1.21	0.00	0.00	3.36	0.00	3.36
Grand Total (Capital + Revenue)	17.58	0.00	0.00	17.80	0.00	0.00	19.15	0.00	0.00	54.53	0.00	54.53

AGENDA No.- F-2

PLAN BUDGET ALLOCATION AND EXPENDITURE (₹ LAKH)

S. No.	Head	2012-2013		2013-2014		2014-2015		2015-16		2016-17		2017-18		2018-19	
		Plan		Plan		Plan		Plan				Plan		Plan	
		Allocation	Expenditure till date	Allocation	Expenditure till date	Allocation	Expenditure till date	Allocation	Expenditure till date	Allocation	Expenditure till date	Allocation	Expenditure till date	Allocation	Expenditure
A	Grant-in-aid salary	0	0	0	0	0	0	6.00	3.11	65.70	63.80	280	271	417.0	402.37
B	Grant-in-aid General							36.00	27.86	114.00	117.00	185	183		121.77
1	T.A.	-	-	8.86	8.86	10.50	9.28	18.00	16.10	10.00	10.00				21.07
2	Research Contingencies	20	6.27	21.99	21.99	79.50	64.63	66.00	68.39	104.00	107.00			230.57	87.16
	Total (A)	20	6.27	30.85	30.85	90.00	73.91	120.00	114.31	179.70	180.80			230.57	230.00
C	Grant-in-aid Capital											1500	1043		1346.75
1	Works	80.00	80.00	58.78	58.78	140.00	140.00	0.00	0.00	700	700			1565	1325.00
2	Equipment	-	-	2.79	2.79	94.00	21.60	133.86	132.80	30.00	21.29				8.75
3	Furniture	-	-	3.27	3.27	10.00	2.08	15.00	13.32	--	7.35				3.27
4	Others (F&F)	-	-	4.31	4.31	16.00	19.07	1.14	1.18	--	0.98				0.64
	Total (B)	80.00	80.00	69.15	69.15	260.00	182.75	150.00	147.31	730	729.62			1565	1337.41
	Grand Total (A+B)	100.00	86.27	100.00	100.00	350.00	256.66	276.00	264.72	909.70	909.7	1975	1497	2212.57	1973.57

Non-plan budget allocation and expenditure (₹ lakh)

		2012-2013		2013-2014		2014-2015		2015-16		2016-17	
		Allocation	Expenditure till date	Allocation	Expenditure till date	Allocation	Expenditure till date	Allocation	Expenditure till date	Allocation	Expenditure till date
A	Grant-in-aid salary										
1	Grant in Salaries/ Establishment Exp.	1.16	1.15	37.36	37.36	120.00	102.21	150.00	161.08	280	275.23
2	Administrative Exp.- Works-office buildings	0	0	10.00	10.00	42.84	42.84	15.00	0.00	10	10.16
3	Research and Operation Expenses	0	0	0	0	10.00	4.84	10.00	4.56	17	22
	Grand Total	1.16	1.15	47.36	47.36	172.84	150.22	176.70	165.64	280	275.23

The Management committee may kindly see the budget provision for information and approval please.

AGENDA No.- F-3

Revenue Generation (Rs in Lakh)

Table: Resource generated (Rs.)

S. No.	Head	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19
1.	Sale of farm produce	66,758	15,62,924	21,70,545	28,94,672	23,03115	13,29150
2.	Sale of tender	8000	69,000	0	18,500	15,000	1,30500
Total		74,758	16,31,924	21,70,545	29,13,172	23,18,115	**14,59650**

The Institute Management committee may kindly note in this regard.

AGENDA No.- F-4

POSITION OF OUTSTANDING ADVANCES

The advances to various government agencies are mentioned below.

Rs. In Lakh

S. No.	Paid to	Amount paid up to 31/03/2014 and Still outstanding		Amount paid during 01/04/2014 to 21/03/2015 and still outstanding		Amount paid during 01/04/2015 to 15/03/2016 and still outstanding	
		Plan	Non-Plan	Plan	Non-Plan	Plan	Non-Plan
1	CPWD	138.78	10.00	140.00	42.84	6.74	28.94
2	DGS&D	0.00	0.00	15.80	0.00	0.00	0.00

The Institute Management committee may kindly note.

List of equipments approved in SFC 2017-20 proposed to be procured during 2019-20

ICAR – NIBSM, Raipur

Final list of equipments for EFC

S. No	Name of the equipment	Quantity required	Estimated cost (in Lakhs)	Justification
1	Refrigerated centrifuge	1	10	For molecular biology work
2	Water purification system	1	5	For tissue culture, molecular biology basic work and all lab based experiments
3	Laminar air flow	4	8	Pathological, microbiological, tissue culture work
4	Stereo zoom microscope with accessories	1	5	Microscopy
5	Epi-fluroscent microscope with accessories	1	7	Microscopy
6	Phase contrast microscope with DIC attachment and accessories	1	10	Microscopy
7	Compound microscopes with accessories	2	2	Microscopy
8	AC with accessories	20	8	For providing cooling condition in laboratories
9	Refrigerated shaker-incubator	1	10	Growing cultures (bacteria), clones and transformation studies
10	Tissue culture racks	5	2	Tissue culture of plants
11	Autoclave	3	3	Sterilization of laboratory chemicals, media etc.
12	Refrigerator	10	4	Storing molecular biology chemicals, cultures and samples
13	Weighing balance	4	4	Weighing chemicals
14	Online UPS-5KV	3	6	Uninterrupted power supply to instruments
15	Ice flaking machine	1	3	Ice for setting up reactions
16	Hot air oven	5	2.5	Glassware sterilization and other purposes
17	BOD incubator	5	5	Incubation of cultures etc
18	pH meter	5	2.4	Preparation solution in specified pH
19	Soil testing kit/module	1	1.5	Testing soil nutrient status
20	-20oC Freezer	5	5	Storing chemicals, cultures, samples, etc
21	Electrophoresis system	4	3	Separation of nucleic acid in a specified voltage
22	Water tanker	1	2	Supply of watering to plants
23	Olfactometer	1	2	Study of semiochemicals
24	Chlorophyll meter	1	2	Measure chlorophyll content of plants
25	Insect growth chamber	1	5	Culturing of insects
26	Tube well	2	4	For irrigation
27	Water bath (refrigerated)	1	5	For low temperature reaction in molecular biology
28	Mini multimedia production unit	1	4	For extension and training
29	e-learning KIOSK	1	2	For teaching to farmers
30	Fire extinguisher	10	2	Safety purposes
31	Minor equipments costing less than 2 lakh each (Such as Power sprayer, pump, canopy thermometer, haemocytometer, humidifier, weeder, minithresher, seed drill, ridge and furrow maker, lawn mover, power tiller, GPS, water bath, microwave oven, voltage stabilizer, UV transilluminator, hot plate and magnetic stirrer, vortex mixer) and miscellaneous items etc.		26.6	Various uses to conduct experiments on biotic stress management
	Equipments needed for Administrative purposes (CCTV security system,-1;			Security, copy of records and drinking water for staff
32	Photocopier-1; Drinking water system with cooler-2)		4	
Total cost=			**165**	

AGENDA No.- F-6

LIST OF EQUIPMENTS PURCHASED DURING 2018-19

S. No.	Name	Number	Amount (Rs.)
1.	Microwave Oven	6	89700
2.	Water dispenser	4	43520
3.	Split AC 1.5 ton with Accessories	16	494890
4.	Voltage Stabilizer	16	56720
5.	Aquaguard 80 PSS UV	1	83500
6.	Refrigerator	8	296000
7.	5 KVA UPS	1	143000
8.	Laptop	2	125306
Total			**13,32,636**

The IMC may please ratify these items of expenditure.

AGENDA No.- F-7

Equipment purchase status

S. No	Name of the equipment	Quantity	Estimated cost (in Lakhs)	Justification	Status
1	Refrigerated centrifuge	1	10	For molecular biology work	Will be purchased 2019-20
2	Water purification system	1	5	For tissue culture, molecular biology basic work and all lab based experiments	Completed this year (31st March 2019)
3	Laminar air flow	4	8	Pathological, microbiological, tissue culture work	Completed this year (31st March 2019)
4	Stereo zoom microscope with accessories	1	5	Microscopy	Will be retendered 2019-20
5	Epi-fluroscent microscope with accessories	1	7	Microscopy	Will be retendered 2019-20
6	Phase contrast microscope with DIC attachment and accessories	1	10	Microscopy	Will be purchased 2019-20
7	Compound microscopes with accessories	2	2	Microscopy	Will be retendered 2019-20
8	AC with accessories	20	8	For providing cooling condition in laboratories	16 ACs purchased, rest Will be done 2019-20
9	Refrigerated shaker-incubator	1	10	Growing cultures (bacteria), clones and transformation studies	Completed this year (31st March 2019)
10	Tissue culture racks	5	2	Tissue culture of plants	Completed this year (31st March 2019)
11	Autoclave	3	3	Sterilization of laboratory chemicals, media etc.	One will be completed this year (31st March 2019), other two will be done 2019-20
12	Refrigerator	10	4	Storing molecular biology chemicals, cultures and samples	Purchased
13	Weighing balance	4	4	Weighing chemicals	Completed this year (31st March 2019)
14	Online UPS-5KV	3	6	Uninterrupted power supply to instruments	Purchased
15	Ice flaking machine	1	3	Ice for setting up reactions	Completed this year (31st March 2019)
16	Hot air oven	5	2.5	Glassware sterilization and other purposes	Purchased
17	BOD incubator	5	5	Incubation of cultures etc	Completed this year (31st March 2019)
18	pH meter	5	2.4	Preparation solution in specified pH	Purchased
19	Soil testing kit/module	1	1.5	Testing soil nutrient status	will be done 2019-20

20	-20oC Freezer	5	5	Storing chemicals, cultures, samples, etc	Purchased
21	Electrophoresis system	4	3	Separation of nucleic acid in a specified voltage	Completed this year (31st March 2019)
22	Water tanker	1	2	Supply of watering to plants	will be done 2019-20
23	Olfactometer	1	2	Study of semiochemicals	will be done 2019-20
24	Chlorophyll meter	1	2	Measure chlorophyll content of plants	Completed this year (31st March 2019)
25	Insect growth chamber	1	5	Culturing of insects	will be done 2019-20
26	Tube well	2	4	For irrigation	will be done 2019-20
27	Water bath (refrigerated)	1	5	For low temperature reaction in molecular biology	Completed this year (31st March 2019)
28	Mini multimedia production unit	1	4	For extension and training	will be done 2019-20
29	e-learning KIOSK	1	2	For teaching to farmers	will be done 2019-20
30	Fire extinguisher	10	2	Safety purposes	Purchased
31	Minor equipments costing less than 2 lakh each (Such as Power sprayer, pump, canopy thermometer, haemocytometer, humidifier, weeder, minithresher, seed drill, ridge and furrow maker, lawn mover, power tiller, GPS, water bath, microwave oven, voltage stabilizer, UV transilluminator, hot plate and magnetic stirrer, vortex mixer) and miscellaneous items etc.		26.6	Various uses to conduct experiments on biotic stress management	Under process
32	**Equipments needed for Administrative purposes** (CCTV security system,-1; Photocopier-1; Drinking water system with cooler-2**)**		4	Security, copy of records and drinking water for staff	Drinking water system purchased, CCTV will be purchased 2019-20
Total cost=			**165**		

AGENDA No.- F-8

LIST OF FURNITURE/FIXTURES PURCHASED DURING 2018-19

S. No.	Items	No.	Amount (Rs.)
1.	Visitors Chair (70) & revolving chairs (8)	78	188411
2.	Plastic chair	15	10170
3.	Magazine stand	6	20253
4.	Table	18	77450
5.	Stool	14	9165
Total			**305449**

The IMC may please ratify these items of expenditure

AGENDA No.- G

ADMINISTRATIVE MATTERS

AGENDA No. G-1

Proposal for approval for expenditure towards entertainment and light refreshment charges at NIBSM, Raipur (C.G)

NIBSM organised the 5th IMC Meeting, Foundation day celebrations and visit of ICAR official such as Deputy Directors General visit for works Review meetings at NIBSM with the scientists. Meeting of IMC besides other meetings was held in the remaining period of this financial year 2018-19 and light refreshment besides working lunch whenever required, during the meetings of this important committee and during visits of dignitaries to the institute.

While observing economy instructions and other norms prescribed/laid down by Government of India/ICAR-NIBSM, tea-refreshment to the participants of meeting were served besides this working lunch was also served whenever meeting were extended to afternoon session. An expenditure of Rs**.** 83863- was incurred (up to 15.03.2019) after obtaining approval/sanction from competent authority of NIBSM who is empowered to sanction expenditure up to this amount.

S. No.	**Occasion**	**Amount (Rs.)**
1.	NIBSM foundation day (07th October, 2018)	39220
2.	Celebration of Independence day	4574
3.	Celebration of Republic day	7110
4.	Institute Research Council (IRC)	14459
5.	Research Advisory Committee (RAC)	18500
Total		**83863**

Placed before Institute Management Committee for perusal please

AGENDA No.G-2.

New Staff/ Promotion/Probation/ Confirmation/Transfers/ Joining/ Resignation/ Superannuation/ Deputation/Obituary Etc.

1. **Probation clearance**
   - Dr. R. K. Murali Baskaran and Sh Yogesh Yele cleared probation on 16.8.2018

2. **Promotion**

   - Dr. P. Mooventhan, Scientist promoted from RGP 6000 to RGP 7000 on 28.6.18

3. **Joining:**

   - Dr. Ashish Marathe, Scientist, Biochemistry joined ICAR-NIBSM, Raipur on 25.07.2018

4. **Superannuation**

   Sh. Saguni Paswan, Assistant superannuated on 31.7.2018

AGENDA No. G-3.

Any other items with the permission of chair