



## From Director's Desk

The semester under report witnessed successful conduct of QRT and IRC meetings of the institute. QRT report was compiled under chairmanship of Dr. S. M. Paul Khurana, former Director, ICAR- CPRI, Shimla and final report was submitted to hon'ble DG, ICAR on June 26<sup>th</sup>, 2019. QRT strongly recommended to undertake basic and strategic research to provide tools to combat biotic stresses that occur in the current times and also for those that can arise in the future. Esteemed QRT also advocated that institute must identify the crops of national importance and develop strategies for their pest management after thoroughly undertaking research gap analysis in Indian NARS and setting research priorities thereof as well as to initiate teaching at NIBSM at the earliest in collaboration with regional agricultural universities and ICAR- IARI. QRT took a note that institute is in infancy but growing up with bright scientists on the current roll. Nevertheless, its mandate and objectives are not easy to achieve quickly in view of poor facility in terms of human resource, appropriate laboratory space and inadequate equipments made available so far.



Institute made a significant progress in establishing its new campus at Baronda farm. Basic infrastructure has reached final stages of completion and campus now looks adorned with the awesome scenario of administrative block, library building, auditorium, two school buildings and two students' hostels. Farm area of about 80 acres was successfully utilized to conduct field trials during the preceding *rabi* season by conducting biotic stress management trials on wheat, rice, chickpea, pigeon pea and fodder grasses. Educational programme has been initiated in the institute by signing an MoU with ICAR- IARI, New Delhi for sharing the research work of M. Sc. and Ph. D. students enrolled in IARI, New Delhi in the disciplines of Plant Pathology, Entomology and Nematology. Scientists of ICAR-NIBSM, Raipur will be designated as IARI faculty along with co-guide of M. Sc. and Ph. D. students pursuing their degrees in IARI-New Delhi. Field experiments of IARI students may now be conducted in the farm of ICAR-NIBSM as students will be provided hostel facility at Baronda campus during the course of their research work. Institute also conducted its IRC meeting in the month of June, 2019 wherein new project proposals *viz.* Isoflavone based screening of soybean germplasm for reaction to yellow mosaic disease and Metabolomics and transcriptomics of silicon mediated defence against yellow stem borer in rice were approved.

  
Jagdish Kumar  
Director (Acting)

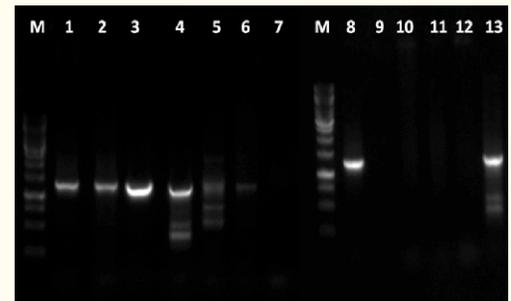
## Research Highlights

### AGRICULTURAL BIOTECHNOLOGY

#### Detection of begomoviruses among the crop species of pulses and vegetables

(P.N. Sivalingam, Vinay Kumar, Yogesh Yele)

The leaf samples of various crop plants were collected from field randomly to know the occurrence and distribution of begomoviruses. The results obtained from PCR analysis indicated the positive amplification of ~1.1 Kb DNA fragment obtained from yellow mosaic samples of mungbean, urdbean, cow pea and *Dolichos*, yellow vein samples of okra, leaf curl samples of tomato and chilli and leaf crinkle in ridge gourd and bitter gourd, suggesting the begomovirus infection (Fig. 1). Overall results suggested that rice bean and *Amaranthus* could be non-host to the begomovirus in Raipur.

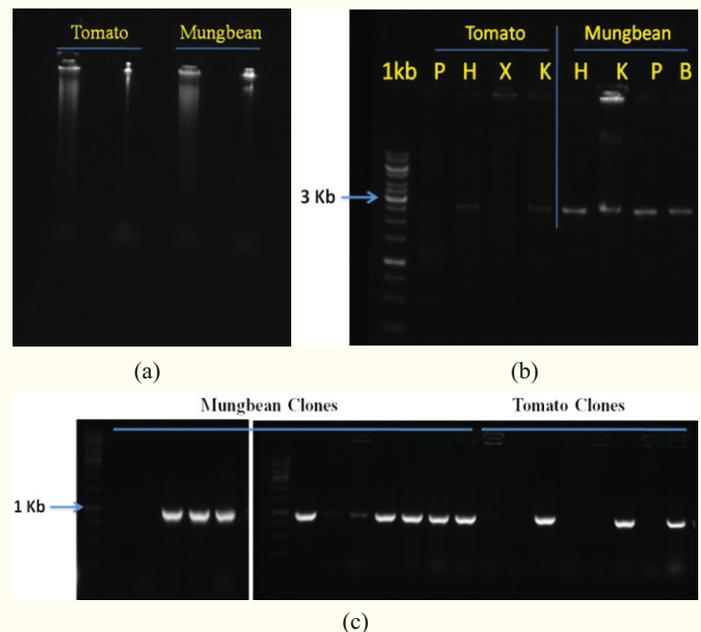


**Fig. 1.** PCR amplification of different plant samples with begomovirus universal primers. M- 1 Kb DNA ladder; lane 1- urdbean, 2- mungbean, 3-cow pea, 4- *Dolichos*, 5- chilli, 6- bitter gourd, 7-rice bean, 8- tomato, 9-cucumber, 10-bottle gourd, 11-*Amaranthus*, 12- brinjal and 13-okra

#### Cloning of begomovirus infecting mungbean and tomato

(P. N. Sivalingam, Vinay Kumar, J. Sridhar, L. L. Kharbikar)

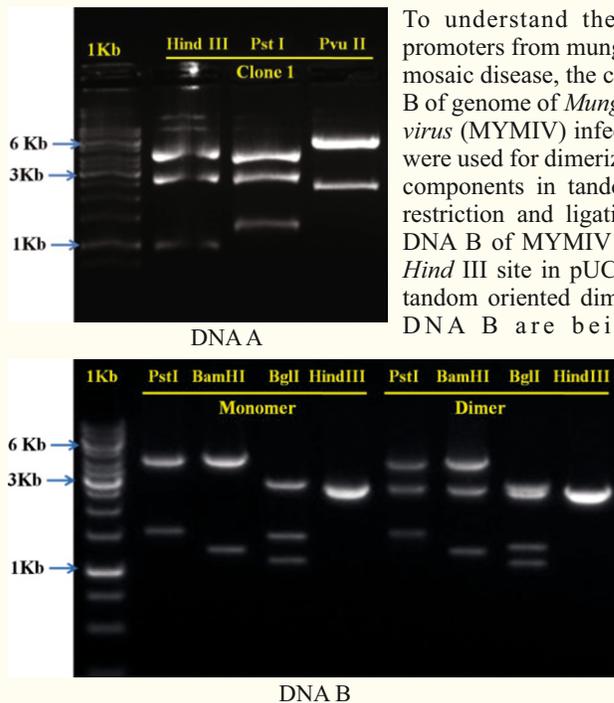
The DNAA and DNAB components of begomovirus causing yellow mosaic disease in mungbean from Raipur, Chhattisgarh have been cloned by rolling circle amplification method and sequenced. The nucleotide sequence analysis revealed that the begomovirus is *Mungbean yellow mosaic India virus* (MYMIV) (GenBank accession No. MN020535 (DNA A) & MN020535 (DNA B)). DNA A and betasatellite component of begomovirus associated with leaf curl disease of tomato in Raipur was cloned by rolling circle amplification method and sequenced. This confirmed that virus species is *Tomato leaf curl Karnataka virus* (TOLCKV) (GenBank accession No. MN020537) associated with *Croton yellow vein mosaic betasatellite* (Fig. 2) (GenBank accession No. MN020538).



**Fig 2.** Cloning of begomovirus genome infecting mungbean and tomato. (a) Rolling Circle Amplification, (b) Restriction of RCA product. P-*Pst*I, H-*Hind*III, X-*Xba*I, K-*Kpn*I, B-*Bam*HI and (c) Colony PCR using begomovirus universal primers.

### Developing infectious clones of MYMIV infecting mungbean

(P.N. Sivalingam, S. K. Jain, Vinay Kumar, L. L. Kharbikar, Ashish Marathe)



To understand the begomovirus induced promoters from mungbean resistance to yellow mosaic disease, the clones of DNA A and DNA B of genome of *Mungbean yellow mosaic India virus* (MYMIV) infecting mungbean in Raipur were used for dimerization of both the genomic components in tandem orientation by partial restriction and ligation method. DNA A and DNA B of MYMIV dimerized in *Bam*HI and *Hind* III site in pUC18 vector (Fig. 3). These tandem oriented dimer clones of DNA A and DNA B are being sub-cloned into pCAMBIA230 vector for agroinoculation using *Agrobacterium tumifaciens* strain EHA 105 and LBA4404. The developed dimer construct of viral genome will be used for inoculation to resistance and susceptible mungbean plants for transcriptome analysis.

Fig 3. Dimerization of DNA A and DNA B of MYMIV clones

### Standardization of technique to identify virus replication and movement in hosts and non-hosts

(P. N. Sivalingam, J. Sridhar, Vinay Kumar, L. L. Kharbikar, Ashish Marathe)

The begomovirus isolates causing yellow mosaic disease in mungbean and leaf curl disease in tomato are being maintained in the glass house under whitefly proof cages. These virus isolates used for single whitefly transmission. DNA isolation and PCR amplification procedures were standardized to test presence of begomovirus by single whitefly in an area of 1.57 cm<sup>2</sup> using universal begomovirus primer (Fig. 4). This standardized procedure was used to test host and non-host to begomovirus infecting tomato, where tomato was used as host and *mungbean* as non-host. Quantification of replication, movement and localization of begomovirus in the host and non-hosts is in progress.

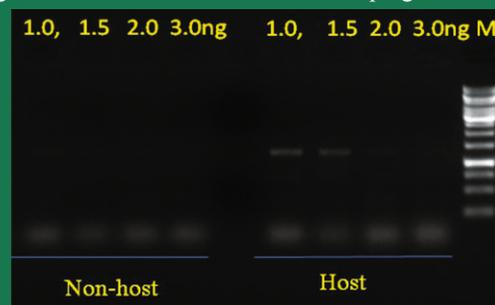


Fig 4. PCR amplification in host and non-host plants for MYMIV. ng-nanogram, M- 1 Kb DNA ladder

### Optimization of protocol for PCR amplification and characterization of genetic groups of *Bemisia tabaci*

(J. Sridhar, R. K. Murali Baskaran, P. N. Sivalingam)

Whitefly, *Bemisia tabaci* is one of the polyphagous pests infesting variety of agricultural and horticultural crop plants and is vectors of >100 plant viruses belonging to begomoviruses. The virus transmission efficiencies of different genetic groups of *B. tabaci* have been reported to be varying. Therefore, it is essential to determine the distribution of various genetic groups of *B. tabaci* and their transmission efficiencies with respect to begomoviruses. Total genomic DNA was isolated from individual whitefly samples of Raipur using DNeasy blood and tissue kit. It was found that two temperatures, 48.7°C and 50.9°C showed very good amplification of DNA. PCR mix was also standardized. The optimized PCR conditions include denaturation at 94°C for 1 min, annealing at 50°C for 2 min (35 cycles) and extension at 72°C for 10 min. An amplicon of approximately 750 bp of mitochondrial *COI* gene was visualized in gel electrophoresis (Fig 5, 6). Therefore, this protocol is useful for characterizing genetic groups of *B. tabaci*.

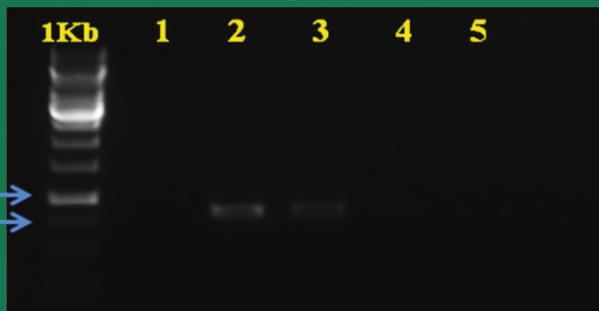


Fig 5. Gradient PCR for amplification of mitochondrial *COI* gene of *B. tabaci*. M: 1Kb marker, Lane 1: -ve control, 2-5: four annealing temperatures at 48.7°C, 50.9°C, 51.3°C, 54.8°C, respectively

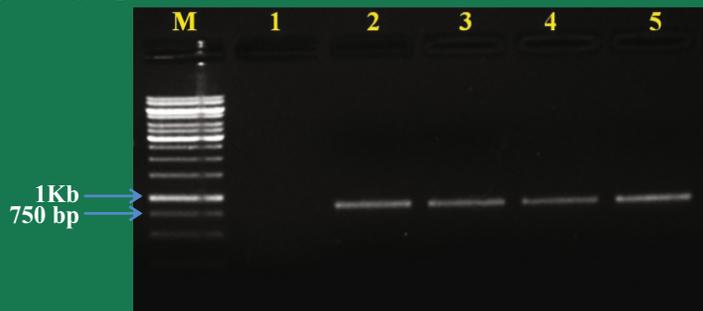


Fig 6. PCR amplification of mitochondrial *COI* gene of *B. tabaci*. M:1Kb Marker, Lane 1: negative control, Lane 2-5: amplification of mitochondrial DNA of *B. tabaci*

### Isolation and characterisation of native *Bacillus thuringiensis*

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

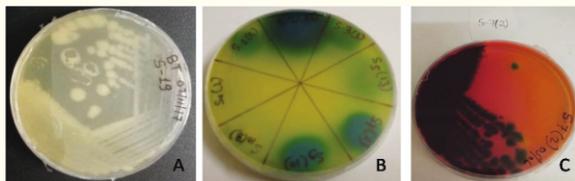


Fig 7. Growth characteristics of *Bacillus thuringiensis* on (A) nutrient agar; (B) *Bacillus cereus* agar, (C) Hichrome bacillus agar

Twenty eight soil samples from Chhattisgarh were processed for isolation of *Bacillus thuringiensis*. Colonies on nutrient agar were subject to gram's staining, growth on *Bacillus cereus* agar and hichrome bacillus agar to identify *Bacillus* group isolates (Fig. 7). About 75 *Bacillus* group isolates were screened by PCR for presence of crystalline spore protein of BT using *cry1* and *cry2* gene specific primers having amplicon size of 277 bp and 701 bp, respectively (Fig. 8, 9). Twelve *Bacillus thuringiensis* (*Bt*) isolates were identified based on *cry1* and *cry2* gene PCR.

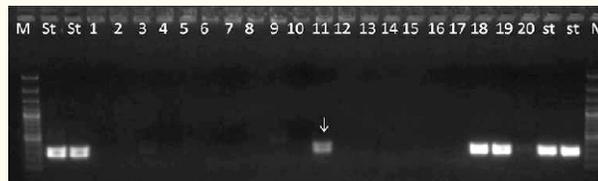


Fig 8. PCR amplification of *cry1* gene of *Bt* with amplicon size of 277 bp

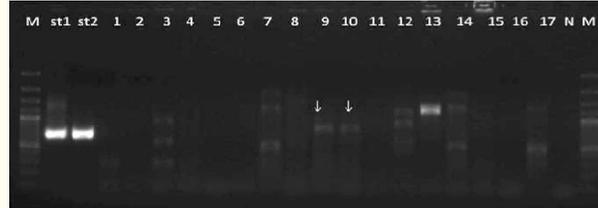


Fig 9. PCR amplification of *cry2* gene of *Bt* with amplicon size of 701 bp

## HOST PLANT RESISTANCE

### Screening of wheat, chickpea and *Lathyrus* germplasm against biotic stresses

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

Field screening of germplasm accessions from mini core subset of wheat, chickpea and *Lathyrus* against biotic stresses was undertaken in *rabi* 2018-19 under field conditions. In wheat, three accessions (IC542799, IC582717, EC217803) were highly resistant (<1% white ear) against pink stem borer whereas 18 and 34 accessions were found to be resistant and moderately resistant, respectively. Out of 238 chickpea accessions screened, 50 lines were found to be least susceptible, 185 lines moderately susceptible and one line was highly susceptible to the pod borer. Majority of the accessions exhibited less than 20% disease incidence (root rot and *Fusarium* wilt) under natural condition. Among 110 *Lathyrus* accessions screened, 22 accessions were found to be moderately resistant to thrips.

### Exogenous application of different silicon sources and potassium reduces pink stem borer damage in wheat

(Mallikarjuna, J., Yogesh Yele, K. C. Sharma, N. B. Prakash)

Silicon (Si) and potassium are known to impart tolerance against numerous biotic stresses in crop plants. Soil application of diatomaceous earth (DE) @ 300 kg ha<sup>-1</sup> significantly decreased the pink stem borer incidence and damage with lowest per cent white ear damage (12.47) and recorded highest grain yield (3.31 t ha<sup>-1</sup>). Highest B: C ratio (2.03) was recorded in soil application of DE @ 150 kg ha<sup>-1</sup> which was superior than insecticidal check (1.74).

## BIOLOGICAL CONTROL

### *In planta* validation of plant growth promoting activities of bacterial endophytes on chickpea

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

Endophytic bacteria are known to have plant growth promoting potential by producing various phytohormones, enzymes, volatile organic compounds *etc.* The bacterial endophyte, 53P recovered from pigeonpea showed significant increase in different growth parameters in chickpea like root length (36.1%), fresh weight of root (206.3%) dry weight of root (125.3%) plant height (23.2 cm) and fresh weight of shoot (42.3%) over the control plants (without endophyte) (Fig. 10). This bacterial endophyte also has antagonistic activity against fungal pathogens. Hence, bacterial endophytes can be explored for plant growth promotion as well as bio control of fungal pathogens.

### PCR based detection of lipopeptide genes in the bacterial endophytes isolated from rice having antagonistic activities against bacterial and fungal pathogens

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

The antimicrobial peptides (AMPs) or lipopeptides are a novel class of potent versatile weapons to deal with a variety of phytopathogens. In order to confirm the presence of lipopeptide genes in the bacterial endophytes of rice having antagonistic activities against bacterial pathogen *Xanthomonas oryzae* pv. *oryzae* (*Xoo*) and or soil borne fungal pathogens namely *Sclerotium rolfsii*, *Fusarium verticillioides* and *Rhizoctonia solani*, PCR based detection was conducted. The surfactin was found in four isolates while bacilliomycin and antifungal iturin genes were found in one isolate. The surfactin specific primer produced the desired amplicon in three *Bacillus subtilis* isolated from stem tissues and one from root tissue. Similarly the Iturin and Bacillomycin D specific primers produced desired amplicons only in *B. subtilis* isolated from root tissues (Fig. 11). This suggested that *Bacillus* endophytes of rice might secrete these lipopeptides inside plant tissues or on their surfaces to protect them from phytopathogens. The *Bacillus* endophytes isolated from root tissues showed the strongest antagonistic potential against tested fungal and bacterial pathogens.



Fig 10. Morphological appearance of chickpea plants with and without treatment of bacterial endophyte

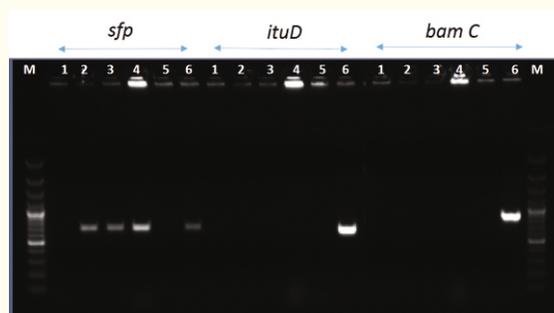


Fig 11. Agarose gel showing PCR amplification of Lipopeptide genes from bacterial endophytes; M; 100 bp ladder, 1-6, bacterial endophytes; sfp; Surfactin; ituD: Iturin and bam C: Bacilliomycin specific primers

### Identification and characterization of bacteriophages against rice bacterial leaf blight, *Xanthomonas oryzae* pv. *oryzae*

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

Bacterial leaf blight (BLB), caused by *Xanthomonas oryzae* pv. *oryzae* (*Xoo*), is one of the most important bacterial diseases of rice worldwide. For the disease management, eco-friendly bio-control methodology of phage therapy can be a potential option. We attempted to isolate the bacteriophage against *Xoo* pathogen isolated from field samples of Chhattisgarh. Growth conditions in solid and liquid culture medium were standardized for bulk culture of *Xoo*. The procedure for the isolation of bacteriophage using *Xoo* isolate was also standardized. About 10 stagnant water samples from fields and pots and two BLB infected leaf samples were collected and processed for phage isolation. Out of 12 samples, one phage against *Xoo* was isolated as indicated by spot test, plaques and clearance of bacterial growth around streaked lines (Fig. 12, 13).



Fig 12. Bacterial growth inhibition in spot assay of processed samples after 72 h

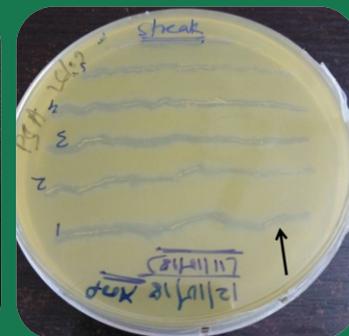


Fig 13. Zone of clearance in *Xoo* overlay around the suspected phage streaked lines after 72 h

### Native *Trichogramma* spp. isolation from Chhattisgarh

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

Three wild population of *Trichogramma* spp. were recovered *ie.*, two from low land rice of research farm and one from low land rice of farmer's field of Baronda village. The first two populations were got identified as *T. chilonis* and third one as *T. japonicum*. The comparative parasitic activity of three native *Trichogramma* with species of ICAR-NBAIR, Bengaluru was studied which resulted that *T. japonicum* collected from farmer's field recorded the maximum parasitic activity of 86.4% but on a par with ICAR-NBAIR species (82.3%). *T. chilonis* obtained from NBAIR showed the highest parasitic activity of 76.9%, followed by two native population of *T. chilonis*, recording 71.1 and 66.4%, respectively (Fig 14, 15, 16).



Fig 14. Experimental set up



Fig 15. Parasitized eggs



Fig 16. *Trichogramma* adults

### Antifeedant activity of violacein against insect pests

(B. K. Choudhary, R. K. Murali Baskaran, Mamta Choudhary, J. Sridhar)

#### *Spodoptera litura*

The antifeedant activity of violacein, a secondary metabolite of *Chromobacterium* spp. against rice moth was studied under laboratory condition. Four different concentrations of violacein (125, 250, 500, 1000 ppm) prepared with ethyl acetate and ethyl alcohol separately were assayed using 3<sup>rd</sup> instar of *Spodoptera litura* in comparison with solvent alone, broth and untreated control. The crude extract of violacein inhibited the feeding activity of larva to the extent of 24.1% which was significantly different from broth violacein (21.2%), ethanol extract violacein 1000 ppm (20.8%) and ethyl acetate extracted violacein 1000 ppm (16.8%) as compared to ethyl alcohol (2.7%) and ethanol alone (4.7%) treatments.

#### *Corcyra cephalonica*

The antifeedant activities of various treatments against 3<sup>rd</sup> instar of rice moth ranged from 16.9 to 38.8 per cent. Among the treatments, the concentrations of violacein (250, 500, 1000 ppm) prepared with ethyl alcohol were equal in efficacy and the antifeedant activity ranged from 32.8 to 38.8 per cent, followed by 1000 ppm of violacein prepared with ethyl acetate (25.8%).

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

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

Under this project, the activities such as farmer's perception level towards Good Agricultural Practices (GAPs), effectiveness of IEMM IVs in terms of knowledge gain, distribution of respondents according to their mass media exposure, social participation, livelihood assets, relationship and influence of the independent variables towards knowledge gain have been completed. The characters namely occupational status, farm size and social participation were found to be positively associated with symbolic adoption at one percent level of probability. The characters namely age, occupational status, farm size, farming experience, social participation were found to be positively associated with knowledge gain at one and five level of probability. *Lathyrus* info mobile app and offline IEMM are in progress.

### Farmer FIRST Programme (FFP)

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

Under Crop Based Module, improved varieties of pulses and oilseed crops such as *Lathyrus*, chick pea, linseed, mustard, moringa and vegetable seeds from IIHR & TNAU were introduced in 18 ha area which benefited 176 farmers. Three low-cost shade net house and one low-cost poly house with drip system, poly mulching and fogging system for micro-irrigation and temperature control were established to enhance the additional income generation and nutritional security. Under the livestock-based module, three kadaknath farming cum hatchery units, four model mushroom production units and four Agro-Processing Centers (APCs) were established. A total of 37 low-cost Azolla production units were established to nourish poultry and goats under NRM based module.



Low cost shade net house



Poly house



Kadaknath farming cum hatchery unit



Oyster mushroom production



Paddy straw mushroom



FFP farmers visit



Plantation of annual moringa PKM-1



Agro-Processing Center



Dignitaries visit to Farmer FIRST villages

### Bioassay of native *Bt* against *Spodoptera litura*

Three concentration of five native *Bt* were prepared and used to treat the castor leaves and shade dried. The pre-starved 3<sup>rd</sup> instar *S. litura* were offered with treated leaves which were compared with VLBT 3 and Dipel (positive control) and untreated check (negative control). The highest mortality of 76% was recorded in Dipel treatment which was significantly different from VLBT3 (19.9%) and NBT 6 & 11 (15.6%) (Fig. 17). NBT2 & NBT3 (22.2%) and NBT4 (24.5%) were equal in efficacy to cause mortality which were on a par with each other (Fig. 18).

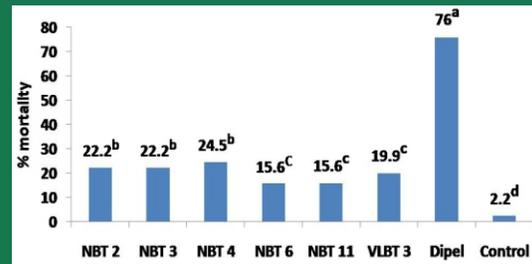


Fig 17. % mortality of *Spodoptera litura* larvae, treated with native *Bt*



Fig 18. Mortality due to Dipel treatment

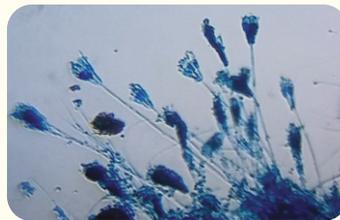
Under Foldscope project, a total of 14 samples collected from different sources were examined and captured images of several microbes such as fungal pathogens, downy mildew of cauliflower (*Peronospora parasitica*), white rust of *Amaranthus* (*Albugo bliti*), *Penicillium*, *Alternaria*, *Mucor*, *Curvularia*, *Aspergillus flavus*, *Erysiphe polygoni*, *Ovulariopsis sissou*, algae like Spirogyra, aquatic moss, *Anabaena azollae*, *Paramecium bursaria* and brinjal root-knot nematode. Two training programme on effectiveness of personal hygiene methods through foldscope microscopy were offered to rural homemakers and Nicobarese tribes.



Foldscope training to rural homemakers and Nicobarese tribes



*Penicillium spp.* observed using Foldscope



Root-knot nematode of brinjal

## Status of Biotic Stresses of crops

Status of biotic stresses in crops during January to June 2019 in ICAR-NIBSM research farm

Crop	Biotic Stress	Scientific Name	Intensity
<b>Rabi 2018-19</b>			
Wheat	Pink stem-borer	<i>Sesamia inferens</i>	10-17%
		<i>Pyrilla</i>	20 to 30 nymphs and adults/plant
Chickpea	Borer	<i>Helicoverpa armigera</i>	>50%
	Wilt	<i>Fusarium oxysporum</i> f. sp. <i>ciceris</i>	Low to medium
	Collar rot	<i>Sclerotium rolfsii</i>	Low to medium
<i>Lathyrus</i>	Thrips	<i>Scirtothrips dorsalis</i>	3-4/leaf
		<i>Thrips florum</i>	3-4/flower
Lentil	Collar rot & wilt complex	<i>Sclerotium rolfsii</i> <i>F. oxysporum</i> f. sp. <i>lentis</i>	Up to 30%



Lentil collar rot and wilt



Chickpea pod borer



Chickpea wilt

### Thrips complex in *Lathyrus*

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

Two species of thrips collected from *Lathyrus* during rabi 2018-19 were identified as *Scirtothrips dorsalis* Hood and *Thrips florum* Schmutz, belonging to the order Thysanoptera and family of Thripidae



## Institute Activities

### Republic day (January 26, 2019)

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

### PM Kisan Samman Nidhi Scheme (February 24, 2019)

On the occasion of launching of Pradhan Mantri Kisan Samman Nidhi Scheme, broadcast of *Mann Ki Baat* by Hon'ble PM was attended by participants from 11.00-11.30 am, followed by PM Kisan Samman Nidhi Scheme launching programme. In this event, more than hundred farmers, five public representatives, scientists and institute staff participated and benefited.

### Farmers-Scientists interface on biotic stresses (March 02, 2019)

Farmers-Scientists interaction was organized at ICAR-NIBSM, Raipur on 02.03.2019. To mark this occasion all scientists from NIBSM, Raipur, wheat trial (monitoring team AICW&BP) from IIWBR, Karnal and IARI, Regional Station, Indore and farmers visited various trials on wheat, *Lathyrus*, chick pea *etc.* About forty farmers from Jaroda, Baloda Bazar, Baronda and Saragaon participated and benefited. The interface meeting was coordinated by Dr. K. C. Sharma, Dr. P. Mooventhan, and Dr. Anil Dixit.

### 6<sup>th</sup> Institute Management Committee Meeting (March 18, 2019)

The 6<sup>th</sup> Institute Management Committee (IMC) Meeting of the institute was held on March 18, 2019 under the Chairmanship of Dr. J. Kumar, Director (Acting) at ICAR-NIBSM, Raipur. The IMC members *viz.*, Dr. K. N. Mohanta, Principal Scientist, ICAR-CIFA, Bhubaneswar (Odisha), Dr. A. K. Mukharjee, Principal Scientist, ICAR-NRRI, Cuttack (Odisha), Sr. A.K. Sarawgi, Prof. & Head, Plant Breeding & Genetics, IGKV, Raipur, Sh. R. K. Chandrawanshi, Joint Director of Agriculture, Chhattisgarh, Dr. P. Kaushal, Joint Director (Research) as guest of Honour, ICAR-NIBSM, Raipur, Dr. Anil Dixit, Principal Scientist, Dr. B. K. Choudhary, Scientist, Dr. Vinay Kumar, Dr. Sridhar J. Scientist as special invitees and Dr. K. C. Sharma, Sr. Scientist (as Nodal Officer, 6<sup>th</sup> IMC) and Sh. A. A. Goswami as Member Secretary attended the meeting. The member secretary presented the action taken report of 5<sup>th</sup> IMC. The proposed agendas items as per the council's guidelines were discussed in the meeting.





### International Women's Day (March 08, 2019)

On the occasion of International Women's Day on March 8, 2019, Dr. Jagdish Kumar, Director (Acting) ICAR-NIBSM inaugurated the function with his brief address. Dr. Binod, Scientist briefed the audience about celebration of International Women's day and its importance.

### International Yoga Day (June 21, 2019)

ICAR-NIBSM celebrated 'International Yoga Day' on June 21, 2019. On this occasion invited lecture on yoga was delivered by sister Uma, Prajapita, Brahma Kumaris Ishwariya Vishwa Vidyalaya, Raipur. All the scientists and staff members of the institute participated in yoga sessions organized as per the Common Yoga Protocol provided by Ministry of AYUSH, Government of India.

### 5<sup>th</sup> IRC meeting (June 11-12 2019)

The fifth Institute Research Committee meeting was held during 11-12<sup>th</sup> June 2019 at ICAR-NIBSM, Raipur under the Chairmanship of Dr. J. Kumar, Director (Acting) and chairman of IRC. On 11<sup>th</sup> June 2019, IRC meeting started with brief remarks by Director in which he appreciated the scientists involved in the institute building activities, establishment of laboratory facilities, post creation, developing MoU for education programme with ICAR-IARI, New Delhi apart from their scientific contributions. Dr. Pankaj Kaushal, Joint Director (Research) presented highlights of various research programme and projects, scientific activities and achievements made by the scientists in different areas. All the scientists presented the work done in last year and proposed the next year plan for their project. Meeting ended with vote of thanks by Dr. Anil Dixit, In-charge PME.

### Quinquennial Review Team (QRT)

First Quinquennial Review Team (QRT) report of ICAR-NIBSM Raipur has been submitted to the Dr. Trilochan Mohapatra, Secretary, DARE and Director General, ICAR in the presence of Dr A. K. Singh, DDG (CS & Hort.), ICAR, Dr. J. Kumar, Director (Acting), ICAR-NIBSM and Dr. Anil Dixit, Member Secretary QRT on June 26, 2019 at ICAR, New Delhi.

### Fall armyworm (FAW) sub-committee meeting (June 04, 2019)

A sub-committee at state level consisting of the Director of Agriculture, Raipur, Chhattisgarh, (Chairman), Shri C. S. Naik, Central IPM Centre, Raipur (Member and co-ordinator), Dr. R. K. Murali Baskaran, Principal Scientist (Agric. Ento.), NIBSM, Raipur (Member and Subject Matter Specialist) and Dr. Sonali Devale, IGKV, Raipur (Member and Subject Matter Specialist) has been constituted to monitor the fall armyworm infestation and management on maize and other alternate hosts. The sub-committee met on June 04, 2019 at the Directorate of Agriculture, Raipur. As one of the subject matter specialists, the NIBSM provided a suggestive IPM module for the management of FAW to the committee.



## Extension and Outreach Activities

### Mera Gaon Mera Gaurav (MGMG)

The *Mera Gaon Mera Gaurav* team (5 teams) of ICAR-NIBSM, Raipur scientists visited 16 times to adapted villages and benefitted 332 farmers through farm advisories. Five farmers meetings and three demonstrations were organized.



Sex pheromone trap demo



Farm advisory



Eco-friendly pest management demo



Sowing

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

One day training cum field visit for 80 DAESI trainees from Raipur, Dhamtari, Mahasamund and Gariaband districts was organized on 25<sup>th</sup> and 28<sup>th</sup> January, 2019 at ICAR-NIBSM, Raipur. Dr. Pankaj Kaushal delivered a lecture on role of input dealers in biotic stress management. Dr. Anil Dixit, Dr. R. K. Murali Baskaran, Dr. Mamta Choudhary, Dr. P. Moovethan, Dr. J. Sridhar and Dr. Mallikarjuna delivered lectures on biotic stresses management in crops and animals. The training was arranged and coordinated by Dr. K. C. Sharma, Sr. Scientist (Entomology) & I/c Extension & Outreach programme.



### Field Experience Training (FET) of ARS probationers

Five scientist probationers belonging to 109<sup>th</sup> FOCARS, NAARM had undergone 21 days Field Experience Training (FET) at Kharri Village of Kasdol Block, Baloda Bazar district under the supervision of ICAR-NIBSM co-ordinators, Dr. P. Moovethan and Dr. R. K. Murali Baskaran from 19.2.19 to 11.3.19.



## One day workshop for Nicobarese tribal farmers on Foldscope Microscopy (March 20, 2019)

ICAR-NIBSM, Raipur organised one-day workshop on “Role of Foldscope Microscopy in minimising the risk of zoonotic diseases, field level diagnosis of plant diseases and ensure the personal hygiene of tribal farmers” at Harminder Bay, Hut bay on March 03, 2019 under the DBT sponsored

Foldscope project in collaboration with ICAR-Central Inland Agricultural Research Institute, Port Blair. Dr. Pankaj Kaushal, Joint Director (Research), ICAR-NIBSM and Dr. P. Mooventhan, Scientist, Principal Investigator of the DBT sponsored Foldscope project demonstrated the Foldscope and its working mechanism in the diagnosis and observation of microorganism and other samples, followed by hands-on training to 51 Nicobarese tribal farmers.

## Infrastructure Development

As per approved Master Plan of ICAR - NIBSM, Baronda, Raipur (Chhattisgarh) construction of administrative building (G+2), library building (G+2), auditorium and two school buildings (G+1), and boys' hostel (G+2) along with the developmental works including roads, water harvesting channels, drainage systems, water storage structure *etc.* is in full swing with a total plinth area of 15160 sq m. In the revised SFC, an additional funds of Rs. 24.78 crore has been sanctioned to construct girl's hostel (Rs. 11.94 crore), electricity sub-station (Rs. 4.02 crore), roof top solar PV system (Rs. 3.60 crore), boundary walls (Rs. 2.51 crore) and laboratory (Rs. 2.711 crore).



(From left) 1. Library 2. Admin building 3. Auditorium



School 1



School 2



Boys' hostel

## Workshops/Symposia/Seminars/Trainings/Conference/other fora

### Workshops/Symposia/Seminars/Trainings organized

S. No.	Title of symposia/seminar/training organized	Period	Venue
1.	Training cum demonstration on eco-friendly pest management technologies under FFP	14.1.2019	Kharri village
2.	Farmers Scientist Interface on the biotic stress in agriculture and FFP interventions and field visit under FFP	18.1.2019	Kharri village
3.	Training cum demonstration on production of annual moringa PKM 1 and PKM 2 on February 12, 2019 at Kharri and s of Kasdol block	12.2.2019	Kharaha village
4.	Training cum demonstration on oyster mushroom production	15.2.2019	Kharri village
5.	Vaccination awareness campaign organised for the kadaknath producers groups	25.2.2019	Kharri and Bamhani villages
6.	Two days farmers' exposure visit cum educational tour during March 18 and 19, 2019 to IGKV, Chhattisgarh Mushroom, Raipur and KVK Kanker	18-19.3.2019	KVK, Kanker
7.	One day DBT sponsored Foldscope workshop for Nicobarese tribal farmers on “Role of Foldscope Microscopy in minimizing the risk of zoonotic diseases, field level diagnosis of plant diseases and ensure the personal hygiene of tribal farmers	20.03.2019	Harminder Bay, Andaman & Nicobar Islands

### Workshops/Symposium/Seminar/Conference/other fora attended

S. No.	Title of symposia/seminar/training attended	Period	Venue	Sponsor	Name of Scientist
1.	Workshop on Disciplinary Rules & Procedures International Conference on Agricultural	12 to 13.02.19	Hotel Marasa Sarovar Premiere, Upadhyaya Nagar, Tirupati, Andhra Pradesh	ICAR-NIBSM	J. Sridhar
2.	Extension and Advisory Services: Innovation to Impact	12 to 14.02.19	MANAGE, Hyderabad	ICAR-FFP	P. Mooventhan
3.	Two days training programme/workshop of Nodal Officers of KRISHI-Knowledge Based Resources Information Systems Hub for Innovations in Agriculture (Management of ICAR Research Data Repository for Knowledge Management initiative	15 to 16.02.19	ICAR-IASRI, New Delhi	ICAR-NIBSM	Vinay Kumar
4.	XIV Agricultural Science Congress	20 to 23.02.19	NAAS complex, New Delhi	ICAR-NIBSM	B. K. Choudhary, P. Mooventhan

S. No.	Title of symposia/seminar/training attended	Period	Venue	Sponsor	Name of Scientist
5.	राष्ट्रीय वैज्ञानिक राजभाषा परिसंवाद	25 to 26.02.19	ICAR-Central Institute of Fisheries Education, Mumbai	ICAR-NIBSM	B. K. Choudhary
6.	National Group Meeting kharif 2019 of AICRP- Forage crops and utilization	26.02.19	IGKV, Raipur	ICAR-NIBSM	P. Kaushal
7.	National Workshop on Plant Protection Techniques	06 to 07.03.19	NIPHM, Hyderabad	ICAR-NIBSM	S. K. Jain, R. K. Murali Baskaran
8.	Annual meet of NASF	06.03.19	NASC Complex, New Delhi	ICAR-NASF	P. N. Sivalingam
9.	One day National Conference on Microcosmos 2019 (NCM-2019)	23.03.19	Dr. B. R. Ambedkar Institute of Technology, Port Blair, Andaman & Nicobar Islands	DBT, New Delhi	P. Mooventhan

## Publications

### Research/Review papers

- Jain, L., V. Kumar, S. Chaturvedi, G. Roy and S. B. Barbudde. 2019. Seroprevalence of leptospirosis in bovines of Chhattisgarh, India. Research Journal of Biotechnology 14(7): 38-42.
- Sivalingam, P. N., Y. Yele., R. K. Sarita and K. C. Sharma. 2019. Incidence of pigeonpea yellow mosaic disease and vector population from Chhattisgarh, India. International Journal of Current Microbiology and Applied Sciences 8: 1699-1703

### Book chapters

- Kumar, V., R. Soni, L. Jain, B. Das and R. Goel. 2019. Endophytic Fungi: Recent Advances in Identification and Explorations, 267-281pp. In: Advances in Endophytic Fungal Research, Fungal Biology (B. P. Singh ed.), Springer publisher, Singapore, DOI: [https://doi.org/10.1007/978-3-030-03589-1\\_13](https://doi.org/10.1007/978-3-030-03589-1_13).
- Dash, B., R. Soni, V. Kumar, D. C. Suyal, D. Dash and R. Goel. 2019. Mycorrhizosphere: Microbial Interactions for Sustainable Agricultural Production, 321-338pp. In: Mycorrhizosphere and Pedogenesis (Ajit Verma and D. K. Choudhary eds.), Springer publisher, Singapore, DOI: [https://doi.org/10.1007/978-981-13-6480-8\\_18](https://doi.org/10.1007/978-981-13-6480-8_18).

### Abstract

- Mooventhan, P., Jagdish Kumar, Anil Dixit, K. C. Sharma, P. N. Sivalingam, Amit Kumar Gupta, S. R. K. Singh, P. Venkatesan, Uttam Singh and Pankaj Kaushal. 2019. Augmenting tribal farmer's income through agricultural innovations in rice fallow areas of Chhattisgarh, Abstract No. 1192, pp 849. In: XIV Agricultural Science Congress, New Delhi, held during February 20-23, 2019

### Repository deposition

S. No.	Item deposited	Accession No.	Repository name	Authors
1.	Bacterial endophytes isolated from pigeonpea (45 numbers)	MK342206-MK342224; MK327147-MK327157; MK332317-MK332327; MK327244-MK327245; MK327269- MK327270	NCBI Genbank	R. K. Mahto, Vinay Kumar, Lata Jain, P. Kaushal

### Compiled and Edited :

R. K. Murali Baskaran, K. C. Sharma, P. N. Sivalingam, Lalit Kharbikar, P. Mooventhan

- Mooventhan, P., Mamta Choudhary and S. B. Barbudde, 2019. Multifaceted use of Foldscope in Agriculture, Abstract No. 6, pp 13. In: National Conference on "MICROCOSMOS 2019" (NCM2019) at Dr. B. R. Ambedkar Institute of Technology, Port Blair, Andaman & Nicobar

### Popular

- Mooventhan, P., S. R. K. Singh, P. Venkatesan, Anil Dixit, K.C. Sharma, P. N. Sivalingam, Amit Kumar Gupta, Uttam Singh and Pankaj Kaushal. 2019. Happy seeder-A promising technology in conservation Agriculture. Harit Dhara, ICAR-IISS, 1(1&2): 27-29.

Mooventhan, P., R. K. Murali Baskaran, Anil Dixit, K. C. Sharma, P. N. Sivalingam, A. K. Gupta, Uttam Singh, Bhisham Sahu, Satish Xaxa and Pankaj Kaushal. 2019. FFP Annual Crop Calendar 8p.

### Success stories

(P. Mooventhan, Jagdish Kumar, Anil Dixit, K.C. Sharma, P.N. Sivalingam, Amit Kumar Gupta, Uttam Singh, S.R.K. Singh, P. Venkatesan, Pankaj Kaushal, 2019)

A total of six success stories under FFP have been prepared and reported to ICAR-ATARI, Jabalpur and ICAR-DKMA, New Delhi

- Promoting Grass pea (Kesari dal) cultivation in rice fallow to boost income of tribal farmers in Chhattisgarh
- Goat farming: An alternative lucrative business for tribal farmers
- Sustainable livelihood through high value Kadaknath poultry farming
- Azolla: The "super plant" for sustainable feed production
- Disease resistant Arka Rakshak tomato variety to solve farmer woes
- It's mushrooming income for resource poor tribal farmers