



NIBSM

NEWSLETTER

राष्ट्रीय जैविक स्ट्रेस प्रबंधन संस्थान

NATIONAL INSTITUTE OF BIOTIC STRESS MANAGEMENT

Baronda, Raipur - 493 225, Chhattisgarh



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Director's desk

The NIBSM Vision-2030 for the next fifteen years and Vision-2050 are under preparation. The various inputs that were received in the Consultation meeting of June 2013 are used to prepare the draft Vision-2030 document. The document provides overview of the future of biotic stresses that are anticipated in the ever-changing scenario of weather patterns and anthropogenic factors, including increased mobility of men and materials around the globe. The agricultural biosecurity has been focussed to be factored into the efforts to enhance productivity of national agricultural commodity production. The unregulated free-

movement of microorganisms, arthropods, larger vertebrates and such other organisms in crop, animal and fishery sector would cause unsuspected turbulence in the commodity production rhythm. Farmers concern in practising integrated farming system to sustain farm-profitability without major concern on the health of crops and animals is appreciated by the institute and its research programmes are garnered towards addressing such emerging problems.

Loss assessment due to biotic stresses in agriculture has been relying on 'guessed estimates'. Due to various factors, real-time assessment of actual commodity loss under biotic stresses in the agricultural seasons has been a challenge in the country. The institute propose to commence networked research in this area using GIS-GPS spatial data over time on violent episodes of damage to key crops as well as in animals (including fishery) that influence factor productivity of the geographic zone. The major perceived constraint is the absence of reliable methodology and tool-kit to assess farmers' economic loss in such episodes. Since these losses have also conjunctive impact of concurrently occurring or impactive pre-disposing abiotic factors during agricultural seasons, research methodology for studying factor-wise influence of every impacting abiotic and biotic factor need more attention. Using new scientific tools of computational mathematics, theories on natural biological processes and simulation science the institute propose to take up the grey areas by toning and sharpening of methodologies in scientific impact assessment of national loss in agriculture due to biotic factors.

Agricultural biosafety of the farming environment and commodity-consumers has arisen in recent times as major concerns in the country as also in the globe. The analysis on impact of agricultural processes for commodity production on the biosafety of farms as well as that on the commodity that are produced for consumption needs strong research support. The national need for developing and evaluating suitable methods in the assessment of perceived biosafety threats is viewed by the institute as a priority. The national aspiration to enact the agriculture biosecurity bill, 2011 and Biotechnology regulatory authority of India bill, 2013 in order to legally bring in necessary strength to agriculture is the background to make NIBSM imagine the need for future skilled and trained manpower requirement to service these sectors. It is contemplated that academic programmes in NIBSM for post-graduate and doctoral degree stream in the area of agricultural biosecurity, agricultural biosafety and agricultural biodiversity would fulfil such needs.

The rodent management campaign in Chhattisgarh proceeded according to the well-laid out pilot plan of NIBSM in Raipur and Dhamtari districts in the identified villages with the intense collaboration of Krishi Vigyan Kendras, line departments in agriculture and animal husbandry departments. The learning experience that these rabi campaigns offered provided insights into a) the need for strong state-planning on making available knowledge, rodenticide, and skilled farmers in every village to sustain the pre-season campaign (kharif, rabi and summer, as the case may be); b) study the impact assessment of such social-engineered campaigns on crops productivity and on zoonoses-freedom of animals / humans in rural set up and c) creation of farmer-driven, sustainable state-model that works at panchayat level to make farm-health the hub of factor productivity of integrated farming. The print media and All India Radio, Raipur supported this programme adequately.


T.P. Rajendran

Research highlights

The programme, 'Nutrition and biotic stress impact in agriculture' is taken up by the institute.

The following weed species were predominantly found during the cropping season of rice during 2014, among the grasses *Echinochloa colona*, *E. crusgalli*, *Paspalum distichum*; sedges like *Cyperus difformis*, *C. iria*, *Lindernia procumbens*, *Eliocharis sp.*; broad-leaves like *Marsilea quadrifolia*, *Ludwigia prostrate*, *Alternanthera sessilis*, *Commelina sp.*, *Cynotis auxillaris* were the important weeds observed. Avoidable crop loss estimation on rice yield in village farms due to these weed flora was 36.5 per cent.

Studies on biotic stresses under different crop nutrition profiles was initiated and undertaken through the following experiments. In order to unify the fertility levels of experimental plots in the first season of this project work and to sustain ideal soil organic carbon content, *dhaincha* (*Sesbania aculeata*) was green-manured in 4 ha area. Experiments showed that quick method of achieving 4.5 t/ha dry matter of dhaincha was spraying 1% cow urine at 10 day interval as against the normal dry matter yield of 3.5 t/ha.



Weed dynamics under varying applied N levels in *Swarna* rice variety was evaluated through graded reduction of soil-applied N doses. The control plots with zero nitrogen recorded maximum weed density, dry biomass with highest weed-diversity. The density and biodiversity of weeds decreased with increase in nitrogen regimes and was the lowest at 125% N plots. The optimum crop growth with applied N doses suppress weed flora and provided maximum grain yield of 6.78 t/ha against the lowest 3.12 t/ha under zero-N. The weed dominance was inversely proportional to weed density in these treatments.

Integrated foliar nutrition management and foliar nutrition management on rice were studied. The foliar application of 2% DAP, 1% Urea, 1% KCl, 1% K₂SO₄ and 1% cow urine at 10, 20 and 30 days interval throughout was evaluated for the spectrum and intensity of weed infestation in *Swarna* variety of rice. Weed flora reduction was the highest in 10 day-interval based application of 2% DAP, 1% Urea, 1% K₂SO₄ and 1% cow urine in comparison with control plots.

Comparative performance of recommended rice varieties for weed suppression ability based on their phenology and physiology; influence of integrated weed management on productivity and weed dynamics of transplanted rice and adoption behaviour of weeds in direct seeded rice with respect to management practices were studied. Tall-stature of rice variety has shown competitive weed-growth suppression over the short varieties. Weed dominance was more with tall stature varieties and density and dry biomass of weeds were higher with short stature varieties. Three hand weeding (HW) at 20, 40 & 60 days after transplanting (DAT) registered the lowest weed density followed by Bispyribac sodium 10 SL @25 g a.i./ha dose with 1 HW at 40 DAT.

VK Choudhary, Anil Dixit and TP Rajendran

Weed spectrum in direct seeded rice

Weeds are a substantial threat to the productivity to direct-seeded rice production. Weed flora, viz., *Echinochloa colona*, *E. crusgalli*, *Panicum repense*, *Digetaria siguanalis*, *Setaria glauca*; sedges like

Cyperus difformis, *C. iria*, *C. rotundus*, *Eliocharis sp.*, *Fimbristyllis miliacea*; broadleaf-flora; viz., *Ludwigia parviflora*, *Alternanthera sessilis*, *Celosia argensia*, *Marsilea quadrifolia*, *Ageratum conyzoids*, *Aschenmone sp.*, *Euphorbia geniculata*, *Cynotis auxillaris* were recorded in institute farm and rice farms of neighbouring villages. The crop management tools have crucial influence in minimising crop loss due to weeds and their physiological and reproductive strategy. Pre-emergence application of pyrazosulfuron 10 WP @ 25 g a.i./ha reduced the early emergence of broadleaves and sedges weeds, but sedges dominated in the subsequent rice phenology period. Fenoxaprop-p-ethyl 9.3 EC @ 60g ai/ha that reduced only the grassy weeds and reappearance of broad leaved weeds and sedges. Similarly, 2,4-D amine salt 58 EC @ 500 g a.i./ha dose significantly minimize the density and biomass of broad leaf weeds and the grassy flora proliferated in the experimental plots. Wide spectrum of weed flora was controlled by Bispyribac sodium 10 SL @ 25 g a.i./ha pre-emergence application and was comparable to two hand weeding at 30 and 55 days after sowing.

VK Choudhary and Anil Dixit

Non-efficacy to herbicides in weed flora of farm bunds

Merremia emarginata (Burm. F.) Hall. F. (Kidney-leaf morning glory; family : Convolvulaceae) growing in non-cropped area of institute farm exhibited resistance to Glyphosate 41 SL @ 1% along with 10 g of urea in 1litre water in *kharif* 2014. The only visible impact of herbicide application was showed mild discoloration on leaves and soon the plants became healthy. Further studies are in progress. It is also revealing to find that the Chinese apple (*Ziziphus mauritiana*) weed on bunds could be managed with stem application of 1% Glyphosate 41 SL.

VK Choudhary

Outreach programme on economic efficiency of rice weed management

Ludwigia prostrate was the dominant broadleaved weeds with 16.7% relative density and 21.3% relative dry weight followed by *Echinochloa colona* (11.9 and 15.8%, respectively) in various villages of rice farms at Gariyabandh, Dhamtari, and Janjgir Champa districts of Chhattisgarh state. Ready-mix herbicide formulation of Pretilachlor 6% + Pyrazosulfuron ethyl 0.15% GR at 10 kg/ha at 8-10 days after transplanting was applied in transplanted of 10 rice farms of these districts in order to evaluate the dynamics of these chemistries and weed flora diversity during *kharif* season. Increase of grain yield was 36.7% at Gariyabandh, 32.7% at Dhamtari and 39.6% at Janjgir-Champa with weed control efficiency of 56.3%, 67.9% 73.1% respectively in these districts. The farmers were demonstrated convincingly about the scientific use of combination herbicide formulation.

Anil Dixit and VK Choudhary

Centre of Excellence and Innovation in Biotechnology for Translational Centre for Molecular Epidemiology of *Listeria monocytogenes* commenced at NIBSM

The Centre of Excellence and Innovation in Biotechnology (CoE-IBTC) by Department of Biotechnology, Government of India for "Translational Centre for Molecular Epidemiology of *Listeria monocytogenes*" has been transferred to NIBSM. This project of Rs 2.3 cr is granted under multi-institutional network mode for five years since 2012. The collaborating institutes are: Indian Veterinary Research Institute, Izatnagar (Uttar Pradesh), ICAR Research Complex for NEH region, Barapani, Shillong (Meghalaya), Nagpur Veterinary College, MAFSU, Nagpur (Maharashtra). Listeriosis is an important bacterial zoonosis, which occurs in a variety of animals including humans, and arises mainly from the ingestion of contaminated food and water. It is serious invasive disease, which leads to septicaemia, abortion, stillbirth, perinatal infections, meningitis, gastroenteritis and meningo-encephalitis, especially in immune-compromised persons and those in contact with animals. Recently, the pathogen has been listed under Food Safety and Standards Act, 2011. Under the rules, it is now mandatory to look for the presence of the pathogen in foods to be exported and imported.

The central component will be the sequencing of genomes of representative clonally dominant Listeria strains from India, to

identify pathogenic traits associated with disease in livestock and humans. The establishment of diagnostic facilities would be helpful to provide backup to the Indian food industry in terms of risk assessment and risk analysis of foods thereby helping to avoid recall of consignments. The network emphasizes to encourage individual institutes to strengthen national surveillance of *Listeria* infection and to contribute to their strengthening by providing a model and specific tools for surveillance and investigation. The centre would generate data on virulence factors, ecological attributes and molecular epidemiology of *L. monocytogenes* in India. Screening wild type strains of *L. monocytogenes* from various sources will provide information regarding mechanism of adaptive physiology and potential strains having good immune-modulation. The cytokine production pattern and quantity of cytokine production will help us to understand host-parasite interaction during listeriosis. The project is expected to come out with a repository of *L. monocytogenes* that will be of value in development of diagnostic applications control strategies and future research. The significance of the project is to develop centres for diagnosis and research on *L. monocytogenes*.

The Project shall organize a number of well-designed training courses of two to three weeks duration each for veterinarians, medics, students and faculty both veterinary, medical streams and personnel from food industry during the course of the project. The topics are: Isolation and identification techniques for *Listeria monocytogenes*, Comparative genomics of *Listeria monocytogenes*, Molecular epidemiological techniques for detection and typing of food borne pathogens, Molecular sub-typing methods for food borne pathogens.

SB Barbuddhe

Print media coverage of institute activities

Navbharat covered the Social-engineered community rodent control campaign at Dhamtari for zoonotic disease management.



All India Radio, Raipur broadcast feature by the Officer on Special Duty on Social-engineered community rodent control campaigns for zoonotic disease management.

Events

NIBSM in the organisation of 23rd ICAR Regional Committee meeting of No.VII

The institute shared roles and responsibilities along with Central Institute of Cotton Research, Nagpur and Indira Gandhi Agricultural

University, Raipur to organise the 23rd meeting of ICAR Regional Committee No. VII during 17-18 October 2014. Shri Radha Mohan Singh, Union Minister of Agriculture inaugurated this meeting. He emphasized the role of Regional Committee in agricultural development of region and appreciated the efforts of National Agricultural Research and Education System in sustaining food grains production through district-wise contingent plans in the wake of deficit monsoon. The establishment of ICAR-NIBSM at Baronda in 2012 was a highlight of the speech of the dignitaries. Shri Raman Singh, Hon'ble Chief Minister, Chhattisgarh presided over the meeting. Sushri Kusum Mehdele, Hon'ble Minister of Animal Husbandry, Horticulture and Food Processing, Fishermen's Welfare and Fisheries Development Madhya Pradesh and Shri Brijmohan Agrawal Hon'ble Agricultural Minister of Chhattisgarh, Members of Parliament and Members of Legislative Assembly from Chhattisgarh participated in this meeting.



Speaking on the occasion, Dr. S. Ayyappan, Secretary, DARE and Director General, ICAR highlighted the major challenges faced by agriculture in Region VII and also briefed about the Council's preparations to counter the challenges. Agriculture Production Commissioner, Chhattisgarh, Agriculture Commissioner, Maharashtra, members of ICAR Society, Vice Chancellors and other senior officers of universities, ICAR officers - Deputy DGs, Assistant DGs, Directors, Project Coordinators, Heads of Regional Stations, non-government organisations participated in the two-day meeting to review the actions and to analyse and develop action points on current problems.

Social-engineered community rodent control campaigns for zoonotic disease management

The institute took up flag ship programme, "Rodent control for Zoonotic Disease Management in Chhattisgarh" that was launched by Hon'ble Governor of Chhattisgarh state in May 2014. NIBSM organised rodent management campaigns at Baronda village of Tilda tehsil on 20-21 December, 2014 and Bodara village of Dhamtari tehsil on 23-24 December, 2014. Well-structured social-engineered community campaigns by farm families of relevant villages were organized in collaboration with Department Agriculture, Central Integrated Pest Management Centre, Raipur and *Krishi Vigyan Kendra*, Dhamtari. The village community including local panchayat functionaries were acquainted on basic principles of rodent vector management, sensitizing the line-department (agriculture and animal husbandry) officials on the significance of rodents of agricultural fields as vectors as well as reservoirs of several zoonotic contagious diseases in animals and human beings such as Leptospirosis. Typical symptoms in animals as well as that of high fever with damage to liver and kidney due to infection in farm families were explained and illustrated. The programme received good media attention too.

Besides officers from development departments, Dr. T. P. Rajendran, Officer on Special Duty, NIBSM, Raipur, Dr. A.M.K. Mohan Rao, FAO Consultant and former Joint Director, (Vertebrate Pest Management), National Institute of Plant Health Management, Hyderabad, Dr. S.B. Barbuddhe, Dr. Anil Dixit, Dr. J. Mallikarjuna, Dr. V.K. Choudhary, Dr. Vinay Kumar, Dr. B.K. Choudhary, Dr. Mamta Tigga and Dr. Lata Jain were involved in the campaigns to educate farmers of the various processes of rodent control through field poisoning of active burrows and impact assessment of treatment including analysis of fresh activity and damage in crops.



हिन्दी राजभाषा कार्यान्वयन

संस्थान की राजभाषा कार्यान्वयन समिति द्वारा वर्ष भर संस्थान में हिन्दी राजभाषा की उपयोगिता बढ़ाने एवं निरंतर प्रगति हेतु अनेक उपाय किये गये। समिति अपने सीमित साधनों के बावजूद अपने दायित्व को पूरा करने के लिए सतत् प्रयत्नशील है। समिति के प्रयासों के परिणामस्वरूप ही संस्थान के विभागों/अनुभागों में हिन्दी में कार्य करने के लिए जो उत्साह पैदा हुआ है वह निःसंदेह राष्ट्रीय गौरव एवं स्वाभिमान का विषय है। भारत सरकार की राजभाषा नीति के अनुसार संस्थान द्वारा संपादित कार्यों में हिन्दी का कार्यान्वयन सुनिश्चित करने के लिए गृह मंत्रालय, राजभाषा विभाग द्वारा जारी राजभाषा वार्षिक कार्यक्रम वर्ष 2014-15 में दिये गये निर्देशों के अनुसार कार्यवाही के लिए सभी अनुभागों को राजभाषा संबंधी नियमों/निर्देशों से अवगत कराया गया तथा इन नियमों के अनुसार कार्यवाही सुनिश्चित करने का अनुरोध किया गया।

हिन्दी पखवाड़ा का आयोजन

संस्थान में राजभाषा कार्यान्वयन समिति के अध्यक्ष डॉ. अनिल दीक्षित, प्रधान वैज्ञानिक द्वारा दिनांक 14 सितम्बर से 30 सितम्बर 2014 तक हिन्दी पखवाड़ा का आयोजन किया गया। जिसमें कार्यालय के समस्त अधिकारियों/कर्मचारियों ने भाग लिया।



Swachha Bharat Mission implemented by ICAR-NIBSM

The ICAR-NIBSM Raipur participated in the nationwide programme on 2nd of October 2014. The Swachhata Shapath was taken by all the staff members. Dr Anil Dixit, Principal Scientist administered the Cleanliness Oath to all the employees. Thereafter all the staff carried out the cleanliness of the institute premises.



Physical infrastructure

Compound wall construction is under completion. The four campus buildings, viz., office, laboratory and two quarters for accommodating scientists with research laboratories are under renovation to facilitate adequate working space for the scientists and administration staff. These buildings are expected to be ready by first quarter of 2015.



Human resource

The following scientists joined the institute during this period.

Dr Vinay Kumar, Scientist (Agril. Biotechnology) on 7th July, 2014 on transfer from ICAR - Directorate of Medicinal & Aromatic Plant, Anand (Gujarat).

Dr Lata Jain, Scientist (Veterinary Microbiology) on 12th August, 2014 on transfer from ICAR - Indian Veterinary Research Institute, Bareilly (U.P.).

Dr Binod Kumar, Scientist (Fisheries Science) on 17th November, 2014 on transfer from ICAR Research Complex for Eastern Region, Patna (Bihar).

Dr Mamta Tigga, Scientist (Veterinary Pathology) on 17th November, 2014 on transfer from ICAR - NRC for Equines, Hisar (Haryana).

Visitors to the institute

Dr S. Ayyappan, Director General, ICAR visited the administrative office of the institute on 18th November, 2014 and provided valuable guidance on the manner of setting up various sections in the institute administration and finance.

Dr P. Minhas, Director, ICAR-NIAM, Baramati visited on 16th October while Dr Shashank Maurya, Assistant DG (IP & TM), Dr A.K. Vasisht, Assistant DG (PIM) and Shri Devendra Kumar, Director (Finance), ICAR visited the institute on 18th November 2014 and provided valuable suggestions on campus development, while appreciating the quality of construction of compound wall of 40 ha plot.

Recognition to scientist

Dr Anil Dixit, Principal Scientist (Agronomy) received the Fellowship of Indian Society of Agronomy for his outstanding contribution in the field of Agronomy. He was awarded the best presentation award during 7th Indian Seed Congress from 25-27 September 2014 at Bhopal on Role of biotic stress management in quality seed production.

Edited and compiled by :- **Dr. T.P. Rajendran, Dr. Anil Dixit and Dr. V.K. Choudhary.**

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