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IN THIS ISSUE

Theme Article Page 2 - 5
Importance of Stored Grain Pests in International trade and food security

Special Event Page 6 - 8

- Special Event: RKVY project
- New Initiatives
- Workshop on Regulating Agricultural Biotechnology
- US-INDIA-AFRICA Triangular International Training Programme
- Induction Training Programme
- Special Training Programmes

Capacity Building Page 9 - 13

- Plant Bio-security
- Plant Health Management
- Vertebrate Pest Management
- Plant Health Engineering
- Pesticide Management

Around the World Page 14

- Plant Health Awareness Programme - New Initiatives

Alumni Forum Page 15

NIPHM Activities Page 16

From the Director General's Desk



Mrs. V. Usha Rani, IAS
Director General

Storage of food grains is an important component of food security. In India, about 40 million tonnes of food grains are stored as a buffer stock to manage any unforeseen eventuality. Stored grain pests cause both qualitative and quantitative loss in stored grains and at times may render the grains unfit for human consumption. In India, the surplus food grains are stored and maintained by Food

Corporation of India, Central Warehousing Corporation, State Warehousing Corporations and Grained Marketing cooperatives. Though, India is surplus in cereal grain production, it imports about 3 to 4 million tonnes of pulses every year to meet the domestic requirement. It is estimated that about 12 to 16 million tonnes of food grains are lost every year and insect pest infestation is one of the important factor in postharvest loss of grains. India is emerging as a leading exporter of cereal grains and tops in export of rice (11 million tonnes), Wheat (anticipated export target of 10 million tonnes) and Maize (4-5 million tonnes) every year. Stored grain pests not only affect the quality of the grain stored for food security but also adversely affect the export trade. Many countries impose stringent phytosanitary regulations to prevent the potential threat posed by Khapra Beetle (*Trogoderma granarium*) and mandate phytosanitary treatment with high dosage of Methyl Bromide fumigation. Many pests of quarantine significance such as *Sitophilus granarius*, *Prostephanus truncates* and many bruchids are not known to occur in India and efforts must be made to prevent their entry through bulk import of pulses into India. The National Institute of Plant Health Management is organizing capacity building programmes in the area of Stored Grain Pests Detection, Identification and Management for various stake holders specifically Food Corporation of India, Central Warehousing Corporation, State Warehousing Corporation, Phytosanitary Certificate Issuing Authorities and Plant Quarantine Officials. Several programmes of various durations (i.e. 5 days, 15 days and 21 days) are scheduled during the current year to promote awareness and develop skills on Detection, Identification and Management of Stored Grain pests to ensure food security and promote safe exports. It is hoped that various functionaries from CWC, FCI and Quarantine officials & Phytosanitary Certification Authorities take advantage of these programmes to equip themselves with skills and competency.

(Smt. V. Usha Rani, IAS)
Director General

Theme Article

Importance of Stored Grain Pests in International trade and food security

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Introduction and scope

Agriculture is an important sector of the Indian economy, accounting for 14% of the nation's GDP, about 11% of its exports, about half of the population still relies on agriculture as its principal source of income and it is a source of raw material for a large number of industries. During 2011-12, India reached 259.32 million tonnes of food grain production. (State of Indian Agriculture, 2012-13). Population explosion, shrinkage of cultivable land along with grain losses is a major problem in a developing country like India.

Storage of food grains is a complex system where grains move from farmer to processors and from processors to consumers. Managing stored grain with minimum loss and maintaining its quality is a major concern at all stages. Safe storage of grains is a problem in almost all the tropical areas due to high humidity and warm climate. Storage of cereals, oil seeds, pulses and food products is associated with the losses in terms of quality, quantity, viability and market values.

The post-harvest losses in India amount to 12 to 16 million metric tons of food grains each year, an amount that the World Bank stipulates could feed one-third of India's poor. It is reported that high wastage and value loss are due to lack of storage infrastructure. Quantity losses occur when insects, rodents, mites, birds and microorganisms, consume the grain. Infestation causes reduced seed germination, increase in moisture, free fatty acid levels, and decrease in pH and protein contents etc. resulting in total quality loss. Quality losses affect the economic value of the food grains fetching low prices to farmers.

The much-deserved attention falls on minimising the magnitude of post-harvest losses in order to cope with current and future demand and attain a state of food security.

The role of storage in the economy

In most countries grains are among the most important staple foods. However they are produced on a seasonal basis, and in many places there is only one harvest a year, which itself may be subject to failure. This means that in order to feed the growing population, most of the global production of maize, wheat, rice, sorghum and millet must be held in storage for periods varying from one month up to more than a year. Grain storage therefore occupies a vital place in the economies of developed and developing countries alike and important component of food security.

In India, about 70% of farm produce is stored by farmers for

their own consumption. Farmers store grain in bulk, using different types of storage structures made from locally available materials. The pre-treatment necessary for better storage life is cleaning and drying of the grain, but storage structure design and its construction also play a vital role in reducing or increasing the losses during storage. Storage losses constitute a major share of food grain loss in postproduction operations.

When scientifically constructed storage structures are available, it is essential that the grain being loaded is of good quality. Therefore, the grain is cleaned to remove impurities, fungus infestation, and rotten seeds, and then dried to a safe storage moisture level. High grain moisture content due to high atmospheric humidity generally above the safe moisture levels (14% for paddy, 13% for milled rice, 12% for wheat, 10% for oilseeds and 9% for pulses) are key factor which will affect grain storage.

In India, surplus food grains are accumulated in the warehouses owned by the Food Corporation of India (FCI), the Central warehousing corporation (CWC) or the State warehousing corporation (SWCs). They have a network of storage depots; include silos and an indigenous method developed by FCI, called Cover and Plinth (CAP).

The main agencies storing surplus grain, and the amounts involved are :

- FCI-7.7 million tonnes (Mt)
- Central Warehousing Corporation 2 Mt
- State Warehousing Corporation-24 Mt
- Grain marketing cooperatives-4.5 Mt
- Some state governments 1.9 Mt.

The Importance of stored grain pests

Insects occupy a key position among all causal agents of stored grain loss. About 500 species of insects have been found to be associated with stored grain products, which belongs to the coleopterans (beetles and weevils), and a few species of lepidopteron (moths), psocopterans (psocids or booklice) and mites. Tropical and subtropical warm and humid climatic conditions in India are very congenial for insect and mite pests to multiply and cause considerable storage losses.

Sources of Infestations

- Infestations of stored grain pests initiate from migration of the insects from previous inoculum to the fresh grains. All species of stored-grain insects have wide host range on which they survive when grains are not available. However, large amounts of stored grain are attractive to

these pests, and they invade the bins through any available opening.

- Other common sources of stored-grain insects are old grain, grain spills, feeds, seed, old gunny bags, insect infested transport vehicles, and grain debris. Insects often move to new grain from carryover grain, from grain not cleaned from “empty” bins, from feed- supply buildings, and from grain debris beneath perforated bin floors.

Impacts of Infestation –

Infestation of stored products by insects results in a variety of damage and economic loss including -

- Physical loss of commodity – by direct consumption
- Spoilage and loss of commodity quality –down grading because of grain damage and nutrition loss
- Waste of effort taken in growing, handling, manufacturing and storing commodities which are destroyed by insect infestation.
- encouragement of mould growth – including of mycotoxins producing fungi.
- Rejection of infested commodities by consumers
- Costs associated with application of measures to control and prevent infestations
- Risks to health, safety and the environment relating to use of pesticides and fumigants.

- Restriction of trade and damage to economies and the environment caused by inadvertent introduction of “exotic” pest species.

















The stored grain pests are very small in size, average adult size being 3-5 mm and are cryptic and therefore, they go unnoticed when present in low numbers. They are highly prolific in that several generations occur in a year.

The insect infestation adversely affects the quality of stored products, renders the stored grain unfit for human as well as animal consumption. Each country has fixed its own tolerance levels for the presence of live or dead insects, insect fragments and uric acid content in grains and milled products. In India, as per the Food Safety and Standards Act, 2006, the uric acid level in food commodity should not be exceed 100 mg/kg and number of weeviled grains (Kernels that are partially or wholly bored by insects injurious to grains but does not include germ eaten grains and egg spotted grains) should not be exceed 3-10 % by count.

All types of food commodities like cereals, pulses, spices, oil seeds and other stored food products are prone to insect pest attack during storage. Following are the major pests of cereals, pulses, oil seeds, oil cakes, meals and dry fruits and nuts -

Common Insect Pests of Stored products

Scientific name	Common name	Scientific name	Common name
Cereals		Oil seeds, oil cakes, meals	
<i>Trogoderma granarium</i>	Khapra Beetle	<i>Caryedon serratus</i>	Groundnut bruchid
<i>Sitophilus oryzae</i>	Rice weevil	<i>Oryzaephillus surinamensis</i>	Saw-toothed grain beetle
<i>Rhyzopertha dominica</i>	Lesser grain borer	<i>Trogoderma granarium</i>	Khapra Beetle
<i>Tribolium castaneum</i>	Red flour beetle	<i>Corcyra cephalonica</i>	Rice Moth
<i>Oryzaephillus surinamensis</i>	Saw-toothed grain beetle	<i>Plodia interpunctella</i>	Indian Meal Moth
<i>Cryptolestes spp.</i>	Rusty grain beetles	<i>Ephestia cautella</i>	Tropical warehouse moth
<i>Sitotroga cerealella</i>	Angoumois grain moth	Dry fruits and tree nuts	
<i>Ephestia cautella</i>	Tropical warehouse moth	<i>Oryzaephillus surinamensis</i>	Saw-toothed grain beetle
<i>Corcyra cephalonica</i>	Rice Moth	<i>Lasioderma serricorne</i>	Cigarette beetle
<i>Plodia interpunctella</i>	Indian Meal Moth	<i>Trogoderma granarium</i>	Khapra Beetle
Pulses		<i>Ephestia cautella</i>	Tropical warehouse moth
<i>Callosobruchus maculatus</i>	Cowpea beetle	Spices	
<i>Callosobruchus analis</i>	Cowpea beetle	<i>Lasioderma serricorne</i>	Cigarette beetle
<i>Callosobruchus chinensis</i>	Adzuki bean weevil	<i>Stegobium paniceum</i>	Drugstore beetle
<i>Sitophilus oryzae</i>	Rice weevil	<i>Tribolium spp.</i>	Flour beetle

Common Insect Pests of Stored products			
			
<i>Trogoderma granarium</i>	<i>Oryzaephilus surinamensis</i>	<i>Callosobruchus analis</i>	<i>Corcyra cephalonica</i>
			
<i>Sitophilus oryzae</i>	<i>Lasioderma serricorne</i>	<i>Callosobruchus chinensis</i>	<i>Plodia interpunctella</i>
			
<i>Rhyzopertha dominica</i>	<i>Stegobium paniceum</i>	<i>Callosobruchus maculatus</i>	<i>Sitotroga cerealella</i>
			
<i>Tribolium castaneum</i>	<i>Cryptolestes spp.</i>	<i>Caryedon serratus</i>	<i>Ephestia cautella</i>

Pest risk during grain import

Increasing trade in stored grains and stored products is causing alarming biosecurity concerns. The international grain movement is increasingly becoming a contentious issue both for biosecurity protection and market access negotiations.







Stored grain pests of quarantine importance play a vital role, in their being absent or present in consignments. The import of grains such as peas, pulses, rice, wheat, maize, oats and other stored products from various countries is regulated under the Plant Quarantine Order, 2003. The destructive stored grain pests like *Trogoderma variabile*,

Sitophilus granarius, *S. zeamais*, *Prostephanus truncates* (Larger grain borer) *Acanthoscelides obtectus*, *Ahasverus advena* (Foreign grain beetle), *Bruchus spp.* and *Ephestia elutella* are not occurring in India and are the pest of quarantine concern to India.

Export impediments

India is having huge potential to export basmati and non-basmati rice, maize, soymeal & wheat. India exports wheat to South Korea, Indonesia, Bangladesh, Thailand and Malaysia etc. Indian wheat draws lesser price than that of Australia and Ukrain due to quality issues. Most of them are related to stored grain pests i.e. Khapra beetle, rice weevil, Indian meal moth etc.

Stored Grain Pests of Quarantine concern to India

		
<p><i>Trogoderma variabile</i></p>	<p><i>Prostephanus truncates</i> (Larger grain borer)</p>	<p><i>Sitophilus granarius</i></p>
		
<p><i>Ahasverus advena</i> (Foreign grain beetle)</p>	<p><i>Acanthoscelides obtectus</i></p>	<p><i>Sitophilus zeamais</i></p>

Many countries enforced strict phytosanitary restriction regime if the Khapra beetle infestation is suspected. In USA, when it was accidentally introduced an emergency eradication plan was executed and the pest was eradicated at a cost of US\$ 15 million in 1981. Countries like Vietnam subject grain imports from India to the mandatory MBr fumigation at abnormally high dosages of 80-100 g/m³ for 48 hrs..

The mere presence of insects even dead, like that of Khapra beetle, results in serious setback in international trade of stored grains and products. The detection of such pests and precise identification is essential to determine the appropriate Phytosanitary treatment so as to have a safe passage to the traded commodities. Fumigation by and large is the most accepted Phytosanitary treatment. In India, fumigation with Phosphine and methyl bromide are accepted phytosanitary treatments.

The various personnel involved in warehouse management, export, import, extension, treatment,

quarantine regulation, research, training and teaching must be aware and possess adequate knowledge and skills on detection and identification of stored grain pests and their management.

NIPHM is mandated to build capacity in these areas and conducts regular 21 day duration training programme for this purpose. The training programme has two built in sub-modules viz. (i) Stored Grain Pests-Detection and Identification (ii) Phytosanitary Treatment (MBr& ALP) which run concurrently with 21 day programme. Modular approach is adopted so as to facilitate stakeholders to opt for appropriate module or for entire course depending upon their role and need. Further, Food Corporation of India (FCI), Central Warehousing Corporation (CWC) and State Warehousing Corporations being the major stakeholders for storing the good grains, an exclusive programme of 6 days duration on Stored Grain Pest Management is being regularly organizing by the NIPHM.

Special Event: RKVY project implementation in Meghalaya

Department of Agriculture, Govt. of Meghalaya in collaboration with NIPHM has taken an initiative through a RKVY project on "Adoption of AESA based Biointensive Pest Management Strategies". The collaboration aims to promote decentralized Biocontrol Agents and Biopesticides Production Centres through Farmer Self Help Groups and has been initiated under RKVY project in Meghalaya".

Under this initiative NIPHM has organized three training programmes at NIPHM and provided training to 32 Agriculture/Horticulture officers from 10 districts of Meghalaya. Additionally four farmers training programmes were organized from 3 to 7 August 2015 and trained 106 farmers along with master trainers in 4 districts of Meghalaya viz. Pynthorwah, Jowai in West Jaintia Hills, Lyngkien (Mylliem C & RD Block) in East Khasi Hills, Bynther, Jowai in West Khasi Hills, Syiem in Ri-Bhoi District, and at



MAMETI, Shillong. Farmers were trained in AESA in conjunction with Ecological Engineering for Pest management through on-farm production of biocontrol agents and



microbial biopesticides. During the programmes farmers were also provided hands-on training in on-farm mass production techniques of *Trichoderma* and *Pseudomonas*. These techniques can easily be adopted with minimal facilities at low cost at farmer's doorstep.

During the visit, it was observed that some of the farmers have started on-farm mass production and using *Trichoderma* in vegetables, spices and ornamental crops.



New initiatives: Popularization of "On-farm production and Biocontrol Agents, Microbial Biopesticides and biofertilizers among farmers" through the officials of Biocontrol Laboratories in Telangana State and Andhra Pradesh on 23.09.2015.

Under the Chairmanship of Smt. V. Usha Rani, IAS, Director General NIPHM, two separate meetings were organized with the officials of Biocontrol Laboratories situated in Telangana State and Andhra Pradesh on 22nd and 23rd September, respectively. 16 officials from Telangana and 21 from Andhra Pradesh actively participated. The meeting aimed for popularization of "On-farm production and Biocontrol Agents, Microbial Biopesticides and biofertilizers among farmers" through the officials of state biocontrol

laboratories with the technical support of NIPHM. In the meeting it was discussed and decided that, initially the officials from each district will initiate the on-farm production of *Trichoderma* and *Pseudomonas* with five farmer's per district, separately. The mother cultures of the BCA, MBP & BF will be supplied free of cost by NIPHM to the farmers directly through the BC laboratories in Andhra Pradesh while in Telangana through BC lab Rajendranagar to subsequent BC laboratories.



Workshop on Regulating Agricultural Biotechnology: India and International Perspectives (10th – 12th , September 15)

A three-day workshop on “Regulating Agricultural Biotechnology: India and International Perspectives” was organized at NIPHM in collaboration with the Department of Biotechnology and the United States Department of Agriculture (USDA). The programme aims to strengthen the human resource involved in Biotechnology Regulations especially Genetically Modified (GM) crops.

The workshop broadly covered the legal framework of biotechnology regulations, principles and practices of scientific risk assessment in terms of food and environmental issues, conduct of field trials, monitoring and compliance of regulations. 48 participants including Indian and International delegates from State Agriculture/Horticulture Departments, State Agricultural Universities, ICAR, NIPHM and private industries participated in the workshop.



A 3-day International Training Programme on 'Plant Health Management for Executives (Extension Practitioners) from Kenya, Liberia, and Malawi under the 4th US-INDIA-AFRICA Triangular International Training Programme' (7, 8, and 14 August, 2015)

A 3-day international training programmes for Executives (Extension Practitioners) from Kenya, Liberia, and Malawi under the Fourth US-INDIA-AFRICA Triangular International Training Programme' was conducted. 31 participants were imparted training on practice of new pest management concepts such as agro-ecosystem analysis (AESA) and ecological engineering (EE) for managing pests in crops especially in rice ecosystem. They were imparted training on mass production of a host insect, *Corcyra* and important biological control agents such as *Trichogramma*, *Bracon*, *Chelonus*, *Chrysoperla*, *Goniozus*, spider, reduviid bug, entomopathogenic nematodes etc. as well as mass production of microbial biopesticides such as *Trichoderma*, *Pseudomonas* etc. They were also exposed to the plant

biosecurity concepts, pest surveillance, pest risk analysis, phytosanitary treatments, low cost fruit fly trap and lure preparation. The participants were trained in integrated rodent pest management, safe and judicious use of pesticides, international regulations on distribution and use of chemical pesticides.



Refresher Training Programme on Agripreneurship in Sustainable Agriculture under Agri-Clinics and Agri-Business Centres Scheme (06 to 10 July, 2015)

A training programme was conducted in which 22 participants were educated on new concepts of pest management i.e. agro-ecosystem analysis for plant health management and ecological engineering for pest management. They have been given hands-on experience on mass production of various biological control agents, microbial biopesticides and biofertilizers. They were also trained in vermicompost preparation, seed treatment with

microbial biopesticides (biopriming), fruit fly trap and lure preparation, pesticide application techniques, rodent pest management etc.



Induction Training Programme (6th to 18th July, 2015 & 18th to 29th August, 2015)

The agricultural extension officials play an important and vital role in implementing various government programmes /policies aimed to benefit the farmers in sustainable agricultural production. In view of this, NIPHM and MANAGE have jointly initiated induction training programme to newly recruited Agricultural /Horticultural



extension officers. The programme is designed with various aspects of Plant Health Management with special focus on farm level mass production of biocontrol agents, biopesticides and mycorrhiza biofertilizers, principles of biosecurity and Extension management skills, marketing, work ethics, etc. The duration of the training programme is of two weeks (8 days at NIPHM and 5 days at MANAGE). During the quarter, two training programmes were organized in which 48 newly recruited Agricultural Officer from Department of Agriculture, Tamil Nadu participated.

“On- farm production of bio control agents and microbial bio pesticides in conjunction with AESA and Ecological Engineering for Pest Management” Training at Gobichettypallayam, Erode District, Tamil Nadu (12th to 14th August, 2015)

National Institute of Plant Health Management (NIPHM) has organized 3 day training –cum-demonstration programme on “On-farm production of bio control agents and microbial bio pesticides in conjunction with AESA and Ecological engineering for pest Management” to the farmers groups of Erode District. A total 48 farmers from different villages were trained on farm level mass production technologies of bio-pesticides (includes *Pseudomonas*, and *Trichoderma viride* production) and bio control agents (*Trichogramma*, *Bracon*, redvid bug and spiders).



CROPSAP Training: 'On-farm production of bio-agents to promote AESA based PHM

Considering various factors responsible for onset and spread of



the pests, it has become necessary to monitor the pests regularly in order to avoid recurrences of pest outbreak in the country. For creating awareness among farmers and real time advisory to bridge the gap in Research and Extension machinery and to develop a scientific approach to pest surveillance system, a comprehensive project on Crop Pest Surveillance and Advisory Project (CROPSAP) was initiated by the Govt. of Maharashtra. Under this project, Department of Agriculture has deputed field level officials to NIPHM for specific training in Plant Health Management. During the training course, participants were imparted with knowledge and skill in Agro Ecosystem Analysis (AESA) based IPM, Ecological Engineering for PHM, Mass production of biopesticides, predators & parasitoids, on-farm production techniques of Biocontrol Agents, mycorrhiza, field observations, etc. Under this project, NIPHM has organized 3 training programmes on 'On-farm production of bio-agents to promote AESA based PHM' for sustainable agriculture. The programmes was organized in three batches from 31 August to 04 September 2015, 07 to 11 September 2015, and 14 to 18 September 2015 (5 days each). The programme was attended by total 76 Agriculture Assistants working in IPM Villages of Maharashtra State.

visit of European Union Capacity Building Initiative for Trade Development in India (CITD) Experts

Capacity Building Initiative for Trade Development in India (CITD) of European Union in India aims to strengthen the capacities in the area of Food Safety and SPS. The CITD expert Mr. Bellmann visited NIPHM Pesticide Residue Laboratory to access the infrastructure facility and technical capabilities available at NIPHM.

The CITD recognized NIPHM as Proficiency Testing Centre (PT) for APEDA and EIC recognised laboratories. Further Mr. Franck Boccas visited NIPHM on 22.09.2015 to develop outline of the project.

Capacity Building

International Training Programme on Pest Risk Analysis (6th - 10th July & 3rd - 8th September, 2015)

Pest risk analysis (PRA) is a science based tool to tackle the alien pests of concern to any nation while facilitating international trade. PRA is a process which helps to assess the risks of entry, establishment, spread & impact potential of exotic pests. PRA identifies phytosanitary measures to prevent the introduction of entry of an exotic pest. The international standards brought out by IPPC serve as guidance for carrying out PRA. Two training programmes on 'Pest Risk Analysis' were conducted during this quarter. Six international participants from South Africa and Zambia and 5 national participants from Gujarat, Tamil Nadu, Karnataka, Bihar, Jammu and Kashmir were trained.



In the national training programme nineteen participants from Maharashtra, West Bengal, Manipur, Telangana, Madhya Pradesh, Andhra Pradesh, Assam, Uttar Pradesh, Chhattisgarh were trained.

Orientation for Phytosanitary Certificate (PSC) Issuing Authority (17th - 22th August, 2015)

Phytosanitary certification is one of the basic measures employed to prevent global movement of plant pests through trade of agricultural commodities. Phytosanitary certificates are issued by the exporting NPPO after carrying out inspection, sampling, testing and treatment (if required) to promote safe trade. To promote export,

Ministry of Agriculture and Farmers Welfare has notified more than 155 public Officers of Central/State Government, ICAR institutes and SAU's for carrying out phytosanitary certification.



The training programme was organized for 19 officials from Rajasthan, Karnataka, Maharashtra, Meghalaya, Madhya Pradesh, Assam, Punjab, Chhattisgarh, Manipur, Andhra Pradesh, Uttarakhand and Uttar Pradesh. They were imparted knowledge on international regulations, obligations under IPPC to promote safe agricultural trade, the role and responsibilities of NPPO and PSC issuing authorities. They were also introduced to on-line PQIS software and pests of quarantine concern to importing countries. The importance of PFA /ALPP in export promotion and role of phytosanitary treatments for mitigating the pest risks as per the Standard Operating Procedures for Phytosanitary Certification were explained.

Forced Hot Air Treatment (24th - 28th August, 2015)

The packaging material is one of the most threatening pathways for incursion of timber pests across the globe. Forced Hot Air Treatment (FHAT) is one of the approved treatments for packaging material under ISPM -15. National Standard for Forced Hot Air Treatment (NSPM-9) has been developed which prescribes treatment procedures and the steps to register the facility. It is essential to certify the FHAT facilities to ensure that wood packaging material is treated and marked in consistence with the provisions of ISPM -15.



NIPHM offered a specialized training programme on FHAT for industry stakeholders, Eighteen participants from Tamil

Capacity Building

Nadu, Telangana, Punjab, Haryana, Maharashtra, Kerala, Uttar Pradesh and Karnataka were trained in FHAT programme.



The participants learnt critical requirements for establishing FHAT facilities, calibration of sensors, placement of sensor, identification of coolest point, safety precautions, conducting the treatments, use of appropriate mark and record keeping in accordance with ISPM – 15 and NSPM – 9. The participants also learnt the pests associated with wood packaging materials.

Quarantine Pests: Detection and Identification (1st to 21st September, 2015)

Insect pests cause great damage in field and storage and hence are considered as threat to biosecurity. Reliable detection methodologies and accurate and timely diagnosis is paramount in identification of insect pests of quarantine concern to prevent their entry, establishment and spread in India.

In the training programme, participants were trained in the concepts of quarantine, regulated pests, international regulations and conventions and important pests of quarantine significance to India. The training imparted hands on experience in both conventional and advanced pest detection methods.

Quarantine Pathogens: Seed health testing methods and molecular diagnostic techniques (7th – 14th September, 2015)

Plant pathogens detection and identification forms the basis for measures to be initiated for eradication, mitigation or management of the pest. A ten days training programme was organized in which 10 participants from Kerala, Chhattisgarh, Karnataka, Madhya Pradesh and Telangana were trained. The participants were exposed to various methods in detection and identification of seed borne plant pathogens, stored grain pests and weeds. Participants were also trained in different diagnostic methods viz., blotter test, agar plate method, ELISA and PCR.

“Plant Biosecurity and Plant Health” for Spice Board Officers (21st - 26th September, 2015)

The Indian spices have an immense export potential. During 2014-15, Indian spices and spice products were exported to the tune of 8, 93,920 tons, valued Rs.14899.68 crore

(US\$2432.85 Million). However, the spices export face many sanitary and phytosanitary issues. Domestic consumption is also on rise and the consumer health has become a priority.



NIPHM, being the apex capacity development institute in the country, took a proactive role in identifying the critical issues for spice production and marketing in consultation with the Spices Board. A special training module was developed by NIPHM integrating various issues involved in production, protection and market access including Sanitary and Phytosanitary issues. The first batch of 23 officers were trained from 21-26 Sep 2015.

Area-wide fruit fly management training (21st -30th, September 2015)

Tephritid fruit flies are responsible for losses in fresh produce as well as considered as major impediment in export of economically important fruits and vegetables. NIPHM organized a 10 days training programme on 'Area-Wide Management of Fruit Flies' for 15 officers of State Department of Horticulture, Tamil Nadu. The participants trained on fruit fly biology, classification, fruit fly identification, exotic fruit flies and their paths of entry & fruit fly surveillance. More emphasis was given on pre-harvest management of fruit flies by employing cultural control, trapping by using baits and lures, biological control agents and sterile insect technique for area-wide management of fruit flies. The participants were also exposed to the strategies to promote export of fresh produce by employing postharvest management measures including phytosanitary treatments and pest free area concept. Practical sessions included preparation of low-cost bottle trap and ME & Cue



Capacity Building

lure, establishment of traps in the field and collection and identification of fruit flies. Interactive exercises on exclusion of exotic fruit fly requirement of traps, lures, human resource etc., for area-wide management of fruit flies were part of the training programme.

On-farm production of biocontrol agents and microbial biopesticides to promote AESA based plant health management in conjunction with Ecological Engineering for pest management” : RKVY-Project (Meghalaya) (24th Aug to 2nd Sept, 2015)

An exclusive programme was organised for 7 officials from Meghalaya under RKVY project. In addition, two exclusive programmes were organised under NIPHM-MANAGE collaboration and trained 34 officials

The aim of the programme is to create a pool of master trainers in on-farm production of biocontrol agents and microbial biopesticides to promote AESA based plant health management in conjunction with Ecological Engineering for Pest Management. Officers were trained in on-farm production of parasitoids viz., *Trichogramma*, *Chelonus*, *Goniozus*, *Bracon* and predators such as Reduviids, Spiders and microbial Biopesticides such as *Trichoderma*, *Pseudomonas*, Entomopathogenic fungi and Entomopathogenic Nematodes (EPN), & biofertilizers including VAM vermicomposting and fruit fly traps.



Integrated Soil Nutrient and Weed Management (ISNWM) (24th -30th August, 2015)

The training programme was organized for 14 participants from different states viz. Uttar Pradesh, Andhra Pradesh, Tamil Nadu and Karnataka. They were trained in AESA, ecological engineering, living soil concept, improvement of rhizosphere for enhancing soil microbial activities, integrated nutrient management, Integrated Weed

Management and weed vegetation analysis. During the course, participants were exposed to techniques of safe and judicious use of pesticides, hands-on-practical on farm level mass production of BCAs, Biopesticides and mycorrhiza.

“On- farm Production of Biocontrol Agents and Microbial Biopesticides” (31st July to 5th Sept & 7th to 12th Sept, 2015)

Two training programmes were organized to train the B.Sc. Ag. final year students from University of Horticultural



Sciences, Bagalkot, Karnataka. A total of 76 students were imparted skills in on-farm production of BCAs and microbial biopesticides. They were provided hands-on experiences in production of biocontrol agents viz. *Trichogramma*, *Chelonus*, *Goniozus*, *Bracon*, Reduviids, Spiders and *Trichoderma*, *Pseudomonas*, Entomopathogenic fungi and Entomopathogenic Nematodes (EPN), VAM, vermicomposting and fruit fly traps. The participants were given knowledge in implementing effective extension services.

Economic Importance of Plant Parasitic and Entomopathogenic Nematode (21st-25th September, 2015)

Plant parasitic nematodes are the most important and difficult to manage pests of agri-horticultural crops. Changing climate and agricultural practices are leading to resurgence of nematode problems in newer crops and geographical localities. Due to the lack of synthetic chemical nematicide, and inadequacy of the management approaches, there is an urgent need to organize awareness



Capacity Building

training programme. Further, there is a need to develop environmentally and economically viable nematode management options using modern biological tools and techniques. Hence, NIPHM has organized a training programme on “Economic importance of plant parasitic and entomopathogenic nematodes”. The objective of the training programme was to provide practical based knowledge on Plant Parasitic and Entomopathogenic Nematodes. A total of 15 participants from various states such as Manipur, Haryana, Madhya Pradesh and Tamil Nadu were trained on a wide range of basic and applied topics related to plant parasitic nematodes and entomopathogenic nematodes. Use of Entomopathogenic nematodes as a bio control agents in Insect pest management, their mass production and application technologies were also explained.



Appropriate Pesticide Application Techniques and Farm Level Storage Structures (13th - 20th July, 2015)

Appropriate pesticide application techniques and equipment selected for applying pesticide are vital to success in pest control operations. This complex process requires a high level of knowledge and understanding, practical skills, well maintained and calibrated equipment, and probably most importantly a desire or will to protect the environment. The main purpose of pesticide application technique is to achieve maximum efficacy with minimum side effect on non-target organism. The knowledge on farm level storage structures enhances the farmers to safely store the produce and also can sell it when there is better market price

The participants were trained in use of high volume, low volume and ultra-low volume spraying techniques, nozzle selection and calibration of equipment, storage problems of food grain at commercial/farm level. The participants learnt the importance of suitable equipment selection and operation of the equipment, selection of suitable nozzles and calibration of the sprayers. A field visit was organized at NIPHM to create awareness on various activities of the institute.

Urban Integrated Pest Management (27th July to 10th August, 2015)

Eight participants from various pest control industries in Telangana, Andhra Pradesh and Odisha participated in Urban Integrated Pest Management training. They were trained on biology & management of mosquitoes, termites, flies, cockroaches, rodents, stored insect pests and other household pests in urban areas. Participants were also given exposure on stored grain pest detection and management methods. They were also exposed to practical application of different sprayers and safe and judicious pesticide application techniques for urban pest management.



Safe and Judicious use of Chemical Fertilizers and Chemical Pesticide (17th-24th Aug, 2015)

Pesticides are poisonous substances and they can cause harm to many living organisms, therefore their use must be very judicious. The application techniques ideally should be target oriented so that safety to the non-targets and environment is ensured. Spray drift and risk associated with the application of pesticide in agriculture are attention seeking. In this regard, safe use of chemical fertilizers and chemical pesticides, appropriate selection of spraying techniques such as high volume, low volume, ultra-low volume and proper selection of nozzles and doses are required. Pesticides formulation and their properties, quality control of pesticides, judicious use of rodenticides, safe use of pesticides and precautions to be taken while storing and spraying of pesticides were covered during the

programme. Ecological engineering and bio control agents production also explained.

Exhibition:

NIPHM participated in Exhibition organized by Indian Institute of Oilseeds Research on 12.09.2015. Low cost equipments and technologies developed by NIPHM were demonstrated over there viz. Low Volume Backpack Sprayer, Light trap, Groundnut stripper, MB Weeder, Seed-cum Ferti drill & Duster. Demonstrated various Bio-control agents, on-farm production methodologies, Low-cost traps etc.

In-Plant training on Plant Health Engineering (01.06.2015 to 30.09.2015):

In-Plant training on Plant Health Engineering was organized for 16 B.Tech Agricultural Engineering students for four month duration. They were trained on Appropriate Pesticides Application Techniques, Farm level storage structures. The students were assigned with project works on



- Design and fabrication of “Groundnut Stripper” to reduce the drudgery of Groundnut Farmers,
- Design and fabrication of manual operated “Seed Cum-Ferti Drill” low cost equipment to help small scale farmers in seeding operation



Groundnut Stripper	Seed Cum-Ferti Drill	M.B. weeder
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- Design and fabrication of “M.B. weeder” to improve the weeding efficacy in dryland areas

Sampling of Fruits, Vegetables and other items for Pesticide Residue Analysis:

The objective of the programme is to build the capacity of analysts in identification, selection, sampling and preparation of agricultural commodities from the farms for

pesticide residue analysis as per the international norms. The participants were trained in different techniques and methodologies adopted. Two programmes were organized during 01.07.2015 - 02.07.2015 and 19.08.2015 - 20.08.2015 and a total of six participants were trained in the programmes

Calibration of Glassware and Laboratory Equipment - Pesticide Formulation Analysis / Quality Control

The program is of eight days duration and was conducted from 14.07.2015-21.07.2015 for the analysts of Pesticide Quality Control laboratories. The participants were trained on Calibration of different Glassware and Calibration of various analytical Instruments like UV-Vis & FTIR spectrophotometers, Gas Liquid Chromatography (GC), High Performance Liquid Chromatograph (HPLC) and other equipments used in Pesticide Analysis Laboratories. Seven participants were trained in this program.

Method for the Detection of Pesticide Residues in Food Products & Preparation of Laboratory as a PT provider as per ISO 17043-2010

A five days training program was organised from 10.08.2015-14.08.2015 for the staff of NIPHM. Further, a three day's training program on Method for the Detection of Pesticide Residues in Food Products was conducted for the analysts of various food testing laboratory.



Inspection Sampling and Prosecution Procedures under Insecticide Act 1968

This program is of 8 days duration was organized from 14.09.2015-19.09.2015 with 14 participants from various States. The objective of the programme is to build the capacity in notified Insecticide Inspectors. The participants were trained on the salient features of the Insecticide Act 1968, Insecticide Rules 1971 and their effective implementation by giving emphasis on the role of Insecticide Inspectors, duties & responsibilities.

Around the World

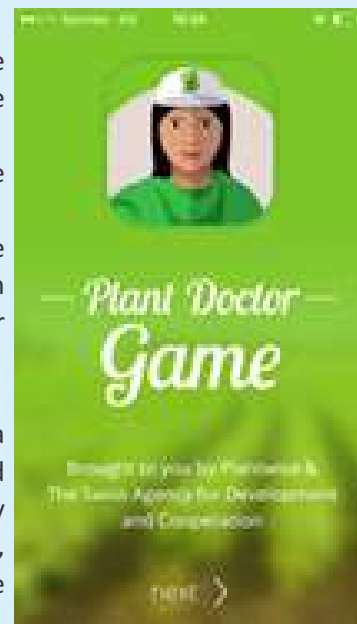
Plant Health Awareness Programme – New Initiatives

“The world doesn't need to spend one more dollar on agricultural research. The truth is we have all the information we need to feed the world. What we don't know is how to get people to use the agricultural knowledge and products we already have” - **Director USAID**

Plant health and plant biosecurity is a global issue that continues to grow in importance as the volume of trade between countries and the number of people travelling increases.

Plant health awareness campaigns are often initiated to alert stakeholders, farmers and the public to the detection of a pest new to an area, the likely arrival of an exotic pests or when an endemic pest increases in significance in response to changing environmental conditions or cropping practices. Providing information on the pest can be achieved using a range of media.

Recently, the Plant Biosecurity Cooperative Research Centre (PBCRC), Australia developed a game-based simulation training tool Quarantine Hero. **Quarantine Hero** is a digital training and assessment tool that allows users to demonstrate their quarantine inspection competency within simulated scenarios. This tool allows plant health officers to improve their skills, knowledge and reinforce good inspection techniques and behaviours. Similarly, CABI Plantwise developed a Knowledge Bank, which is a gateway to practical online and offline plant health information and Plant Doctor Simulator which is a tablet-based plant observation and diagnosis app. Users are provided with over 20 simulated plant pest and disease observation and diagnosis scenarios in four common crops: tomato, cassava, maize and cabbage.



NIPHM is also plays a proactive role in creation of awareness between the farmers and stakeholders either by capacity building training programmes or by various awareness campaigns. In view of this, NIPHM recently launched Krishi video Advise (mobile app) and Plant pests and disease advisory online services for the farmers and growers. Farmers/Extension officers may upload basic information and photos of specific problem and get expert advice through SMS.

NATIONAL INSTITUTE OF PLANT HEALTH MANAGEMENT

Pest Diagnostics & Advisory Services

Home
Post a Query
Posted Queries
Replies
Expert Login
Training

NIPHM is offering Diagnostics & Advisory services on Pest/diseases of Plants . Farmers/Extension officers may upload basic information and photos of specific problem and get expert advise through SMS.

Name :

Designation :

State :

District :

Mandal :

Crop Name :

Age of Crop (Days) :

Pest Name (Optional) :

Problem Description :

Mobile No :

Upload Images : No file chosen
 No file chosen
 No file chosen

Alumni Forum

B. Smitha, AO, KCPM, Moncompu, Kerala a CPGDPHM student trained at NIPHM has done a wonderful effort in training the farmers SHGs in Kerala for promoting “on- farm production of Trichoderma and Psedomonas during this year”. She has organized seven such farmer's training programmes and trained 239 farmers during the month of May to August 2015. As a result, two SHG's namely Harithasree SHG in Kodamthuruth Grama Panchayath and “Women in Agriculture” SHG at Ambalapuzha South Panchayath have started on farm production. One farmer at Kuthiathodu Panchayath is also started producing Trichoderma for his own use.



Mr. Ashok Kumar from Karimnagar, Telangana who trained at NIPHM has initiated the awareness & popularization of on farm production of bio-control agents and bio-pesticides. NIPHM has developed/standardized simple methodologies with available low cost inputs for the mass production of bio-control agents and bio-pesticides at farm level. He has taken the initiative to popularize the natural farming and creating awareness to use bio-pesticides.

Mr. Ashok is very popular in many TV programmes and his interviews / programmes are uploaded on youtube under natural farming. NIPHM constantly provided technical material, support and encouragement to him.



Independence Day was Celebrated by NIPHM officers with great enthusiasm,
Dr. N. Sathyanarayana, Director General i/c NIPHM hoisted the National Flag on this occasion



वर्ष 2015-16 हेतु राजभाषा कार्यान्वयन समिति की द्वितीय बैठक संपन्न

दिनांक 15-07-2015 को डॉ.के.सत्यगोपाल, भा.प्र.से., महानिदेशक, रावस्वाप्रसं (एनआईपीएचएम) की अध्यक्षता में राजभाषा हिन्दी के प्रगामी प्रयोग से संबंधित अप्रैल-जून, २०१५ को समाप्त तिमाही प्रगति रिपोर्ट की समीक्षा हेतु राजभाषा कार्यान्वयन समिति(राकास) की बैठक आयोजित की गई। उक्त बैठक में महानिदेशक के समक्ष संबंधित रिपोर्ट प्रस्तुत की गई। महानिदेशक ने उक्त रिपोर्ट की समीक्षा की एवं अधिकारियों को हिन्दी में अधिक से अधिक छोटी-छोटी अभ्युक्तियां एवं टिप्पणियां लिखने के निदेश दिए। संस्थान में हिन्दी के प्रभावी कार्यान्वयन हेतु महानिदेशक ने प्रोत्साहन योजना शुरू करने के लिए कर्मचारियों एवं अधिकारियों के लिए परिपत्र जारी करने के निदेश दिए। इस योजना के तहत प्रति वित्तीय वर्ष तक दस हजार या इससे अधिक शब्द हिंदी में कार्य करने वाले कर्मचारियों को नकद पुरस्कार एवं प्रमाणपत्र प्रदान किये जाएंगे। संस्थान में अधिकारियों, कर्मचारियों एवं प्रशिक्षार्थियों में हिंदी के प्रति रूचि पैदा करने के लिए ई-हिन्दी जर्नल पत्रिका शुरू करने का निर्णय लिया गया। इस पत्रिका में मौलिक/स्व रचित रचनाएं प्रकाशित की जाएंगी। उक्त निर्णयों के अनुपालन हेतु परिपत्र जारी कर दिया गया है।

इस संस्थान में दिनांक 31-08-2015 से 14-08-2015 तक 'हिंदी पखवाड़ा-2015' का आयोजन किया गया। हिंदी पखवाड़ा के दौरान विविध हिंदी प्रतियोगिताएं आयोजित की गईं एवं प्रतियोगिता में सफल प्रतिभागियों को १४ सितंबर, २०१५ को हिंदी दिवस के अवसर पर श्रीमती वी. उषा रानी, भा.प्र.से., महानिदेशक ने नकद पुरस्कार एवं प्रमाणपत्र वितरित कीं।

पादप-संरक्षण (गान)

1. जय-जय राष्ट्रीय पादप स्वास्थ्य प्रबंधन संस्थान।
पादप संरक्षण के एहसास का नाम।
तेरे विज्ञान से होता कृषि-समुत्थान।
किसान अधिकारी पीते संरक्षण ज्ञान।
खेत-प्रयोगशाला में रखे पादप-ध्यान।
देश-विदेश में तेरी विश्वसनीय पहचान।
2. जय-जय राष्ट्रीय पादप स्वास्थ्य प्रबंधन संस्थान।
पादप संरक्षण के एहसास का नाम।
करता जा पादप धन का सम्मान।
वो देते जाएंगे सु-उत्पादन ज्ञान।
तन्मय हो करे संरक्षण-अनुष्ठान।
चारों-दिशायें गाये तेरा गुणगान।
3. जय-जय राष्ट्रीय पादप स्वास्थ्य प्रबंधन संस्थान।
पादप संरक्षण के एहसास का नाम।
बचावेंगे पावन जैव-संपदा की जान।
प्रतिबद्ध लाने को जैव-संरक्षण संग्राम।
माँ कृषि को देंगे विश्वसनीय पहचान।
आओ मिल गाये, संस्थान गर्वगाथागान।
4. जय-जय राष्ट्रीय पादप स्वास्थ्य प्रबंधन संस्थान।
पादप संरक्षण के एहसास का नाम।
तुम जोर से गाओ मेरा भारत महान।
भूल न पाओ हम सब कृषि-संतान।
कृषक सम्मान में निछावर तेरा ज्ञान।
तू पादप संरक्षण के एहसास का नाम।
जय-जय राष्ट्रीय पादप स्वास्थ्य प्रबंधन संस्थान।

कवयित्री प्रियंका सिंह
सहायक वनस्पति संरक्षण अधिकारी
(के.ए.ना.प्र.केन्द्र, गुवाहाटी)

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