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NEWS LETTER

THEME ARTICLE



Healthy



Purple seed stain

AROUND THE WORLD



UPOV

ISF International Seed Federation
Seed is Life



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SPECIAL EVENTS





From the Director General's Desk

Seed is the foundation to crop production and healthy, quality seed is the basic and most critical input for sustainable and profitable agriculture. Seed-borne diseases are of great concern not only to the farmers but also to the seed industry all over the world as an infected seed can act as a primary source of inoculum and carries the pathogen for long distances. Seed is being produced in one country and getting exported to other countries and infected seed has the potential of introducing the pathogens into the importing country. In 2020, around 7502.06 metric tons of seed were imported and 7264.795 metric tons of seed were exported worldwide (Source: International Seed Federation). Seed trade is subjected to bilateral or multilateral agreements at regional and international levels wherein seed health is considered as a serious concern.

Several International organizations such as International Plant Protection Convention (IPPC), International Seed Testing Association (ISTA) and Organization for Economic Cooperation and Development (OECD) are involved in setting standards and regulations that provided an enabling environment for global seed movement. IPPC developed an exclusive International Standard for Phytosanitary Measure-38 (ISPM-38) which deals with International movement of seeds. It also gives guidelines in ISPM- 27 as diagnostic protocols for regulated pests which include pathogens. In India, seed certification comes under the ambit of the Seeds Act, 1966 and quality seed must satisfy standards as outlined in Indian Minimum Seed Certification Standards (IMSCS, 2013).

The seed health tests have become a major component towards sustainable crop production and safe trade of seeds. Seed health testing will be mainly used in seed certification schemes, to make accurate decisions on seed treatment and to issue a phytosanitary certificate in quarantine. The theme article describes the importance of seed health testing methods and the notable seed health detection techniques employed for obtaining high quality seed. The seed health testing methods include visual inspection of seeds, washing test, and incubation methods (blotter and agar), grow-out test, seed soak method, serological assay and nucleic acid-based techniques. The seed health testing labs were established in NIPHM to give training on different seed health testing methods to various stakeholders such as officials/officers working in plant quarantine stations, seed health testing labs, state agricultural universities and ICAR and stakeholders from seed industries.

बीज फसल उत्पादन का आधार है एवं स्वस्थ, गुणवत्तापूर्ण बीज टिकाऊ और लाभदायक कृषि के लिए बुनियादी और सबसे महत्वपूर्ण इनपुट है। बीज जनित रोग न केवल किसानों के लिए बल्कि दुनिया भर के बीज उद्योग के लिए भी बहुत चिंता का विषय हैं क्योंकि संक्रमित बीज इनोकुलम के प्राथमिक स्रोत के रूप में कार्य कर सकते हैं एवं रोगाणुओं को लंबी दूरी तक ले जा सकते हैं। बीज एक देश में उत्पादित किया जा रहा है और दूसरे देशों को निर्यात किया जा रहा है एवं संक्रमित बीज में रोगाणुओं को आयात करने वाले देश में लाने की क्षमता है। वर्ष 2020 में, दुनिया भर में लगभग 7502.06 मीट्रिक टन बीज आयात किए गए और 7264.795 मीट्रिक टन बीज निर्यात किए गए (स्रोत: अंतर्राष्ट्रीय बीज संघ)। बीज व्यापार क्षेत्रीय एवं अंतर्राष्ट्रीय स्तरों पर द्विपक्षीय या बहुपक्षीय समझौतों के अधीन है, जिसमें बीज स्वास्थ्य को एक गंभीर चिंता का विषय माना जाता है।

अंतर्राष्ट्रीय वनस्पति संरक्षण सम्मेलन (आईपीपीसी), अंतर्राष्ट्रीय बीज परीक्षण संघ (आईएसटीए) और आर्थिक सहयोग एवं विकास संगठन (ओईसीडी) जैसे कई अंतर्राष्ट्रीय संगठन वैश्विक बीज संचलन के लिए अनुकूल वातावरण प्रदान करने वाले मानक और विनियमन स्थापित करने में शामिल हैं। आईपीपीसी ने फाइटोसैनिटरी माप-38 (आईएसपीएम-38) के लिए एक विशेष अंतर्राष्ट्रीय मानक विकसित किया है जो बीजों के अंतर्राष्ट्रीय संचलन से संबंधित है। यह विनियमित कीटों के लिए निदान प्रोटोकॉल के रूप में आईएसपीएम-27 में दिशानिर्देश भी देता है जिसमें रोगजनक शामिल हैं। भारत में, बीज प्रमाणन 1966 के बीज अधिनियम के दायरे में आता है और गुणवत्ता वाले बीज को भारतीय न्यूनतम बीज प्रमाणन मानकों (आईएमएससीएस, 2013) में उल्लिखित मानकों को पूरा करना चाहिए।

बीज स्वास्थ्य परीक्षण टिकाऊ फसल उत्पादन एवं बीजों के सुरक्षित व्यापार की दिशा में एक प्रमुख घटक बन गए हैं। बीज स्वास्थ्य परीक्षण का उपयोग मुख्य रूप से बीज प्रमाणन योजनाओं में, बीज उपचार पर सटीक निर्णय लेने और संगरोध में फाइटोसैनिटरी प्रमाणपत्र जारी करने के लिए किया जाएगा। विषय लेख में बीज स्वास्थ्य परीक्षण विधियों के महत्व और उच्च गुणवत्ता वाले बीज प्राप्त करने के लिए नियोजित उल्लेखनीय बीज स्वास्थ्य पहचान तकनीकों का वर्णन किया गया है। बीज स्वास्थ्य परीक्षण विधियों में बीजों का दृश्य निरीक्षण, धुलाई परीक्षण और ऊष्मायन विधियाँ (ब्लॉटर और अगर), ग्रो-आउट परीक्षण, बीज भिगोना विधि, सीरोलॉजिकल परख और न्यूक्लिक एसिड-आधारित तकनीकें शामिल हैं। एनआईपीएम में बीज स्वास्थ्य परीक्षण प्रयोगशालाएँ विभिन्न हितधारकों जैसे कि वनस्पति संगरोध स्टेशनों, बीज स्वास्थ्य परीक्षण प्रयोगशालाओं, राज्य कृषि विश्वविद्यालयों एवं आईसीएआर में काम करने वाले अधिकारियों और बीज उद्योगों के हितधारकों को विभिन्न बीज स्वास्थ्य परीक्षण विधियों पर प्रशिक्षण देने के लिए स्थापित की गई थीं।

(Dr. Sagar Hanuman Singh IPoS)
Director General

IMPORTANCE OF SEED HEALTH AND AN OVERVIEW OF SEED HEALTH DETECTION TECHNIQUES

R Madhubala, S L Pavani and C Alice R P Sujeetha

Introduction:

Seed is the foundation to crop production and a high quality seed is an essential prerequisite for profitable production. High quality seed is not only need to be viable, free from contaminants but also should be healthy. Sowing healthy seeds of high quality is our concern to increase food production. Seed health is an essential component of seed quality which directly related to food production and food security of a country. Seed-borne diseases are of great concern to farmers and seed producing agencies where the disease is high and average yields are low and where more food is needed to feed the ever-increasing population. It is estimated that 30% of seed-borne diseases can be controlled by using disease-free seeds. Seeds are regularly moved locally and internationally, in small or large quantities, for trade and research purposes. These are often produced in one or more location/countries and distributed from those to several other location/countries. Before establishing and applying any management practice, it is important to understand the biology of seed borne disease. In most of the seed borne diseases, infected seed is the primary source of inoculum and if it is controlled, the disease will be controlled.

Seed health:

Seed health refers primarily to the presence or absence of disease-causing organisms, such as fungi, bacteria, viruses, nematodes and insects. Mainly, seed health is a measure of freedom of seeds from pathogens. The farmers/growers have to deal with the loss due to infection with seed-borne pathogens, which may start from germinating seed, seedling in the nursery and plants in the field.

Seed health tests are required to ascertain the health of commercial seed. It is important to test the seeds for pathogens before they are sown in the field and to avoid seed borne pathogens traveling from infected to non-infected areas within a country or across international boundaries. Seed health testing refers to detect the presence or absence of insects/pathogens on or within the seed and thus determines the health status of a seed.

Importance of seed health testing:

Seeds act as a carrier for long distance movement of seed-borne pathogens. Seeds are routinely tested to prevent or control plant pests and pathogens that may affect seed quality, seed movement, and their introduction into new territories.

Seed health testing may be used in the following circumstances:

- Testing for seed certification schemes.
- Testing to make accurate decisions regarding the appropriate use of seed treatment.
- Testing for quarantine purposes to avoid the spread of disease to new regions and to issue a phytosanitary certificate.
- Testing for the evaluation of planting value in the field.

- Testing for treated seeds.
- Testing for storage quality

Many international organizations such as International Seed Federation, International Seed Testing Association and International Plant Protection Convention are working to promote seed health in order to ensure the safety of seed production and trade. In India, the Seed Act was enacted in 1966 with an aim to regulate the quality of seed sold for agricultural purpose.

Seed health testing methods:

The testing methods primarily focus on the detection of seed borne pathogens and mostly depend on incubation methods, morphological identification and grow-out tests for detection of pathogens on seed. Presently, due to advances in technology, the seed-borne pathogens are detected both by conventional methods and using immunological/serological and molecular methods. The commonly used methods are field inspections, direct visual examination, incubation methods, grow-out test, serological/immunological and molecular based techniques.

i) Field inspection:

Inspection of the standing crop is an essential step to examine for disease of plants grown to produce seed in the field, nursery, or greenhouse. Field inspection during seed production helps to reject the seed lots with high incidence of seed-transmitted pathogens in the field itself. The number of inspections and the stages of crop growth vary from crop to crop depending on the crop duration and susceptible stage of plants to diseases, *etc.*

Field inspections are conducted at i) vegetative or pre-flowering stage ii) flowering stage iii) post-flowering and pre-harvest stage. Multiple diseases can be examined simultaneously, which is a major benefit of field inspection. It is often possible to determine the primary pathogenesis of a nematode, fungus, bacterium and virus depending on the signs present in the plant sample to make a tentative diagnosis.

ii) Visual examination:

This method is used to give first-hand information about the abnormalities on seed surface. It also helps for selection of a particular method for detection of seed-borne pathogens. A stereoscopic microscope or an illuminated swinging-arm desk magnifier of X 2 magnification can be used for examination. Four hundred or more seed samples are subjected to examination under stereoscopic microscope for detection of fungal fructification such as pycnidia, acervuli, and smut sori.

It can be applicable to many pathogens such as *Aschochyta*, *Botrytis*, *Botryodiplodia*, *Cercospora*, *Colletotrichum*, *Diplodia*, *Fusarium*, *Pleospora*, *Macrophomina* and *Rhizoctonia* spp. In conventionally produced, non-processed wheat seeds, the incidence and contamination of *Tilletia* species were assessed using visual inspection. Out of 151 samples of basic, certified, and commercial seed lots showed that 129 samples were contaminated with *Tilletia* spp. (Zupunski *et al.*, 2012).

Some other examples of visual examination are maize seeds infected with *Nigrospora* which have white streaks with black spore masses near the tips; sorghum seeds infected with *Acremonium* wilt which are completely

deformed; and soybean seeds infected with *Cercospora kkuchii* showing symptoms of purple seed stain and soybean mosaic virus showing mottling and seed discolouration (Vishunavat, *et al.*, 2023).



Healthy

Purple seed stain

Soybean (*Cercospora kkuchii*)

iii) Seed Washing Test:

Seed washing test or sedimentation test has to be adopted for detecting spores of surface borne and external seed-borne pathogens. Seed samples (50 seeds) are placed in test tubes containing distilled water (10 ml) and a few drops (10-20) of 95% ethyl alcohol or a detergent. The sample tubes are agitated in a mechanical shaker for 10 min. The aqueous suspension is then centrifuged at 3,000 rpm for 10 min. The supernatant is poured off and the pellet is suspended in 2 ml of sterile water. Spores or fungal structures present in the suspension can be viewed by examining a few drops of the suspension under the light microscope (Narayanasamy, 2011). This washing test is helpful for detecting surface-borne fungal spores causing smuts, bunts, rusts, downy mildew and powdery mildew, *etc.*

iv) Incubation methods:

a) Blotter Test:

The most commonly used test for detection of seed-borne fungi is blotter test and its variants. Three layers of moistened absorbing (blotting) paper are used as substrate for 5-10 seeds, depending on the seed size, and placed equidistant from one another in a Petri dish. The representative seed samples placed in the Petri dish are incubated at $22\pm 2^{\circ}\text{C}$ under near ultraviolet (NUV) light with alternate cycles of 12 h of light and darkness for 7 days. The seeds are then examined under a stereomicroscope for the presence of fungal colonies and their characteristics are recorded for identifying the pathogen (Narayanasamy, 2011). Fungi are identified on the basis of their morphological characters, such as growth of the mycelium, its septation, size and shape of the fruiting bodies, spores, their size and shapes, arrangement of conidia on conidiophores, *etc.*



This method is widely used in testing seeds for fungi such as *Alternaria*, *Ascochyta*, *Bipolaris*, *Botryodiplodia*, *Botrytis*, *Cercospora*, *Cladosporium*, *Colletotrichum*, *Curvularia*, *Drechslera*, *Fusarium*, *Macrophomina*, *Myrothecium*, *Phoma*, *Phomopsis*, *Rhizoctonia*, *Sclerotinia*, etc. The seeds of cereals, vegetables, legumes, ornamentals, and forest trees are tested by this method (Vishunavat, *et al.*, 2023).

This test was applied routinely for detection of seed-borne pathogens in common bean and soybean seeds (Dhingra *et al.* 1978); *Leptosphaeria maculans* pathogen causing black leg disease (anamorph *Phoma lingam*) in crucifer seeds (Maguire and Gabrielson, 1983) and *Alternaria padwickii* in rice seeds (Gutierrez *et al.*, 2010). Deep freezing blotter, 2,4-D blotter, alkaline blotter method using NaOH (0.8%) or KOH (0.4%) and blotter test with mannitol are the variants of blotter test used for the detection of seed-borne pathogens.

b) Agar plate method:

In this method, instead of blotter paper, malt extract agar or potato dextrose agar or Czapek's Dox are used for fungi on which most of the fungi display their growth and nutrient agar for bacteria. Sterilized culture medium is poured in sterile Petri dish of 9 mm diameter at 15ml/plate. After solidification, the surface sterilized seeds are plated on appropriate medium or selective medium that specifically encourages the growth of the target pathogen in the same way as in the blotter test. These plates are incubated under similar conditions as in the standard blotter test for the same period of time. The colony characteristics of the pathogen growing on the medium are used for identification. This method is suitable for the detection of *Drechslera teres* (*Pyrenophora teres*) and *Drechslera graminea* (*Pyrenophora graminea*) in barley; *D. avenae* in oats; *Colletotrichum lini* in linseed; *Ascochyta* spp. in legumes, etc.

v) Grow out/seedling symptom test:

Certain seed-borne pathogens exhibit characteristic symptoms on developing seedlings, and thus, seedling grow-out test can be used as a detection method to assess the seed-borne pathogens and their transmission through seed. The seeds are grown in pots containing sterilized soil/peat in a greenhouse. The presence of pathogen is detected based on the appearance of symptoms in the germinated seeds and growing seedlings.

This test is highly applicable for bacterial and viral pathogens and in few cases fungal pathogen also. Soybean seed infection by *Sclerotium* sp. could not be detected by blotter test or agar test on Potato Dextrose Agar; however, seed infection by this pathogen was detected by the grow-out test (Dhingra and Muchovej, 1980). This test also useful in detecting the obligate parasites which causes downy mildew of sorghum and corn (maize) as they have not been isolated in any cell-free media so far. The requirements of a large greenhouse space and the long time to obtain results are the major limitations for wider application of this test (Narayanasamy, 2011). The grow-out test has to be conducted for seed lots to be distributed to farmers for commercial cultivation.

vi) Seed Soak Method:

The seeds are soaked in 0.2-0.3% sodium hydroxide or potassium hydroxide solution to soften the tissues. The method is widely used for the detection of pathogens of loose smut, karnal bunt and paddy bunt diseases (Agarwal and Srivastava, 1985).

vii) Whole Embryo Count Method:

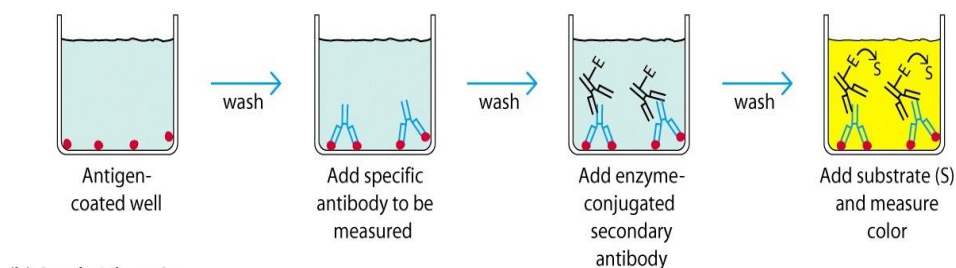
This method is used when seed-borne infection is deep seated in the seed tissues such as embryo in case of barley (*Ustilago nuda*) and loose smut of wheat (*U. tritici*). In this method, 5% sodium hydroxide is used to extract the embryo from the seeds.

viii) Immunoassays:

Immunoassays have been applied effectively for detection, identification, and differentiation of plant viruses and their strains. They have been used more frequently for the detection of viruses when compared to bacteria, fungi and phytoplasmas. Enzyme Linked Immuno Sorbent Assay (ELISA), Dot Immuno Binding Assay (DIBA) and lateral flow assay are the immunoassay techniques used for the detection of seed-borne pathogens. Among them, enzyme-linked immunosorbent assay (ELISA) is widely used to detect seed-borne fungi, bacteria, and viruses.

a) Enzyme Linked Immuno Sorbent Assay (ELISA):

The enzyme-linked immunosorbent assay (ELISA) became very popular for detection of viruses in plant material, insect vectors, seeds, and vegetative propagated plants due to its adaptability, robustness, sensitivity and economy in use of reagents. In this method, antigens from the pathogens are made to specifically bind with antibodies conjugated to an enzyme. The detection can be visualized based on color changes resulting from the interaction between the substrate and the immobilized enzyme. ELISA is used in a wide range of situations, especially to test a large number of samples in a relatively short period of time.



ELISA has been an effective method for the detection of multiple viruses present in seeds (Chalam *et al.*, 2017). Direct Antigen Coating-ELISA (DAC-ELISA) and Double Antibody Sandwich-ELISA (DAS-ELISA) are commonly employed for the pathogen detection. The consistent use of ELISA has been demonstrated for the detection of *Erwinia stewartii* in corn seeds (Lamka *et al.*, 1991). In ELISA-based assay, a single plant can be concurrently evaluated for several viruses on a single plate using different antibodies. For eg. the use of virus-free soybean seeds is the primary strategy to reduce incidence and subsequent spread of Soybean mosaic virus (SMV) disease and the DAS-ELISA was found to be effective in detecting one SMV-infected seed in a lot of 7000 healthy seeds.

b) Dot Immunobinding Assay:

In Dot immunobinding Assay (DIBA) which is analogous to standard ELISA procedure, microplates are replaced by nitrocellulose or nylon-based membranes on which the antigen is immobilized. The free protein-binding sites present on the nitrocellulose membrane are blocked, because of their high affinity for proteins using either nonfat dry milk (skimmed milk) powder or bovine serum albumin (BSA). The unconjugated virus-specific antibody is allowed to react with the immobilized antigen which is probed with alkaline phosphatase (AP), horseradish peroxidase (HRP) labeled protein A. An appropriate substrate is used for the visual detection of the colored

reaction product. It was employed for the detection of seedborne inoculum of Barley stripe mosaic virus (BSMV) in barley and Bean common mosaic virus (BCMV) in bean.

c) Lateral Flow Strip Method

It is used for detecting viruses/bacteria and is a variation of ELISA. The antibodies are immobilized onto a test strip in specific zones. The test does not require any major equipment and kits are available. This technique is suitable for on-site use on field and the sample preparation simply involves crushing the sample and mixing it with the extraction solution provided in the kit. These tests generally provide qualitative results using antibodies and colour reagents incorporated into a flow strip (Chalam *et al.*, 2019).

ix) Molecular or nucleic acid-based methods:

All organisms including plant pathogens contain nucleic acids, the storehouses of genetic information on which the characteristics of the individual organisms. Molecular methods are based on using specific gene sequences to accurately identify the pathogens. Compared with immunological methods, they have a greatly improved sensitivity, detection rate, and specificity.

polymerase chain reaction (PCR) has plentiful assenting features, including specificity, sensitivity, rapidity, and simple interpretation, which makes it convenient for the detection of seed-borne pathogens in agricultural/horticultural crops. The samples have been examined in PCR by using specific primer pairs which enables to detect specific viruses. The basic PCR technique and its variants such as RT-PCR, nested PCR, multiplex PCR, IC-PCR and real-time PCR have been used for the rapid detection of seed-borne pathogens.

a) Polymerase Chain Reaction (PCR)

Polymerase Chain reaction (PCR) technique in molecular biology is used to amplify a single or a few copies of a piece of DNA generating thousands to millions of copies of a particular DNA sequence. This is now a common and often indispensable technique used in seed health testing labs for a variety of applications which includes detection and diagnosis of plant pathogens of quarantine importance.



From the last three decades, PCR and reverse transcription polymerase chain reaction (RT-PCR) are recognized as excellent techniques for the amplification of the genomic DNA in a reasonably short time. These techniques are very useful in detecting the virus at picogram level in infected plant/seed material. At present, more than 200 viruses and viroids have been reported by using RT-PCR in different types of agricultural and horticultural crops. The RT-PCR assay is found to be five times more sensitive than standard ELISA.

Table 1: Summary of some detection methods used for seed-borne pathogens (Zhang *et al.*, 2023)

Detection Methods	Required Time	Sensibility	Specificity	Applicability
Visual inspection	5–10 min	Low	Low	Cheap, requires professional knowledge
Washing test	30–50 min	Low	Low	Cumbersome, requires professional knowledge and counting under a microscope

Germination test	7-14 d	Low	Low	Simple and cheap, but takes a long time
Immunoassay	2-4 h	Middle-high	Middle-high	Expensive and requires specific instruments
PCR	5-6 h	High	High	Expensive, requires specific instruments but easy to explain
qPCR	4-6 h	Very high	Very high	Complex, expensive, with high specificity requirements for primers
Nested PCR	5-6 h	Very high	Very high	Expensive, ensures the accuracy and feasibility

Table 2: Principal diagnostic assays reported for the detection of seed-borne pathogens (Kaur *et al.*, 2019)

Technique(s)	Virus	Host	Reference
Biological methods			
Grow-out, indicator plant assay	Cowpea aphid-borne mosaic virus (CABMV), Cucumber mosaic virus (CMV), and Southern bean mosaic virus (SBMV)	Cowpea	Salem <i>et al.</i> (2010)
Serological methods			
DAS-ELISA	Cucumber mosaic virus (CMV), Zucchini yellow mosaic virus (ZYMV), Squash mosaic virus (SqMV), Tobacco ring spot virus (TRSV), and Cucumber green mottle mosaic virus (CGMMV)	Winter squash	Sevik and Balkaya (2015)
	Pepper mild mottle virus (PMMoV), Cucumber mosaic virus (CMV), Potato virus Y (PVY), and Alfalfa mosaic virus (AMV)	Pepper	Milosevic <i>et al.</i> (2015)
DAS-ELISA and RT-PCR	Alfalfa mosaic alfamovirus (AMV), Cucumber mosaic cucumovirus (CMV), Lettuce mosaic potyvirus (LMV), Cucumber green mottle mosaic virus (CGMMV), Tomato bushy stunt tobamovirus (TBSV), Tobacco mosaic tobamovirus (TMV), Tomato black ring nepovirus (TBRV), and Tomato mosaic tobamovirus (ToMV)	Pepper, tomato, cucumber, lettuce	Gumus and Paylan (2013)

DIBA	Potato leaf roll virus (PLRV), Potato virus S (PVS), Potato virus X (PVX), and Potato virus Y (PVY)	Potato	Samsatly <i>et al.</i> (2014)
PCR-based methods			
RT-PCR	Soybean vein necrosis virus	Soybean	Groves <i>et al.</i> (2016)
	Cowpea aphid-borne mosaic virus (CABMV), Cucumber mosaic virus (CMV), and Southern bean mosaic virus (SBMV)	Cowpea	Salem <i>et al.</i> (2010)
PCR	Tomato yellow leaf curl virus	Tomato	Kil <i>et al.</i> (2016)
Real-time PCR	Squash mosaic virus (SqMV)	Cucurbits	Ling <i>et al.</i> (2011)
	Potato leafroll virus (PLRV), Potato virus X (PVX), and Potato virus S (PVS)	Potato	Mortimer-Jones <i>et al.</i> (2009)
	PVY, PLRV, PVX and Potato virus A	Potato	Agindotan <i>et al.</i> (2007)

Table 3: Summary of different techniques for detecting seed-borne pathogens of quarantine significance (Chalam *et al.*, 2019)

Techniques	Fungi	Bacteria	Viruses	Viroids
Dry seed examination	+	+	+	+
Seed washing test	+	+	-	-
Whole embryo test	+	-	-	-
Soaked seed test	+	-	-	-
Incubation tests	+	+	-	-
Growing-on test	+	+	+	+
Enzyme-linked immunosorbent assay (ELISA)	-	+	+	-
Dot-immunobinding assay (DIBA)	-	-	+	-
Lateral flow strips	-	+	+	-
Polymerase chain reaction (PCR)	+	+	+	+
Reverse transcription-PCR (RT-PCR)	-	-	+	-
Real-time PCR	+	+	+	+

Conclusion:

Seed-borne pathogens such as fungi, bacteria and viruses, represent a major threat to crop production and yield. Seed health testing methods are required to ascertain the healthy status of the seeds. In order to achieve a high quality and healthy seed, many countries have applied a routine testing of seed borne diseases as an integral part of seed testing, seed certification and are considered as a tool for entire seed-borne disease control program. The requirement of phytosanitary certificate for seed trade among regions and countries has also increased importance of seed health testing. The reliable, effective, inexpensive, and rapid detection methods need to be standardized for detecting the seed-borne pathogens.

Irrespective of the detection methodology, the specificity, sensitivity, reliability, and efficiency of the assay and pathogen tolerance in the seed lot also need to be understood before a technique is considered acceptable for seed health test as a tool for disease management and can be routinely used in seed quality assessment.

NIPHM established the seed health testing labs and gives training on seed health testing methods to various stakeholders such as officials working in plant quarantine stations, seed health testing labs, state agricultural universities and ICAR and stakeholders from seed industry.

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Around the World

The seed is moving across international borders as germplasm for R&D purposes, experimental lines and hybrids for screening purposes, basic seed for multiplication purposes and commercial varieties and hybrids for marketing purposes and the movement of quality seed is the focus of several organizations.

I. International Seed Testing Association (ISTA):

ISTA is key institution which provides internationally agreed set of rules for seed sampling and testing, gives authority to seed testing laboratories, and provides international seed analysis certificates to facilitate seed trading nationally and internationally. The main aim is to develop, adopt, and publish standard procedures for sampling and testing seeds and to promote uniform application of these procedures for evaluation of seeds in International trade. More than 130 of the Member Laboratories are accredited by ISTA and entitled to issue ISTA Certificates. The membership is a diverse collaboration of seed scientists and analysts from universities, research centres and seed testing laboratories around the world.

II. International Seed Health Initiative (ISHI):

ISHI provides a forum for exchanging information, sharing expertise on seed health testing and the development of new seed health tests. It also shares its knowledge on seed health testing through various documents besides its methods, validation and best practices.

III. International Seed Federation (ISF):

ISF is a non-governmental, non-profit making organization that represents the interests of national seed associations and seed companies at a global level. It has more than 7500 members in 70 countries. It works in partnership with organizations responsible for international treaties, conventions and agreements and those that shape policies that impact the seed industry.

IV. Organization for Economic Co-operation and Development (OECD):

OECD is an inter-governmental organization to discuss, develop and reform economic and social policies. The OECD Seed Schemes promote the use of certified agriculture seed that is of consistently high quality. These seeds are produced and officially controlled according to a set of harmonised procedures implemented in the 62 participating countries.

V. World Seed Partnership (WSP):

The World Seed Partnership (WSP) is an initiative taken by five international organizations to support the development of the seed sector in countries around the world with an aim to provide guidance on the development of an appropriate and effective seed regulatory framework built on the following elements

1. Establishment and implementation of an effective system of plant variety protection (International Union for the Protection of New Varieties of Plants - UPOV)
2. Enhanced seed quality assurance for better on-field performance through improved seed sampling, seed testing and storage capabilities (ISTA)
3. Development of a reliable and internationally acceptable seed varietal certification system for seed movement nationally and internationally (OECD)
4. Facilitating growth of the local seed industry to ensure farmers' access to improved varieties and seeds (ISF)

Ensuring the participation of farmers in relevant discussions and access to new plant varieties and sustainable and affordable seeds (World Farmers' Organization - WFO).



Training Programs

Plant BioSecurity Division

The Plant Biosecurity Division has organized following training programmes during the months of **July-September, 2024**.

Capacity Building Programmes:

S. No.	Name of The Programme	Duration	Date	
			From	To
Plant Biosecurity Division (PBD)				
1)	Stored Grain Pest and Warehouse Management	05	08.07.24	12.07.24
2)	Forced Hot Air Treatment (FHAT)	05	22.07.24	26.07.24
3)	Phytosanitary Inspection Training for Phytosanitary Service Agency and Phytosanitary Service Provider for Inspection of Plants/ Plant Products and other Regulated Articles in Export	30	01.07.24	30.07.24
4)	Customized seed health testing and molecular diagnostic techniques – for TGSSOCA officers.	03	27.08.24	29.08.24
5)	Diagnosis of pests, pest risk analysis, pest surveillance & phytosanitary treatments (ITEC)	14	11.09.24	24.09.24
6)	Pest Free Area for market access (Online)	02	12.09.24	13.09.24
7)	Fruit fly Surveillance and management	05	23.09.24	27.09.24
Vertebrate Pest Management (VPM)				
8)	Non-Insect Pest Management – Mites, Crabs, Snails, Slugs and Avian	03	02.07.24	04.07.24
9)	International training program on “Integrated Vertebrate Pest Management” under MEA ITEC	14	10.07.24	23.07.24
10)	Urban Integrated Pest Management	15	21.08.24	04.09.24
11)	Rodent Pest Management	05	02.09.24	06.09.24

PBD - FARMERS PROGRAMME				
1)	Farmer awareness programme on WDRA and eNWR	01	23.07.24	23.07.24
2)	Farmer awareness programme on WDRA and eNWR	01	25.07.24	25.07.24
3)	Rice Crop Protection, Good Agricultural Practices and Export promotion	03	01.08.24	03.08.24
4)	Farmer awareness programme on WDRA and eNWR	01	07.08.24	07.08.24
5)	SPS Measures, Good Agriculture practices and Food Safety	01	05.08.24	05.08.24
6)	SPS Measures, Good Agriculture practices and Food Safety	01	06.08.24	06.08.24
7)	SPS Measures, Good Agriculture practices and Food Safety	01	08.08.24	08.08.24
8)	SPS Measures, Good Agriculture practices and Food Safety	01	09.08.24	09.08.24
9)	Farmer awareness programme on WDRA and eNWR	01	30.09.24	30.09.24
10)	Farmer awareness programme on WDRA and eNWR	01	30.09.24	30.09.24
VPM- FARMERS PROGRAMME				
11)	Rodent Management for oil farm growers (Telangana)	01	06.07.24	06.07.24
12)	Farmers training on RPM at Peddha shapur (off campus)	01	22.07.24	22.07.24
13)	One day workshop on Rodent and urban pest management at Chennai	01	19.09.24	19.09.24

DETAILS OF TRAINING PROGRAMMES (Govt. Officials & Private sector)

➤ Stored Grain Pest and Warehouse Management

Five days customized training programme on “Stored Grain Pest and Warehouse Management” for the officers of State Civil Supplies was organized and attended by eight officers. The participants got acquainted with pest detection, monitoring and Identification, Grain sampling methods, fumigation procedures for AIP fumigation and Biotic and abiotic factors, warehouse management etc.



➤ **Forced Hot Air Treatment (*Payment program/private industry*)**

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 is the only Institute in India to offer a specialized training programme on FHAT for industry stakeholders. The training programme was organized during 22nd-26th July, 2024 at NIPHM and attended by 43 aspirants. The participants learnt the 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.



➤ **Phytosanitary Inspection Training for Phytosanitary Service Agency and Phytosanitary Service Provider for Inspection of Plants/ Plant Products and other Regulated Articles in Export**

One month “Phytopsanitary Inspection Training for Phytosanitary Service Agency and Phytosanitary Service Provider for Inspection of Plants/ Plant Products and other Regulated Articles in Export” was organized to impart the technical skills and competency to perform phytosanitary inspection and certification in compliance of NSPM-23. The training enabled the participants to acquire technical skills and competency in performance of phytosanitary inspection for export consignments of plants/plant products and other regulated articles meeting the

phytosanitary requirements of importing country and there by fulfilling the international obligations under IPPC the International Plant Protection Convention (IPPC) and WTO-SPS Agreement. This programme was attended by eight aspirants.



VERTEBRATE PEST MANAGEMENT (VPM)

➤ **International training Program on “Integrated Vertebrate Pest Management”**

In collaboration with Indian Technical and Economic Cooperation Programme– Ministry of External Affairs (ITEC- MEA) fourteen days programme on “Integrated Vertebrate Pest Management” was organized at NIPHM. This programme was organized to create a pool of experts in the area of major vertebrate pests like wild boar, monkey, birds etc. including their management techniques and in this programme eight officers (Mauritius, Zimbabwe and Uzbekistan) were trained.



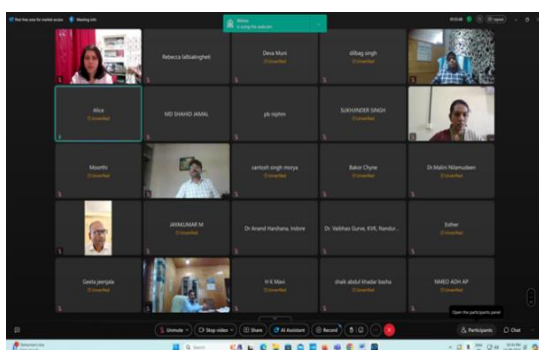
➤ **Urban Integrated Pest Management**

Fifteen days training programme for private industry on “Urban Integrated Pest Management” is being organized and attended by twenty five participants. As per the Insecticides Act, 1968 the PCOs applies for grant of license to undertake pest control operations should be trained and obtain certificate of minimum 15 days training. The

training provides an opportunity to develop skills about urban pest’s biology, bionomics and management practices and prepares the participants for emergency preparedness to prevent the outbreak of communicable zoonotic diseases, to develop skills in safe use of chemical pesticides.



- A two days’ online programme on Pest Free Area for Market Access was organised, attended by 55 officers from different states departments & universities.
- A five days training programme on Rodent Pest Management was organised in that a total of 20 officers attended from various states.
- A three days training programme on Seed Health Testing And Molecular Diagnostic Techniques for Telangana State Seed And Organic Certification Authority Officers was organised and attended by 3 officers.
- A five days training program on Fruit Fly Surveillance And Management training was organised attended by 15 officers. One day Workshop on Urban and House Hold Pest Management for Proprietors was organised in association with Tamil Nadu Pest Management Association at Chennai. Total 145 participants attended the workshop from different district of Tamil Nadu.



Online program on Pest Free Area



Director PBD addressing the participants during Inaugural session of training program on Fruit fly Surveillance and Management



One day Workshop on Rodent and Urban Pest Management for the Pest Control

Proprietors at Chennai

➤ **International training program on “Diagnosis of pests, Pest Risk Analysis, Pest Surveillance and Phytosanitary treatments”**

Two weeks training program on “Diagnosis of pests, Pest Risk Analysis, Pest Surveillance and Phytosanitary treatments” was organised at NIPHM for the officers of Uzbekistan deputed by Agency of Plant Protection and Quarantine, Department of Agriculture. A total of 29 officers attended the program. The program emphasised on pest management, participants have gained comprehensive skills in pest diagnosis, risk analysis, surveillance, and phytosanitary treatments and had hands on training experience in different lab activities.



International program on Diagnosis of pests, Pest Risk Analyses, Pest Surveillance and Phytosanitary Treatments

PBD - FARMERS PROGRAMME

- Farmer awareness programmes on WDRA and eNWR - NIPHM in collaboration with WDRA conducted two farmer awareness programmes on WDRA and eNWR at Bollepally, Bhongir, and Muthyreddygudem, Yadagirigutta, Telangana. Total hundred Farmers were trained.
- **Rice Crop Protection, Good Agricultural Practices and Export promotion** - Three days Farmers training program on “Rice Crop Protection, Good Agricultural Practices and Export promotion” to the farmers of Yanam, UT of Puducherry was organized at Hyderabad, Telangana and attended by thirty farmers. Farmers have learnt on different aspects like Pest management in Rice (Insects, Diseases and Rodents), Good Agricultural Practices, Storage management of food grains and export promotion activities. Trainees had hands on training in preparation of bait poison for rodents, identification of major insects and rice pests and were get acquainted with activities taken up in laboratories and various low cost techniques of NIPHM.



- NIPHM in collaboration with Warehousing Development and Regulatory Authority (WDRA) has conducted one farmer awareness programme on WDRA and eNWR at Jammikunta, Telangana and total fifty farmers were trained.



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 Source : <https://epaper.sakshi.com/>

- **APEDA sponsored training on “SPS Measures, Good Agriculture practices and Food Safety”** - NIPHM in collaboration with Agricultural and Processed Food Products Export Development Authority (APEDA) organised 04, one day awareness programmes on "SPS Measures, Good Agriculture practices and Food Safety” at Odisha (KVK, Nayagarh & KVK, Dhenkanal) and Jharkhand (Soil Survey Office, Hazaribagh & KVK, Khunti). The programmes were attended by total of 240 participants (progressive farmers, exporters and other stakeholders involved in export of agricultural commodities).

ODISHA

Dhenkanal



Nayagarh



JHARKHAND

Hazaribagh



Khunti



VPM- FARMERS PROGRAMME

- In collaboration with Chemi Tech Chemical Pvt. Ltd., Hyderabad, a One day Farmers training on “Rodent Pest Management” for the oil farm growers was organized at Hyderabad, Telangana and attended by eighteen farmers.
- One day training on “Vertebrate Pest Management” for the farmers was organized at Pedda Shapur, Sahamshabad Mandal, Rangareddy District and attended by twenty two farmers.

FORTHCOMING PROGRAMMES (October-December, 2024)

Name of the programme	No. of Days	From	To
Vertebrate Pest Management – Wild boar, Monkey and Birds	03	14.10.2024	16.10.2024
Seed Health Testing and Molecular Diagnostic Techniques for plant pathogens	05	14.10.2024	18.10.2024
Phytosanitary measures for safe export	03	04.11.2024	06.11.2024
Rodent Pest Management in Grain Storage	05	18.11.2024	22.11.2024
Advance techniques for identification of crop pests	05	25.11.2024	29.11.2024
Pest Surveillance techniques for Agricultural and Horticultural crops (Kharif /Rabi)	05	02.12.2024	06.12.2024
Forced Hot Air Treatment (FHAT)	05	16.12.2024	20.12.2024
Certificate Course on Urban Integrated Pest Management	15	Dates to be decided	

Plant Health Management Division

The Plant Health Management Division has organized following training programmes during the months of **July-September, 2024**.

Capacity Building Programmes:

S No	Name of the programs	Duration (Days)	From	To
I.	Officers programme			
1.	Field diagnosis and management of plant parasitic nematodes	05	01.07.2024 to	05.07.2024
2.	Orientation Training to Master Trainers for Safe and Judicious Use of Glyphosate by PCOs	01	16.07.2024	-
3.	Orientation training on Plant Health Management for newly recruited officials of DPPQ&S	30	20.06.2024	19.07.2024
4.	Production Protocol for Bio control agents (predators, parasitoids, microbial bio pesticides & bio fertilizers)	21	18.07.2024	07.08.2024
5.	Bio-input Production and Application in Organic and Natural Farming Systems	05	29.07.2024	02.08.2024

6.	Production protocol for bio-fertilizers and bio-pesticides	03	05.08.2024	07.08.2024
7.	Training of Trainers on On-Farm production of Trichoderma and Pseudomonas using NIPHM media	02	05.08.2024	06.08.2024
8.	Bio-input Production and Application in Organic and Natural Farming Systems	05	19.08.2024	23.08.2024
9.	On-farm production of bio control agents and microbial bio pesticides	10	21.08.2024	30.08.2024
10.	Plant Health Management Strategies for Organic and Natural Farming Systems	05	02.09.2024	06.09.2024
11.	Production Protocol for Entomopathogenic Nematodes	05	09.09.2024	13.09.2024
12.	Pest problems and their management under changing climatic scenario	03	18.09.2024	20.09.2024
13.	Field diagnosis of pests for Integrated Pest Management	05	23.09.2024	27.09.2024
II.	Farmers training programme			
1.	On-farm production of bio-inputs	02	01.07.2024	02.07.2024
2.	On-farm production of bioinputs	02	15.07.2024	16.07.2024
3.	Bio-input production and application in Organic and Natural Farming Systems	05	05.08.2024	09.08.2024
4.	On-farm production of Bio-inputs	3	12.08.2024	14.08.2024
5.	On-farm production of bio-inputs	2	19.08.2024	20.08.2024
6.	On-farm production of bio-inputs	02	12.09.2024	13.09.2024
7.	Training cum demonstration on usage of bio-inputs in FCV tobacco	02	18.09.2024	19.09.2024
III.	Webinars/Workshop			
	Nil	-	-	-
IV.	Student training programme			
	Nil	-	-	-

Training programme for officers

➤ Field diagnosis and management of plant parasitic nematodes

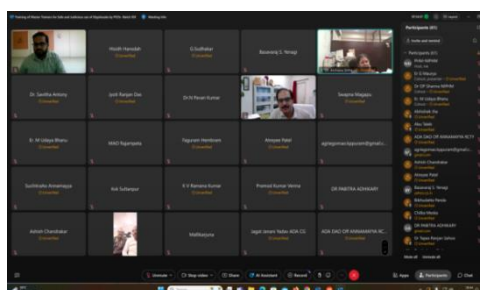
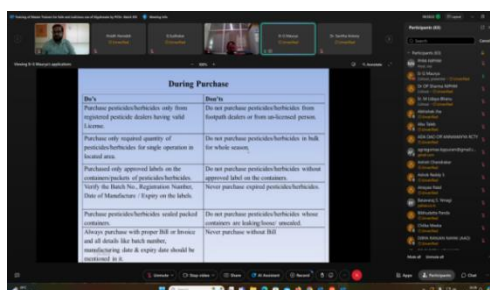
As per the approved training calendar, NIPHM conducted training programme on “Field diagnosis and management of plant parasitic nematodes” from 01.07.2024 to 05.07.2024 (5 days). In this program, a total of 08 officials from different places of India have participated. The participants have undergone different sessions such as current status of plant parasitic nematode Problems in India, nematode management through bio-pesticides, sampling and extraction of plant parasitic nematodes, Integrated Nematode Management in Vegetables grown in poly houses, Plant parasitic nematodes of quarantine importance in India, field and polyhouse visit at NIPHM for infestation, On Farm Mass Production of Trichoderma,

Pseudomonas and different bio-fertilizers for the biological control of nematodes, Plant parasitic nematodes in orchard crops and their management. Hands on practices were done on handling of Nematodes, entomopathogenic nematodes, diagnosis of Plant parasitic nematodes in Horticultural crops.



➤ **Orientation Training to Master Trainers for Safe and Judicious Use of Glyphosate by PCOs**

A training programme on ‘Orientation Training to Master Trainers for Safe and Judicious Use of Glyphosate by PCOs’ Batch- XIII’ was organized at NIPHM on 16.07.2024. Total of 71 Officers/ Scientists from KVKs, SAUs, SAMETIs, DPPQ&S and State Agriculture Dept. of different states have attended. In this training program, awareness about Glyphosate and its uses, properties of Glyphosate & its formulations, toxicity , environmental effects, doses, calculations and weed control efficiency of glyphosate, label and leaflet warnings, DOs and DON'Ts, safety precautions and application techniques of Glyphosate herbicide were covered. The programme was aimed to sensitise and create a pool of Master Trainers for training the rural youths to act as Pest Control Operators (PCOs) and implement restricted use of Glyphosate around the country. Dr Archana Sinha Joint Director (Chemistry) & Addl. PPA DA&FW also interacted with participants and clarified the queries as per CIBRC norms.



➤ **Orientation training on Plant Health Management for newly recruited officials of DPPQ&S**

An orientation training program on plant health management for newly recruited officials of DPPQ&S was conducted from 20.06.2024 to 19.07.2024 (30 days). In this training programme, a total of 30 participants from DPPQ&S were trained. During this training program different aspects of Plant health management such as on farm production of different biocontrol agents, locust management, weed management, GAP, quality control of biopesticides were covered. Introduction to Plant Biosecurity and Plant Quarantine, International regulatory framework, Overview of Plant Quarantine in India including Import Regulations – DIP Act and PQ Order, 2003, Agricultural Biosecurity in India and role of National Agricultural Biosecurity System, phytosanitary terminology, Group exercise: phytosanitary terminology, Pest incursion management, etc. were arranged. Pesticide management aspects like insecticides Act, 1968, Insecticides Rules, 1971, pesticide formulations & their compatibility, quality control of pesticide formulations, analysis of pesticide formulation, chromatographic analysis of pesticide formulation were part of the course. Food safety and pesticide residue regulations, pesticide residues, pesticide formulations etc. were also covered. Participants have also visited ICRISAT, Plant Quarantine station, Hyderabad etc. for exposure visit.



➤ **Production Protocol for Bio control agents (predators, parasitoids, microbial bio pesticides & bio fertilizers)**

A training program on Production Protocol for Bio control agents (predators, parasitoids, microbial bio pesticides & bio fertilizers) is scheduled at NIPHM from 18.07.2024 to 07.08.2024 (21 days). In this program, a total of 22 officers/scientists from different SAUs, KVKs and ICAR institutes and State departments were participated. They underwent sessions on Introduction to biological control of insect pests and plant diseases, Ecological engineering for pest management, Role of pheromones in pest management, Production protocol for mass production of egg and larval parasitoids, Role of entomophagous insects in pest management, Role of

biopesticides in plant disease management, Establishment of microbial biopesticides laboratory, Novel bio-inoculants for sustainable agriculture, Biological control of weeds, Use of entomopathogenic nematodes (EPN) for sustainable agriculture, Role of botanicals in pest management, Registration of bio pesticides, Analysis of Biopesticides for chemical contaminants, Development of Advanced formulations of *Trichoderma*, Major challenges in implementation of BCAs at field level, Impact of climate change on entomopathogens and their mitigation, etc. The program shall be helpful to the participants in understanding and getting hands-on experience on production of different bio control agents and microbial bio-fertilizers.



➤ **Production protocol for bio-fertilizers and bio-pesticide**

A training programme on ‘Production Protocol for Bio-fertilizers and Bio-pesticides’ has been organized by NIPHM from 05.08.2024 to 07.08.2024 (3 days). In this programme total of 16 officials/entrepreneurs from different states have been participated. This training is helpful to the participants to knowledge on aspects of bio-input production such as mass production and quality control of biofertilizers & biopesticides.



➤ Training of Trainers on On-Farm production of Trichoderma and Pseudomonas using NIPHM media
 Training of Trainers on ‘On-farm production of Trichoderma and Pseudomonas using NIPHM media’ was conducted from 05.08.2024 to 06.08.2024 at NIPHM. A total of 4 Agriculture Officers from two districts have attended the program. The training sessions were conducted on importance of Trichoderma and Pseudomonas in improvement of soil health, On-farm Production of Trichoderma and Pseudomonas using NIPHM media, hands on practice and demonstration on application methods of Bio pesticides were organised.





➤ **Bio-input Production and Application in Organic and Natural Farming Systems**

As part of the capacity building programs proposed under Panjabrao Deshmukh Naisargik Sheti Mission (PDNSM)-Maharashtra, two training programmes on *Bio-input Production and Application in Organic and Natural Farming Systems* has been organized from 29.07.2024 to 02.08.2024 and 19.08.2024 to 23.08.2024 (5 days). A total of 51 field officers from different districts of Maharashtra have participated. They underwent sessions on the concept and principles of organic and natural farming, Agro Ecosystem Analysis, Ecological Engineering for pest management, protocols and requirements for the establishment of Bio-input production Centres, hands-on practice sessions on farm-level production of bio-fertilizers, bio-pesticides, and biological control agents, etc. This program shall be helpful to the participants in the knowledge of protocols for on-farm production of bio-inputs, application methods, and establishment of BRCs. Officers shall able to other field-level staff in the execution of the bio-inputs production and relevant schemes. The officers have visited NIPHM laboratories, farm, AICRP-IFS unit, PJTSAU, Hyderabad, and experienced the significance of integrated farming systems in organic and natural farming practices and preparations adopted by the unit.





➤ **On-farm production of bio control agents and microbial bio pesticides**

An officers training program on ‘On-farm production of bio control agents and microbial bio pesticides’ was organised from 21.08.2024 to 30.08.2024 (10 days). In this training program a total of 9 participants from SAUs, State Dept. of Agriculture and NGOs have participated. The participants underwent various sessions such as, Introduction to Biological Control of Insect Pests, Protocols and requirements for bio-input production units, Role of Parasitoids in bio-control of insect pests, Role of botanicals and ITK consortia for pest management, Botanical and ITK consortia: preparation and application methods, Mass production techniques of laboratory host: *Corcyra cephalonica*, Mass production techniques of different parasitoids (egg and egg larval), Introduction to Biological Control of Plant Diseases, Ecological Engineering for Pest Management, Role of pheromones in insect pest management. Hands on practice sessions were organised on ‘On-farm production of Bio control agents and microbial bio pesticides. Visit to KN Biosciences and ICAR-IIOR were also organised as a part of training program.



➤ **Plant Health Management Strategies for Organic and Natural Farming Systems**

As part of the capacity building programs proposed under Panjabrao Deshmukh Naisargik Sheti Mission (PDNSM)-Maharashtra, a training programme on Plant Health Management Strategies for Organic and Natural

Farming Systems has been organized from 02.09.2024 to 06.09.2024 (5 days). A total of 24 officers from different districts of Maharashtra have participated. The participants underwent sessions on the concept and principles of organic and natural farming, Agro Ecosystem Analysis, Ecological Engineering for pest management, protocols and requirements for the establishment of Bio-input Production Centres, hands-on practice sessions on farm-level production of bio-fertilizers, bio-pesticides, and biological control agents, etc. This program shall be helpful to the participants in the knowledge on protocols for on-farm production of bio-inputs, application methods, establishment of BRCs and quality control aspects. Officers shall be able to train other field-level staff in the execution of the bio-control programmes and bio-inputs production at the field level. The officers have visited NIPHM laboratories, farm, and Natural farming farm, Shabad Mandal and experienced about significance of integrated farming systems in organic and natural farming practices and preparations suitable for non-chemical farming systems. The trainee officers have keenly observed and practiced the production methods of different bio-inputs.



➤ **Production Protocol for Entomo-pathogenic Nematodes**

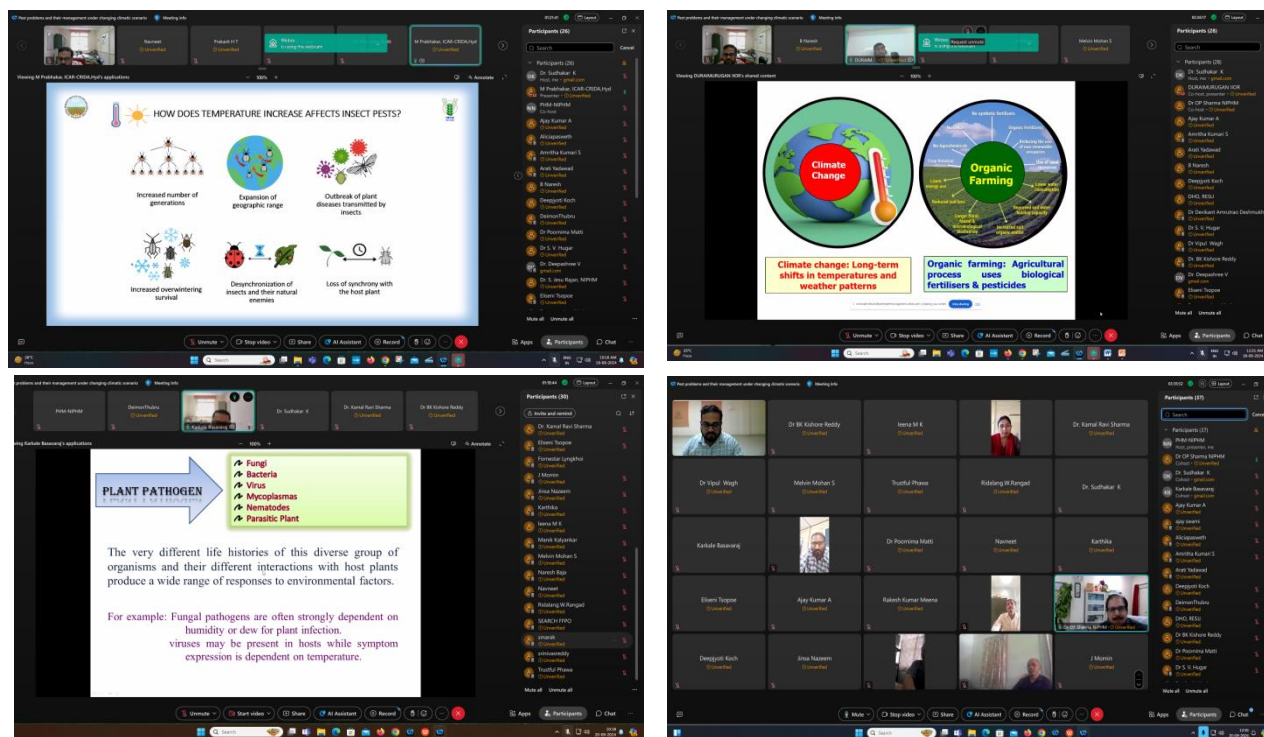
A training program on ‘Production Protocol for Entomo-pathogenic Nematodes’ was conducted from 9th to 13th September, 2024. In this training program a total of 20 participants from different states have been participated. They underwent sessions on Introduction to Biological Control -Principles and Concepts. On farm

Mass production of host insect: *Corcyra cephalonia* and Wax moth. Introduction to Entomopathogenic nematodes. Formulation of Entomopathogenic nematodes. Morphological and Molecular Identification of Entomopathogenic nematodes. Success stories of use of EPN for the management of soil insects pests. Application methods of EPN.



➤ **Pest problems and their management under changing climatic scenario**

As per the training calendar of NIPHM 2024-25, training programme on ‘Pest problems and their management under changing climatic scenario’ has been organised by NIPHM in **online mode** from 18.09.2024 to 20.09.2024 (3 days). In this program, 35 officers from different states have participated. They underwent sessions on climate change impact on crop pest interactions and pest management adaptations, impact of climate change on entomopathogens & mitigation, impact of climate change on crop pest outbreak, impact of climate change on plant disease outbreak, ecological engineering for climate resilient pest management, eco-friendly inputs for pest management, mitigation strategies for climate change. This program shall be helpful to the participants in getting advanced knowledge about impact of climate change on pest scenario and their management using various climate resilient practices.



➤ Field diagnosis of pests for Integrated Pest Management

An exclusive training programme for CROPSAP officials was conducted on ‘Field diagnosis of pests for Integrated Pest Management under CROPSAP (Maharashtra)’. In this program a total of 34 field level officers from different districts of Maharashtra have attended. The participants underwent various aspects of pest monitoring practices like principles of IPM & insect pest management, field diagnosis of pests: AESA exercise (field visit) and major diseases, integrated disease management in rice cotton and pulses, role of seed treatment in soil borne disease control role of bio-fertilizers in PHM, integrated nutrient management in field crops, use of Entomopathogenic fungi (EPF) and NPV in pest management, on-farm production of parasitoids & predators, on-farm production of *Trichoderma* spp. & *Pseudomonas fluorescens*, safe & judicious use of pesticides, integrated nematode management & mass production and use of EPN, on-farm production of biofertilizers and application methods.





Farmers training programmes

➤ On-farm production of bio-inputs' (A special programmes for Development foundation, Ghaziabad)

As part of the capacity building program in collaboration with Development foundation, Ghaziabad, 4 farmers training programme on 'On-farm production of bio-inputs' were organized from 01.07.2024 to 02.07.2024 ; 15.07.2024 to 16.07.2024; 19.08.2024 to 20.08.2024 (2 days); 12.09.2024 to 13.09.2024. A total of 166 FPO members/ farmers from Nashik district of Maharashtra have participated. Participants underwent sessions on natural farming preparations and its application methods, on-farm production of bio-pesticides (*Trichoderma* & *Pseudomonas*), EPF, NPV, bio-fertilizers and its application methods, on-farm production of predators and parasitoids, mass production of entomopathogenic nematodes. This program shall be helpful to the participants in providing the knowledge and skills for protocols for on-farm production of bio-inputs, application methods, and establishment of BRCs.





➤ **Bio-input production and application in Organic and Natural Farming Systems'**

As per the Request received from ATMA, Buladana, MS a special training program “Bio-input production and application in Organic and Natural Farming Systems” is being organized at NIPHM from 05.08.2024 to 09.08.2024 (5 days). In this program, a total of 35 (32 farmers + 3 Block development officers) have participated. All are from Buladana district of Maharashtra. Participants underwent sessions on natural farming preparations and its application methods, on-farm production of bio-pesticides (*Trichoderma* and *Pseudomonas*), EPF, NPV, bio-fertilizers and its application methods, on-farm production of predators and parasitoids, mass production of entomopathogenic nematodes, natural farming preparations and botanical extracts.. This program shall be helpful to the participants in providing the knowledge and skills for protocols for on-farm production of bio-inputs, application methods, and establishment of Bio-input resource centres.



➤ **Farmers training program on ‘On-farm production of Bio-inputs’**

As part of the capacity building programs proposed under Panjabrao Deshmukh Naisargik Sheti Mission (PDNSM)-Maharashtra, a FPO farmer training programme on On-farm production of bio-inputs has been organized from 12.08.2024 to 14.08.2024 (3 days). A total of 33 FPO farmers from different districts of Maharashtra have participated. They underwent hands-on training sessions like Agro Ecosystem Analysis, Ecological Engineering for pest management, on-farm production of bio-fertilizers, biopesticides, and biological control agents, etc. This program shall be helpful to the farmers in the knowledge of protocols for on-farm production of bio-inputs, application methods, establishment of BRCs, etc. FPO group farmers shall be able to initiate the bioinputs production as rural enterprises and it may enhance the cultivable area of organic and natural farming in Maharashtra. The farmers have visited NIPHM laboratories, AICRP-IFS unit, PJTSAU, Hyderabad and experienced the significance of integrated farming systems in organic and natural farming practices and preparations adopted by the unit.



➤ **Training cum demonstration on usage of bio-inputs in FCV tobacco**

Two training cum demonstrations on usage of bio-inputs in FCV tobacco were conducted at NLS region, Tobacco Board, Andhra Pradesh and facilitated training cum demonstrations on on-farm production of *Trichoderma*, *Pseudomonas fluorescens* and biofertilizers and demonstrated the different methods of application in FCV tobacco on 18.09.2024 & 19.09.2024. The growers were taught about the importance of different bio

inputs in FCV Tobacco and a demonstration was conducted by the usage of bio inputs in the enrichment of cocopeat and FYM with NIPHM bio inputs at each platform. A total of 180 tobacco growers attended and interacted with application methods of bio-inputs.



Forthcoming training programmes in PHM Division

S No	Name of the programme	Durati on (No. of Days)	From	To
I.	Officers training programmes			
1.	Conservation of pollinators for sustainable agriculture – online	03	07.10.2024	09.10.2024
2.	Bio-inputs production and application in organic and natural farming systems	05	04.10.2024	08.10.2024
3.	Establishment of bio-input resource Centre (BRCs)	05	04.11.02024	08.11.2024
4.	Locust Pest Management – Online	03	12.11.2024	14.11.2024
5.	Plant Health Management Approaches for sustainable Agriculture	21	20.11.2024	10.12.2024
6.	Plant Health Management in Fruit Crops	05	09.12.2024	13.09.2024

II.	Farmers training programmes			
1.	Establishment of bio-input production centre	03	Dates to be decided	
III.	Certificate course-			
1.	Certificate Course on PHM in Organic and Natural Farming	90	27.11.2024	05.03.2025

Pesticide Management Division

The Pesticide Management Division has organized following training programmes during the months of **July-September, 2024**.

Capacity Building Programmes:

Sl. No.	Name of the programme	No. of Days	From	To
1.	Inspection, Sampling and Prosecution Procedures under Insecticide Act, 1968 (ISPP)	04	02.07.2024	05.07.2024
2.	Sampling of Fruits, Vegetables and other items for Pesticide Residue Analysis	02	08.07.2024	09.07.2024
3.	Sampling of Fruits, Vegetables and other items and Calibration of laboratory equipment for Pesticide Residue Analysis	05	08.07.2024	12.07.2024
4.	Handling/Operation of GC-MS/MS and LC-MS/MS for Chemical/Pesticide Analysis (Payment basis)	05	08.07.2024	12.07.2024
5.	Pesticide Residue Analysis (Payment basis)	05	22.07.2024	26.07.2024
6.	Pesticide Formulation Analysis	60	23.07.2024	20.09.2024
7.	Testing of Physicochemical properties of Pesticide formulations	05	05.08.2024	09.08.2024
8.	Toxicity Profile of Pesticides with Reference to Cotton Crop (Payment Basis)	02	13.08.2024	14.08.2024
9.	Management of Pesticides and their Residues for the Protection of Food Crops (ITEC-MEA programme)	14	21.08.2024	03.09.2024

1.	Inspection, Sampling and Prosecution Procedures under Insecticide Act, 1968 (ISPP)	04	03.09.2024	06.09.2024
2.	Laboratory Quality Management and Internal Audit as per the ISO/IEC17025:2017	05	09.09.2024	13.09.2024
3.	Inspection, Sampling and Prosecution Procedures under Insecticide Act, 1968 (ISPP)	04	23.09.2024	27.09.2024
4.	Instrumental Analysis (GC & HPLC) of Pesticide Formulation (For student on payment basis)	05	23.09.2024	27.09.2027

➤ **Inspection, Sampling and Prosecution Procedures under Insecticide Act, 1968 (ISPP):**

The division has conducted a training programme on “**Inspection and Sampling & Prosecution procedures under Insecticide Act, 1968**” from **02.07.2024 to 05.07.2024 (4 days)**. A total of **36 participants/ officers** have participated from eight States viz. Karnataka, Meghalaya, Maharashtra, Gujarat, Goa, Andhra Pradesh, Haryana and Chhattisgarh. The participants were trained on techniques of inspection, sampling of pesticides & prosecution for quality control and various aspects of the Insecticide Act , 1968 & Insecticide Rules 1971.



Inspection, Sampling & Prosecution Procedures under Insecticide Act 1968

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

Two days training programme on “**Sampling of Fruits, Vegetables and other items for Pesticide Residue Analysis**” was conducted from **08.07.2024 to 09.07.2024**. Two private **participants** were participated from General Mills India Private Limited, Mumbai. The participants were trained on sampling of Fruits, Vegetables and other items for pesticide residues analysis.



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

➤ **Sampling of Fruits Vegetables and other items and Calibration of Laboratory equipment for Pesticide Residue Analysis:**

Five days training programme on “Sampling of Fruits, Vegetables and other items and Calibration of Laboratory equipment for Pesticide Residue Analysis” was conducted **from 08.07.2024 to 12.07.2024**. A total of **5 participants** were participated from State Agriculture Department of, Maharashtra, Rajasthan and Uttarakhand. The participants were trained on sampling of Fruits, Vegetables and other items for pesticide residues analysis and Calibration of Laboratory equipment for Pesticide Residue Analysis.



Sampling of Fruits, Vegetables and other items and Calibration of Laboratory equipment for Pesticide Residue Analysis

➤ **Handling/Operation of GC-MS/MS and LC-MS/MS for Chemical/Pesticide Analysis (Payment basis):**

The Division has conducted 5 days training programme on “Handling/Operation of GC-MS/MS and LC-MS/MS for Chemical (Pesticide) Analysis” **from 08.07.2024 to 12.07.2024**. The programme is designed for students and private Laboratories working in the field of analytical. A total of 11 private **participants** were participated. The participants were trained on operation of GC-MS/MS and LC-MS/MS for pesticides analysis.

➤ **Pesticide Residue Analysis (Payment basis):**

The Division has conducted 5 days training programme on “Pesticide Residue Analysis” **from 22.07.2024 to 26.07.2024**. The programme is designed for students and private Laboratories working in the field of pesticide residue analysis. A total of 13 **participants** including students from TNAU Tamil Nadu, MPKV Rahuri and private laboratories were participated. The participants were trained on basic pesticide residues analysis in agricultural commodities and water sample.



Pesticide Formulation Analysis (60 days)

➤ **Pesticide Formulation Analysis:**

The Division has conducted 60 days training programme on “Pesticide Formulation Analysis” **from 22.07.2024 to 20.09.2024** for the officials working in Pesticide Testing Laboratory to impart hands on training on various technique involved in quality control of pesticide such as Volumetric/Titrimetric method, Chromatographic method and Spectrophotometer method. The participants were from various State Agricultural Dept. of Jammu and Kashmir, Telangana, Karnataka, Tamil Nadu, Maharashtra, Puducherry, Rajasthan and Madhya Pradesh.



Pesticide Formulation Analysis (60 days)

➤ **Testing of Physicochemical Properties of Pesticide Formulation:**

Five days training programme on “Testing of Physicochemical properties of Pesticide formulations” was conducted **from 05.08.2024 to 09.08.2024**. A total of 18 **participants** were participated from State Agriculture Department of, Tamil Nadu, Bihar, Rajasthan and Haryana. The participants were trained importance of testing of physical parameters of pesticide for quality.



Testing of Physicochemical Properties of Pesticide Formulation

➤ Toxicity Profile of Pesticides with Reference to Cotton Crop (Payment Basis)

Two days training programme on “Toxicity Profile of Pesticides with Reference to Cotton Crop” was conducted from **13.08.2024 to 14.08.2024**. A total of **49 participants** were participated from State Agriculture Department of, Maharashtra, Rajasthan and Uttarakhand. The participants were trained on Toxicity Profile of Pesticides for cotton crops.



Toxicity Profile of Pesticides with Reference to Cotton Crop

➤ Management of Pesticides and their Residues for the Protection of Food Crops (ITEC-MEA programme)

The division has conducted a training programme on “Management of Pesticides and their Residues for the Protection of Food Crop from **21.08.2024 to 03.09.2024**. A total of **26 participants** from 14 countries (Bhutan, Cameroon, Eritrea, Ethiopia, Ghana, Guyana, Mozambique, Nepal, Sri Lanka, Suriname, Tanzania, Uganda and Zimbabwe) were participated. The trainees were trained on pesticide regulation, Quality control of pesticides, Pesticide Application techniques, Bio-intensive pest Management, Food safety and GAP practices. It also includes hands on practical of Pesticide Residues Analysis and testing of pesticides for Quality Control.



Management of Pesticides and their Residues for the Protection of Food Crops (ITEC-MEA programme)

➤ **Inspection, Sampling and Prosecution Procedures under Insecticide Act, 1968 (ISPP):**

Four days training programme on “Inspection, Sampling and Prosecution Procedures under Insecticide Act, 1968 was conducted from **03.09.2024 to 06.09.2024**. A total of **13 participants** were participated from State Agriculture Department of Maharashtra, Tamil Nadu, and Goa. The participants were trained on inspection, techniques of sampling of pesticides & procecution for quality control and various aspects of the Insecticide Act , 1968 & Insecticide Rules 1971.



Inspection, Sampling and Prosecution Procedures under Insecticide Act, 1968

➤ **Laboratory Quality Management System and Internal Audit as per ISO/IEC 17025: 2017**

Five days training programme on “Laboratory Quality Management System and Internal Audit as per ISO/IEC 17025: 2017” was conducted **from 09.09.2024 to 13.09.2024**. A total of **35 participants** including 17 trainees of Pesticide Formulation programme. The participated were from State Agriculture Department of Andhra Pradesh, Gujarat, Maharashtra, Uttar Pradesh, Tamil Nadu, Telangana, Odisha, and Punjab. The participants were trained on general requirements of a testing laboratories and procedure for internal Audit as per ISO/IEC 17025: 2017.



Laboratory Quality Management System and Internal Audit as per ISO/IEC 17025: 2017

➤ **Inspection, Sampling and Prosecution Procedures under Insecticide Act, 1968**

The division has conducted 4 days special training programme for Bihar State on “Inspection, Sampling and Prosecution Procedures under Insecticide Act, 1968 from **23.09.2024 to 27.09.2024**. A total of **18 participants** were participated from State Agriculture Department of Bihar. The participants were trained on inspection, techniques of sampling of pesticides & procecution for quality control and various aspects of the Insecticide Act , 1968 & Insecticide Rules 1971.

➤ **Instrumental Analysis (GC & HPLC) of Pesticide Formulation (Payment basis)**

The division has conducted 5 days training programme on “Instrumental Analysis (GC & HPLC) of Pesticide Formulation” from **23.09.2024 to 27.09.2024**. A total of **5 students** were participated from the Universities. The participants were trained on Instrumental analysis of Pesticide Formulation by GC and HPLC.

Sl. No.	Title of the Programme	Duration	From	To	Eligibility Criteria
1.	Method validation and Measurement of Uncertainty in Pesticide Residue Analysis	5	18.11.2024	22.11.2024	Analysts / Scientists involved in Pesticide Residue Analysis in Govt. Labs / Universities

2.	Pesticide Residue Analysis (PRA)	21	20.11.2024	10.12.2024	Analysts/ Scientists working in Govt. laboratories/Universities
3.	Inspection, Sampling and Prosecution Procedures under Insecticide Act, 1968 (ISPP)	4	03.12.2024	06.12.2024	Prospective or Designated Insecticide Inspector (Central / State)
4.	Laboratory Quality Management System and Internal Audit as per ISO/IEC 17025: 2017	5	09.12.2024	13.12.2024	Analysts working in Government Laboratories

Plant Health Engineering Division

The Plant Health Engineering Division has organized following training programmes during the months of **July-September, 2024**.

Capacity Building Programmes:

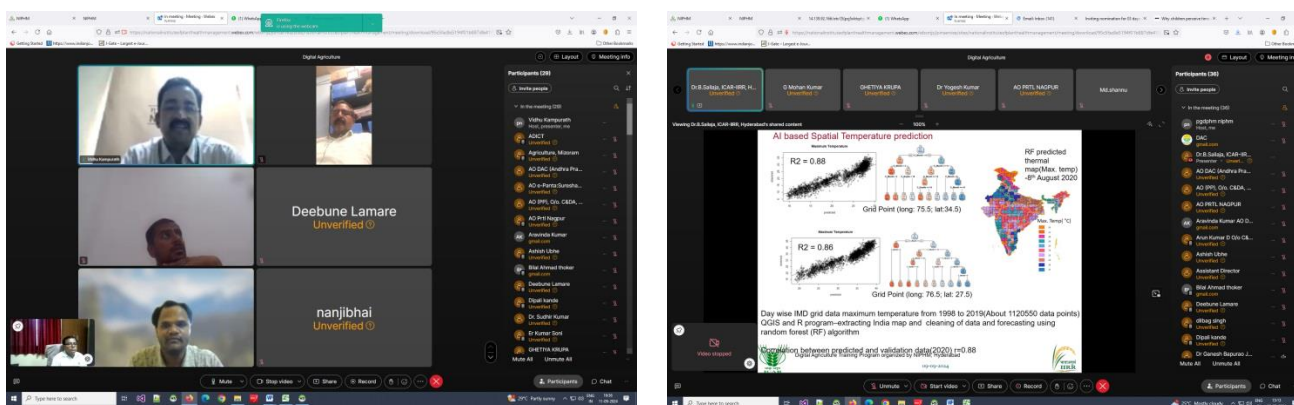
S No	Category	Name of the programme	No. of Days	From	To
1.	Officers	Digital Agriculture-Virtual Mode	03	09.09.2024	11.09.2024
2.	Officers	Pesticide Application Techniques and Safety Measures (BAMETI) on Payment-Physical Mode	05	23.09.2024	27.09.2024
3.	Officers	Pesticide Application Techniques and Safety Measures-Virtual Mode	05	19.08.2024	23.08.2024
4.	Students	Micro irrigation, water shed management and precision farming-Physical mode	10	02.09.2024	12.09.2024
5.	Students	Pesticide Application Techniques and Safety Measures-Physical mode	08	01.07.2024	08.07.2024
6.	Farmers	Pesticide application Techniques and Safety Measures -Virtual Mode	01	03.08.2024	03.08.2024

Drone Remote Pilot Certification

S No.	Name of Training Program/ Webinar	From (dd-mm-yyyy)	To (dd-mm-yyyy)	Duration (in days)	On/Off Campus
1.	Basic Remote Pilot Certification	01.07.2024	05.07.2024	05 days	On campus
2.		15.07.2024	19.07.2024		
3.		22.07.2024	26.07.2024		
4.		05.08.2024	09.08.2024		
5.		20.08.2024	24.08.2024		
6.		16.09.2024	20.09.2024		
7.		23.09.2024	26.09.2024		

➤ **Digital Agriculture**

An online training program on “Digital Agriculture” of 3 days duration was organized from 09th to 11th September 2024. In this, 25 participants 15 Male and 10 Female participated.



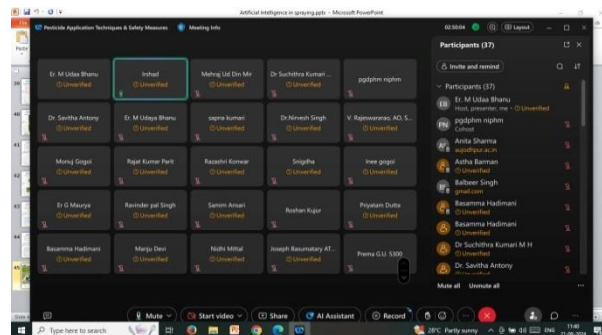
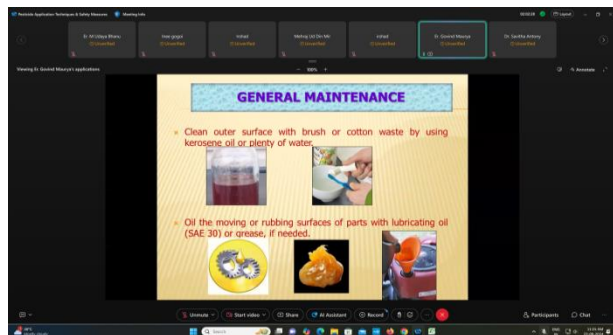
➤ **Pesticide Application Techniques and Safety Measures for BAMETI officials on Payment:**

A special 5 days training on “Pesticide Application Techniques and Safety Measures” for the *BAMETI* officials at the NIPHM campus on from 23rd to 27th September 2024 on payment basis. Eighteen officials (14 male and 4 female) registered and attended the training programme.



➤ **Pesticide Application Techniques and safety Measures:**

One online training programme on “Pesticide application techniques and safety measures” was conducted between 19th to 23rd August 2024. The group consisted of 33 participants (17 female and 16 male) from 9 states attended. The trainees were imparted the principles of pesticide application techniques, nozzles, various types of application methods, formulation and compatibility issues, advanced application measures, drones in agriculture.



➤ **Pesticide Application Techniques and Safety Measures:=-**

"Pesticide Application Techniques and Safety Measures" training conducted for the Agricultural Engineering students from Kerala (St Thomas College of Engg & Technology). A total of 28 students (07 male and 21 female) attended 8 days training programme from 01st to 8th July 2024.



➤ **Micro irrigation, water shed management and precision farming**

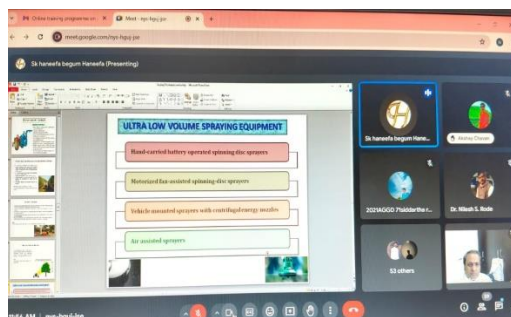
Training programme on “Micro irrigation, watershed management and Precision farming” conducted for the Agricultural Engineering students from Kellapaji College of Agricultural Engineering and Technology, Tavanur, Kerala. A total of 38 students (6 male and 32 female) attended the 10 days training programme from 2nd to 12th September 2024. The program emphasized on Micro irrigation systems, Concepts of Remote sensing, GIS, Basics of GPS and its applications, Ground water management, Wastewater management, Drones in Agriculture, IoT in agriculture, Geo informatics and sensor based technology in precision farming, Advances in planning water

harvesting intervention and irrigation management and also visited ICRISAT, Jain irrigation, WTC, PJTSAU and CRIDA HRF institutes as part of training..



➤ **Pesticide application Techniques and Safety Measures**

Two online farmers training was organized on “Pesticide Application techniques and safety measures” one programme was conducted on 3rd August 2024 with collaboration KVK, Hingoli, Maharashtra total 28 farmers attended, and second was conducted on 30th August 2024 with collaboration MGM Nanasaheb Kadam College of Agriculture, Gandheli, Maharashtra total 68 farmers attended the programme. Collaborative parties gathered participants and NIPHM speakers took the lectures on Application techniques, nozzles and safety precautions.



Drone trainings

➤ **Basic Remote Pilot Certification:**

This training is part of the Drone Academy who trains and certifies the Drone Pilots for use of drones in various applications. The academy has been certified as RPTO (Remote Pilot Training Organization) in association with an Industry partner (M/s Marut Drones). Seven batches of 05 days training programmes on Basic Remote Pilot Certification were conducted for 49 participants. Lectures were arranged on topic viz., Introduction on international civil aviation organization, RPAS with in ICAO frame work, formation of RPAS, Classification of drones, Drone operation zones, ATC procedure , radio telephony and flight radio telephony, Basic principles of flight, Types of wind designs, Battery maintenance, Rotorcraft operations and aerodynamics, Application of

drones in each sector, Hybrid operations and aerodynamics, Weather and meteorology, Risk assessment and analysis safety management system, drone maintenance etc. The lab assembly and maintenance of drones and simulation experiments for drone flying also was included in the curriculum. Exclusive 2 days of on-field flying classes also were conducted in dual as well as solo mode.



✓ **Forthcoming training programmes**

S.No	Title of the Programme	From	To	Eligibility criteria	Course Coordinator & e-mail
1.	RS & GIS applications in Plant Health Management	19.11.2024	23.11.2024	Extension officers from State Dept. of Agri./ Horti., soil survey, soil conservation, Watershed Project, Scientists of ICAR/ SAUs , etc. working on GIS	Er. M. Udaya Bhanu sopeniphm2-ap@nic.in
2.	Irrigation systems and advancements	26.11.2024	28.11.2024	Extension officers from State Dept. of Agri./ Horti., soil survey, soil conservation, Watershed Project, Scientists of ICAR/ SAUs, etc.	Er. Govind Maurya asopeniphm1-ap@nic.in
3.	Pesticide application techniques and safety measures	02.12.2024	06.12.2024	Extension officers from State Agriculture and Horticulture departments, Scientists of ICAR, SAUs and officials from KVKs, DPPQs, NGOs	Dr. Vidhu Kampurath jdenggniphm-ap@nic.in
4.	Enhancing efficiency through optimum spraying techniques for effective pest and disease control	03.12.2024	23.12.2024	Extension officers from State Dept. of Agri./ Horti., soil survey, soil conservation, Watershed Project, Scientists of ICAR/ SAUs , etc.	Dr. Vidhu Kampurath jdenggniphm-ap@nic.in Er. Govind Maurya asopeniphm1-ap@nic.in

Special Events

- The 78th Independence Day has been celebrated at NIPHM on 15.08.2024. Dr. Sagar Hanuman Singh, IPoS, Director General, NIPHM has hoisted the National Flag in the office campus. Following the flag hoisting ceremony, prizes were distributed to the winners and runners in the competitions conducted among the officer/staff working at NIPHM.



Parthenium Awareness week 2024

Parthenium, also known as carrot grass, is a problematic and aggressive weed posing a serious threat to agriculture, the environment and human health. It is an alien weed flora introduced into India during the mid-1950s from Mexico/America. Initially, *Parthenium* was a problem in waste and vacant land but now it has become a problematic weed in cropped fields as well. It causes health hazards like skin allergy (dermatitis), hay fever and asthma in human beings, and is toxic to livestock. It threatens native biodiversity besides loss of crop productivity. It is a nuisance in public amenity areas like parks, residential colonies and orchards. It harbors other pests like mosquitoes, cockroaches, rodents, etc. in urban areas. The weed squeezes grasslands and pastures, hence reducing the fodder supply. In view of the above, an awareness week is being observed at NIPHM from 16-22 August 2024. The program was inaugurated by Director General, Dr.Sagar Hanuman Singh, IPoS on 16.08.2024 and briefed about the *Parthenium* and scenario in India and encouraged to join hands to eliminate the *Parthenium* weed for health, environment safety and diversity. All the staff and trainees of NIPHM have participated and removed the *Parthenium* from the campus premises.

Glimpses of Parthenium Awareness week 2024



ABN ఆంధ్రజ్యోతి

కలుపు మొక్క పర్యావరణానికి హాని

రాజేంద్రనగర్, అంద్రప్రదేశ్ (అంధ్రజ్యోతి): కలుపు (పాఠేనియం) మొక్క పర్యావరణానికి, మానవుల ఆరోగ్యానికి హానికరమైన దీనిని అంద్రప్రదేశ్ అధికారికంగా పేర్కొని (ఎన్ఎస్-ఎమ్) ప్రకారం దానిని 1997 నేర్పే స్థాయికి తగ్గించేందుకు మొక్కల నిర్మూలనను ప్రతి ఒక్కరూ నిరూపించాలని అయిన నిబంధనలు రాష్ట్రప్రభుత్వం నేరం జారీ చేసింది. కలహింస కాలంలో పోల్ల నీయం మొక్కపై అధికారం నిర్వహించారు. ఈ సందర్భంగా పాప నీయం అంద్రప్రదేశ్ రాష్ట్రం గ్రామీణ పరిపాలనా అంశ కారా డివిజన్, గుంటూరు, 1990 ఏప్రిల్ కాలంలో మొక్కలను అంద్రప్రదేశ్ ప్రభుత్వం ద్వారా అధికారికంగా ప్రకటించింది. ఈ మొక్కలను తగ్గి వేరవేరు చేయాలని అంద్రప్రదేశ్ ప్రభుత్వం ప్రకటించింది. ఈ మొక్కలను తగ్గి వేరవేరు చేయాలని అంద్రప్రదేశ్ ప్రభుత్వం ప్రకటించింది. ఈ మొక్కలను తగ్గి వేరవేరు చేయాలని అంద్రప్రదేశ్ ప్రభుత్వం ప్రకటించింది.

జున్నెండ్ల శ్రీనివాసు రావుతో కలుపు మొక్కపై శ్రీనివాసు రావుగారు అంద్రప్రదేశ్ (ఎన్ఎస్-ఎమ్) ప్రకారం దానిని 1997 నేర్పే స్థాయికి తగ్గించేందుకు మొక్కల నిర్మూలనను ప్రతి ఒక్కరూ నిరూపించాలని అయిన నిబంధనలు రాష్ట్రప్రభుత్వం నేరం జారీ చేసింది. కలహింస కాలంలో పోల్ల నీయం మొక్కపై అధికారం నిర్వహించారు. ఈ సందర్భంగా పాప నీయం అంద్రప్రదేశ్ రాష్ట్రం గ్రామీణ పరిపాలనా అంశ కారా డివిజన్, గుంటూరు, 1990 ఏప్రిల్ కాలంలో మొక్కలను అంద్రప్రదేశ్ ప్రభుత్వం ద్వారా అధికారికంగా ప్రకటించింది. ఈ మొక్కలను తగ్గి వేరవేరు చేయాలని అంద్రప్రదేశ్ ప్రభుత్వం ప్రకటించింది. ఈ మొక్కలను తగ్గి వేరవేరు చేయాలని అంద్రప్రదేశ్ ప్రభుత్వం ప్రకటించింది.

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పాఠేనియం కలుపు మొక్క పర్యావరణానికి, మానవులకు హాని

పాఠేనియం నిర్మూలనను ప్రతి ఒక్కరూ నిరూపించాలని అంద్రప్రదేశ్ ప్రభుత్వం ప్రకటించింది.

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Visitors:

Officials: (Govt./Private/NGO)

- Secretary DA&FW and Minister and Ministry of Agriculture, Kerala visited NIPHM



- One batch of 57 agricultural engineering students from College of Agricultural Engineering, Madaksira along with two faculties visited Plant Health Engineering workshop on 13.09.2024 and got acquainted with low cost developed equipment and different types of sprayers and Drones.



- Fifteen officials from Directorate of Marketing and Inspection, DA& FW visited PHM Division as a part of institutional visit

- **Students Visit:** 55 students from College of agriculture Warangal, Telangana and 189 students from college of agriculture Maharashtra visited NIPHM.
- **Farmers Visit:** 40 farmers visited PHM division through ATMA, Solapur (MH) and 40 Agri-input dealers from Mahabubabad (TS) visited PHM Laboratories and Demonstration Farm.

Research & Development

- AICRP- Biocontrol is continued during the quarter.
- **Pesticide Formulation and Residue Analytical Centre (PFRAC):**

The Pesticide Formulation and Residue Analytical Centre (PFRAC), Pesticide Management Division, is an accredited laboratory in accordance to ISO/IEC 17025:2017. During the period the laboratory has collected 277 samples (Fruits, vegetables, cereals, pulses, milk and water) from Banjarahill Hyderabad, Medchal/Malkajigiri, Alwal and Saidabad under Central Sector Scheme “Monitoring of Pesticide Residues at National Level (MPRNL). The samples were analyzed for pesticide residues by LC-MS/MS and GC-MS/MS.

A total of 180 samples (fruit and vegetables) were received from ANGRAU and samples were analyzed under MPRNL scheme. The Laboratory also received 105 water samples from CSIR-NEERI for pesticide residues analysis by LC-MS/MS under MPRNL scheme.

The division has also received 103 tobacco samples from Tobacco Board, Guntur and 4 samples from Farmers of Telangana. All the samples were analyzed.

A total of 25 botanical/bio-pesticides samples were received from Andhra Pradesh, Bihar, Chhattisgarh, Karnataka, Maharashtra, Madhya Pradesh and Telangana. The samples were analyzed by GC-MS/MS and LC-MS/MS. Four samples of Azadirachtin received from Bihar were also analyzed.

A total of 20 pesticides formulation samples were analyzed that are received from National Seed Corporation, Food Corporation of India and other pvt. Customers for quality test.



Analysis of samples (PFRAC laboratory)

➤ **Proficiency Testing Center (PTC):
 Proficiency testing programme on Pesticide Residues Analysis (PT-PRA)**

PTC has organized PT PRA programme (PTC/PR/01 & 02/24-25) on Pomegranate and Rice Powder. The samples were sent to 34 participants during the month of August 2024 for evaluation of participant's laboratory performance.



Sample Preparation of Pomegranate & Rice Powder (PTC/PR/01 & 02/24-25)

➤ **PTC has initiated PT PRA water samples (PTC/PR/03/24-25) programme during the month Sept 2024. A total of 45 water samples were prepared for evaluation of participant's laboratory performance.**



Water Sample preparation for Proficiency testing (PTC/PR/03/2024-25)

➤ **Proficiency testing programme on Pesticide Formulation Analysis (PT-PFA)**

PTC conducted PT PFA programme on Lambda Cyhalothrin Technical, Imidacloprid WS and Fenvalerate EC (PTC/PF/01/02 & 03 /24-25) during the period. Samples were sent to 14 State Pesticide Testing Laboratories and two private participants. The laboratory (PFRAC) analysed samples for homogeneity and stability test. Participant's results were evaluated by using statistical z-score to evaluate the laboratory performance. Interim reports were sent to 16 participants.

- Commercial scaling up of irradiation protocol as phytosanitary measure for major cut flowers -funded by BARC-Board of Research in Nuclear Sciences (BRNS), Department of Atomic Energy (DAE), GOI.
- Survey and field evaluation of sterile insect technique for the management of Oriental fruit fly, *Bactrocera dorsalis* (Diptera:Tephritidae) infesting economically important fruit crops-funded by BARC-Board of Research in Nuclear Sciences (BRNS), Department of Atomic Energy (DAE), GOI.
- Development of eco-friendly and integrated stored grain pest management techniques for food grain storage in FCI godowns (multi-locations) - Funded by FCI.
- Hot Water Immersion Treatment (HWIT) of Chillies at Commercial scale -Funded by APEDA.
- Evaluation of Animal Out repellent against the wild boar & rodents
- In-house study on Feeding preference and development of stored pests in different millets and screening of plant powders for management

Lab Activities

- **QC lab for bio-pesticides:** During the quarter 39 biopesticide sample was received and tested for various quality parameters.
- **Biofertilizer Laboratory:** Various biofertilizers are produced and sold to trainees and farmers. During this quarter biofertilizers were given to 23 farmers.
- **Bio-pesticide laboratory:** Activities like demonstration of on-farm production of *Trichoderma* and *Pseudomonas* to trainees, maintenance of mother culture of *Trichoderma* and *Pseudomonas*. Bio-inoculum startup kit was provided to 10 officers from Different states
- **Host, predators and parasitoids lab:** NIPHM is maintaining and producing various parasitoids and predators for insect pest control. These beneficial insects, biocontrol agents were supplied to trainees and farmers for use in their fields. From July to August 19 farmers/ Scientists have taken different predators and parasitoids from NIPHM.

- **Nematology Laboratory.** As a part of the regular activities soil testing is done for soil samples for nematode population. During this quarter seven samples were tested for nematode population and advisories were given accordingly.
- Maintaining/Rearing of stored grain insect cultures viz. *Tribolium*, Rice weevil, Khapra, Pulse beetle, Cigarette beetle, saw toothed grain beetle and rice moth.
- Fruit fly lure preparation (ME & CUE) and sale
- Urban pest insect box preparation
- Maintenance of vermicompost unit and sale
- Disease specimen- Herbarium collection
- Maintenance of vermicompost unit at NIPHM and Staff Quarters

Extension Activities / Village Adoptions

Village Adoption: As a part of the development of model IPM village by NIPHM, the farmers encouraged for organic farming practices. On the occasion of parthenium awareness week, awareness was conducted at Government School at adopted village. Parthenium ill effects on crops and humans were explained to school children. Shramadanam was conducted in school premises to remove parthenium weed plants along with students and staff.



Faculty Achievements

- Dr. Alice R. P. Sujeetha, Director, Plant Biosecurity and Dr. C S Gupta, Scientific Officer, NIPHM attended the two days “Capacity Building Programme on Triangular Cooperation” from 19 to 20 September, 2024 at Research and Information System for Developing Countries, New Delhi. In the training program, Director-PBD briefed about the various activities of NIPHM and strength of NIPHM to collaborate with GIZ and RIS, New Delhi for capacity building programs. NIPHM has submitted the concept note for future collaboration with Research and Information System for Developing Countries, New Delhi.



- **Auditing:** Technical auditing of RCIPMC Bengaluru was done by PHM team and verified the technical activities of the centre.



- **Verification of RPTLs:** Facilities at Regional Pesticide Testing laboratory (RPTL), Chandigarh and Kanpur was verified for facilities available for microbial bio-pesticides quality testing.



Other Activities

- **MoU with Development foundation:** A meeting was held with Director-Development **Foundation** on 26th July, 2024 regarding the training of support staff for State Warehousing Corporations (SWCs) and other agencies across India under the chairmanship of DG, NIPHM. Final MoU was prepared and signed original MoU received and submitted the same to Registrar .
- The MoU between NIPHM and Barefoot School of Foundation was held on 10.09.2024 at DG Conference Hall, NIPHM. The Registrar, Director (PBD, PHM, PMD), Joint Director (PHE), AFAO and ASO (VPM) from NIPHM and Mr Avinash Salunke (Founder) and Mr Sharad Patil (Co-Founder) from Barefoooter School of Foundation, Pune has attended the event. The Caution of Deposit of Rs 50,000/- has been received from the Barefoot School of Foundation.



- Officials from PMD delivered a talk in DD Kisan on Pesticide Residue: A Challenge for Organic Farms (कीटनाशक अवशेष: जैविक खेतों के लिए एक चुनौती).
- Officials from PMD attended meeting of FAD 27 on Pesticide Residue and two BIS-FAD- 1 on pesticide Formulation conducted by Bureau of Indian Standard.



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