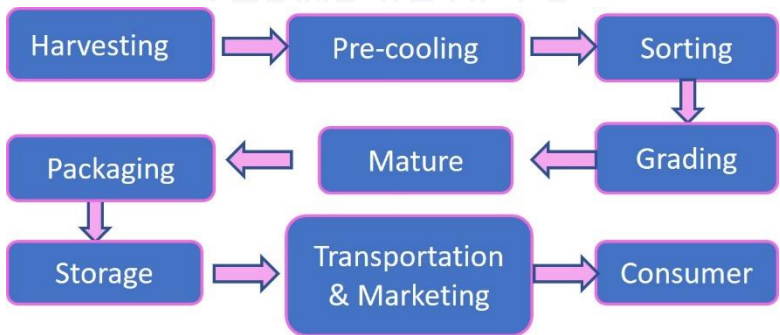




NEWS LETTER

THEME ARTICLE



AROUND THE WORLD



SPECIAL EVENTS



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From the Director General's Desk

In developing countries, nearly 65% of food loss occurs at the production, processing and post-harvest stages. Depending upon the crop, between 15% to 35% of food may be lost before it even leaves the field. Despite high levels of food production, India ranks only 94th out of 107 countries in the 2020 Global Hunger Index. The estimated economic value of post-harvest losses in India was INR 926.51 billion (USD 15.19 billion). The COVID-19 pandemic is worsening nutrition insecurity in India. In a world where hunger and malnourishment are on the increase, unacceptable levels of food loss and waste, call for urgent action.

Post-harvest technologies are the need of the hour to meet the hunger and malnutrition requirements of the world population. It is the application of technology to the post-harvest handling and storage of agricultural produce which improves the quality and shelf-life of agricultural products, reduce the wastage of agricultural produce, improves the economics of agriculture and an important tool in the fight against hunger and malnutrition.

The challenge of food loss and waste in India is under researched. Paying more attention to the issue offers immense potential for improving India's food security, economy, and environment. Measuring food loss and waste accurately is essential, as what gets measured gets managed. Yet the measurement of food loss and waste is a complex and costly proposition owing to the wide range of agriculture commodities, distinct measurement traits, multiple stages in the supply chain and processing, and the presence of numerous factors.

Since the horticulture producers are heavily dependent on the domestic market, many times overproduction led to low price and that ultimately results in a loss to the farmers. Therefore, to avoid overproduction of selected varieties in a particular district or region, development of a mixed cropping pattern is needed as well as the linkage of production with processing and organized marketing is also needed in order to eliminate flooding of the local market and falling prices during peak seasons. Horticulture experts may advise farmers on this aspect to avoid such situation. Need of post-harvest management and various strategies for reducing the food loss are discussed in the theme article.

विकासशील देशों में, लगभग 65% खाद्य नुकसान उत्पादन, प्रसंस्करण और कटाई के बाद के चरणों में होती है। फसल के आधार पर, खेत से निकलने से पहले ही 15% से 35% के बीच खाद्य नष्ट हो सकता है। खाद्य उत्पादन के उच्च स्तर के बावजूद, भारत 2020 ग्लोबल हंगर इंडेक्स में 107 देशों में से केवल 94^{वें} स्थान पर है। भारत में फसल के बाद के नुकसान का अनुमानित आर्थिक मूल्य INR 926.51 बिलियन (15.19 बिलियन अमरीकी डालर) था। COVID-19 महामारी भारत में पोषण असुरक्षा को बढ़ा रही है। ऐसी दुनिया में जहां भूख और कुपोषण बढ़ रहा है, खाद्य हानि और बर्बादी के अस्वीकार्य स्तर, तत्काल कार्रवाई की मांग करते हैं।

विश्व की आबादी की भूख और कुपोषण की आवश्यकताओं को पूरा करने के लिए कटाई के बाद की प्रौद्योगिकियां समय की आवश्यकता हैं। यह कृषि उत्पादों की कटाई के बाद की हैंडलिंग और भंडारण के लिए प्रौद्योगिकी का अनुप्रयोग है जो कृषि उत्पादों की गुणवत्ता और शेल्फ जीवन में सुधार करता है, कृषि उपज की नुकसान को कम करता है, कृषि के अर्थशास्त्र में सुधार करता है और भूख और कुपोषण के खिलाफ लड़ाई में एक महत्वपूर्ण उपकरण है।

भारत में खाद्य के नुकसान और बर्बादी की चुनौती पर ज्यादा शोध नहीं किया गया है। इस मुद्दे पर अधिक ध्यान देने से भारत की खाद्य सुरक्षा, अर्थव्यवस्था और पर्यावरण में सुधार की अपार संभावनाएं हैं। खाद्य के नुकसान और भोजन की बर्बादी को सही ढंग से मापना आवश्यक है, क्योंकि जो मापा जाता है वह प्रबंधित हो जाता है। फिर भी कृषि वस्तुओं की विस्तृत श्रृंखला, विशिष्ट माप लक्षणों, आपूर्ति श्रृंखला और प्रसंस्करण में कई चरणों और कई कारकों की उपस्थिति के कारण खाद्य हानि और अपशिष्ट का माप एक जटिल और महंगा प्रस्ताव है।

चूंकि बागवानी उत्पादक घरेलू बाजार पर बहुत अधिक निर्भर हैं, इसलिए कई बार अधिक उत्पादन के कारण कीमत कम हो जाती है और अंततः किसानों को नुकसान होता है। इसलिए, किसी विशेष जिले या क्षेत्र में चयनित किस्मों के अधिक उत्पादन से बचने के लिए, पीक सीजन के दौरान, मिश्रित फसल पैटर्न के विकास की आवश्यकता है साथ ही स्थानीय बाजार की बाढ़ और गिरती कीमतों को खत्म करने के लिए प्रसंस्करण और संगठित विपणन के साथ उत्पादन को जोड़ने की भी आवश्यकता है। ऐसी स्थिति से बचने के लिए बागवानी विशेषज्ञ इस पहलू पर किसानों को सलाह दे सकते हैं। फसल के बाद के प्रबंधन की आवश्यकता और खाद्य हानि को कम करने के लिए विभिन्न रणनीतियों पर थीम लेख में चर्चा की गई है।

(Dr. Sagar Hanuman Singh IPoS)
Director General

POST-HARVEST MANAGEMENT FOR FRUITS AND VEGETABLES TO ENSURE ON FARM FOOD SAFETY

Haneefa Begum.SK., Udaya Bhanu. M., and Govind Kumar Maurya

Introduction:

India produced 99.07 million metric tonnes of fruits and 191.77 million metric tonnes of vegetables in year 2019-20. The estimated losses in fruits and vegetables are climbing higher and has reached from 30 to 40 per cent. Globally, applications of post-harvest technologies for instance, use of ethylene, 1-methylcyclopropene (1-MCP) and temperature management has proved to reduce postharvest losses of fruits and vegetables. In order to reduce the damage to fresh fruits and vegetables during their handling, a lot of care has to be taken in terms of better handling methods, packaging, good transportation. Post-harvest technologies such as controlled ripening, edible coating, temperature management, and chemical treatment methods are potential tools to reduce losses in fruits and vegetables, increase food and nutritional security.

We daily eat fruits as fresh in form of salad and vegetables after cooking, but many of us hardly know where they come from and how much care they have received during handling. Management of fruits and vegetables after the harvest is an important step till it reaches in the hands of the consumer. We as a consumer always look for the freshness of produce with least damage. Lack of post-harvest management skills and technology such as temperature control to maintain the cold chain, value addition, and packaging have caused several economic and food security setbacks like high levels of poverty, hidden hunger and malnutrition.

Good agricultural practices usually cover pre-harvest practices, while good handling practices deal with post-harvest practices for fruits and vegetables. After the fields have been harvested, minimizing microbial contamination of the produce must continue to be a priority. Specific strategies should be implemented during produce transportation, washing, grading, packing and storage to minimize the potential of microbial contamination.

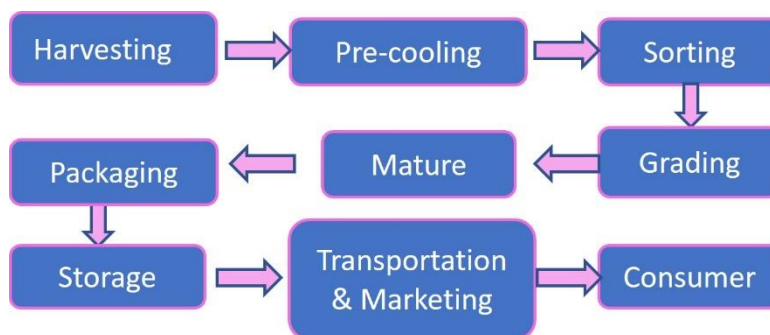


Fig. 1. Sequence of operations in fruits and vegetables supply chain

Need for post-harvest operations:

Fruits and vegetables are ideally harvested based on optimum maturity or visual quality. However, since they are living biological entities, they will deteriorate after harvest. The rate of deterioration varies greatly among products depending on their overall rate of metabolism, but for many it can be rapid. For example, marketing chains where produce is transported from farm to end user within a short time period, the rate of PH deterioration is of little consequences. However, with the increasing remoteness of production areas from population centers, the time lag from farm to market is considerable. The deliberate storage of certain produce to capture better return adds to this time delay between farm and end user, by extending the marketing periods into times of shorter supply. Thus, a modern marketing chain puts increasing demands on produce and creates the need for the post-harvest techniques that allows retention of quality over an increasingly longer period.

Post-harvest management is a set of post-production practices that includes cleaning, washing, selection, grading, disinfection, drying, packing and storage. These eliminate undesirable elements and improve product appearance, as well as ensuring that the product complies with established quality standards for fresh and processed products. Post-harvest

practices include the management and control of variables such as temperature and relative humidity, the selection and use of packaging, and the application of such supplementary treatments as fungicides. Production practices have a tremendous effect on the quality of fruits and vegetables at harvest and on postharvest quality and shelf-life environmental factors such as soil type, temperature, frost, and rainy weather at harvest can have an adverse effect on storage life and quality.

Management practices can also affect post-harvest quality. Produce that has been stressed by too much or too little water, high rates of nitrogen, or mechanical injury (scrapes, bruises, abrasions) is particularly susceptible to post-harvest diseases.

Harvesting:

Harvesting is the operation of gathering the useful part or parts of the plant and is carried out at the time when all the nutrients have developed and the edible parts have reached the appropriate degree of maturity. In general, the harvest takes place 10 or 15 days after the grain has reached physiological maturity. The goal of good harvesting is to maximize crop yield and minimize any crop losses and quality deterioration.



Fig.2. Fresh fruits and vegetables

Field containers:

Field containers are used to gather fruits in the field which have smooth bottom and sides so that while gathering the fruits in such containers, bruises or injury does not occur. Plastic crates have become common field containers in place of bamboo or metal baskets.



Fig.3. Crates used for collecting of fruits and vegetables

Post-harvest handling of fruits and vegetables:

Quality cannot be improved after harvest, only maintained, therefore it is important to harvest fruits, vegetables, and flowers at the proper stage and size and at peak quality. Immature or over mature produce may not last as long in storage as that picked at proper maturity. Harvest should be completed during the coolest time of the day, which is usually in the early morning, and produce should be kept shaded in the field. Handle produce gently. Crops destined for storage should be as free as possible from skin breaks, bruises, spots, rots, decay, and other deterioration. Bruises and other mechanical damage not only affect appearance but provide entrance to decay organisms as well. Post-harvest rots are more prevalent in fruits and vegetables that are bruised or otherwise damaged. Mechanical damage also increases moisture loss. The rate of moisture loss may be increased by as much as 400% by a single bad bruise on an apple, and skinned potatoes may lose three to four times as much weight as non-skinned potatoes. Damage can be prevented by training harvest labor to handle the crop gently, harvesting at proper maturity, harvesting dry whenever possible.

Table.1. Ideal storage conditions for fruits and vegetables

Product	Optimum storage Temperature(⁰ F)	Relative humidity (%)
Apples	30 -40	90 -95
Banana ripe	56-60	85-95
Beans green, oranges	40- 45	95
Berries, cherries, Strawberries	32 -35	90-95
Broccoli, cabbage , carrots, cauliflower, Lettuce	32	95 -100
Coconut	55-60	80-85
Cucumber	50 -55	95

Grapes	31-32	85
Leafy vegetables, Kiwi, Lettuce	32	95-100
Lemons	52-55	90-95
Mangoes, Melons	50 -55	85-90
Mushrooms	32	95
Okra	45-50	90-95
Onions	32-35	65-75
Papayas, Pineapples	50-55	85-95
Pomegranates	41-50	90-95
Potatoes	45-50	90-95
Tomato	55-70	90-95
watermelon	55-70	85-95

(Source: Soonchye Tan et al., 2016, *Storage of Fruits and Vegetables*. Department of primary industries and Regional development.)

Post-harvest and storage considerations:

Packaging: Packaging should be designed to prevent physical damage to produce and be easy to handle.

Temperature: Temperature is the single most important factor in maintaining quality after harvest. Refrigerated storage retards the following elements of deterioration in perishable crops:

- Aging due to ripening, softening, and textural and color changes
- Undesirable metabolic changes and respiratory heat production
- Moisture loss and the wilting that results
- Spoilage due to invasion by bacteria, fungi, and yeasts
- Undesirable growth, such as sprouting of potatoes

One of the most important functions of refrigeration is to control the crop's respiration rate. Respiration generates heat as sugars, fats, and proteins in the cells of the crop are oxidized. On-farm cooling facilities are a valuable asset for any produce operation. A grower who can cool and store produce has greater market flexibility because the need to market immediately after harvest is eliminated. The challenge, especially for small-scale producers, is the set-up cost. Innovative farmers and researchers have created a number of designs for low-cost structures.

Pre-cooling: Pre-cooling is the first step in good temperature management. The field heat of a freshly harvested crop—heat the product holds from the sun and ambient temperature—is usually high, and should be removed as quickly as possible before shipping, processing, or storage. Refrigerated trucks are not designed to cool fresh commodities but only maintain the temperature of pre-cooled produce. Rapid pre-cooling to the product's lowest safe temperature is most critical for crops with inherently high respiration rates.



Fig.4. Precooling of fruits and vegetables

Postharvest treatments:

Fresh fruits are living tissues subject to continuous change after harvest. Some changes are desirable from consumer point of view but most are not. Postharvest changes in fresh fruit cannot be stopped, but these can be slowed down within certain limits to enhance the shelf life of fruits. The post-harvest treatments play an important role in extending the storage and marketable life of horticultural perishables. The most important postharvest treatments include:

- Washing with chlorine solution:** Chlorine treatment (100–150 ppm available chlorine) can be used in wash water to help control inoculums build up during packing operations. Maintain pH of wash water between 6.5 and 7.5 for best results.
- Ethylene inhibitors/Growth regulator/fungicide treatments:** 1-MCP (1-methyl cyclopropene), AVG (Amenoethoxyvinyl glycine), silver nitrate, silver thiosulfate, cycloheximide, benzothiadiazole etc. are some of

the chemicals which inhibit ethylene production and/or action during ripening and storage of fruits. The growth regulators or fungicidal application such as GA₃ can be effectively used to extend/enhance the shelf life of fruits.

c. **Calcium application:** The post-harvest application of CaCl₂ or Ca (NO₃)₂ play an important role in enhancing the storage and marketable life of fruits by maintaining their firmness and quality. Calcium application delays aging or ripening, reduces postharvest decay, controls the development of many physiological disorders and increases the calcium content, thus improving their nutritional value. The post-harvest application of CaCl₂ (2–4 %) or Ca (NO₃)₂ for 5–10 min dip extend the storage life of pear up to 2 months, plum up to 4 weeks and apple up to 6 months at 0–2 °C with excellent color and quality. Calcium infiltration reduces chilling injury and increase disease resistance in stored fruit.

d. **Thermal treatments:** Thermal treatments included

(a) Hot water treatment: Fruits may be dipped in hot water before marketing or storage to control various post-harvest diseases and improving peel color of the fruit.

(b) Vapor heat treatment (VHT): This treatment proved very effective in controlling infection of fruit flies in fruits after harvest. The boxes are stacked in a room, which are heated and humidified by injection of steam.



Fig. 5 Hot water treatment for mangoes.

Table 2. Hot water treatments for different fruits

Commodity	Pathogens	Temperature (°c)	Time (min)
Apples	<i>Gloeosporium sp.</i>	45	10
	<i>Penicillium expansum</i>		
Grape fruit	<i>Phytophthora</i>	48	3
Lemon	<i>Pencillium digitatum</i>	52	5 – 10
	<i>Phytophthora sp.</i>		
Mango	<i>Collectotrichum gloeosporioides</i>	52	5
Orange	<i>Diplodia sp.</i>	53	5
	<i>Phomopsis sp.</i>		
	<i>Phytophthora sp.</i>		
Papaya	<i>Fungi</i>	48	20
Peach	<i>Monolinia fructicola</i>	52	2.5
	<i>Rhizopus stolonifer</i>		

(Source: Shepard et al.,2021, *Advances in postharvest disinfestation of F&V using hot water treatment.*)

The temperature and exposure time are adjusted to kill all stages of insects (egg, larva, pupa and adult), but fruit should not be damaged. A recommended treatment for citrus, mangoes, papaya and pineapple is 43 °C in saturated air for 8 h and then holding the temperature for further 6 h. VHT is mandatory for export of mangoes.

e. **Fumigation:** The fumigation of SO₂ is successfully used for controlling post- harvest diseases of grapes. This is achieved by placing the boxes of fruit in a gas tight room and introducing the gas from a cylinder to the appropriate concentration. However, special sodium metabisulphite pads are also available which can be packed into individual boxes of a fruit to give a slow release of SO₂. The primary function of treatment is to control the Botrytis Cinerea. The SO₂ fumigation is also used to prevent discoloration of skin of litchis.

f. **Irradiation:** Ionizing radiation can be applied to fresh fruits and vegetables to control micro-organisms and inhibit or prevent cell reproduction and some chemical changes. It can be applied by exposing the crop to radiations from radioisotopes (normally in the form of gamma-rays measured in Grays (Gy), where 1 Gy = 100 rads.



Fig.6. Irradiated Mangoes

g. **Waxing:** Waxing of fruits or vegetables is a common post-harvest practice. Food grade waxes are used to replace some of the natural waxes removed during harvesting and sorting operations and can help reduce water loss during handling and marketing. It also helps in sealing tiny injuries and scratches on surface of fruits and vegetables. It improves cosmetic appearance and prolongs the storage life of fruits and vegetables. The wax coating must be allowed to dry thoroughly before packing.



Fig. 7. Wax coated oranges

Conclusions: -

Postharvest handling is the final stage in the process of producing high quality fresh produce. Being able to maintain a level of freshness from the field to the dinner table presents many challenges. A grower who can meet these challenges, will be able to expand his or her marketing opportunities and be better able to compete in the marketplace. Postharvest management is a set of post- production practices that includes: cleaning, washing, selection, grading, disinfection, drying, packing and storage. These eliminate undesirable elements and improve product appearance, as well as ensuring that the product complies with established quality standards for fresh and processed products. There is an urgent need to develop technologies to overcome post-harvest losses of fruits. One way of achieving this could be by developing feasible technology to extend the post-harvest shelf life.

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Around the World**SMART FARMING FOR AGRICULTURE****Er. M Udaya Bhanu, Scientific Officer (PHE)***Plant Health Engineering Division*

The United Nations projects that by the year 2050 the population of the world will be 9.7 Billion. With the relevance of over 60 percent of the world population on agriculture for food, the pressure to increase production to meet demands doesn't seem to ease. Coupled with climate change, which is leading to rising global temperatures, levels of carbon dioxide, and frequency of droughts and floods, along with increasing labor costs, high production costs, and unpredictability poses a major challenge to the future of agriculture. Hence, the goal is to increase productivity sustainably. To increase sustainability a very precise and calculated set of practices designed specifically for a plot needs to be followed and to follow best practices data needs to be recorded and analyzed digitally.

Agriculture has seen many revolutions, whether the domestication of animals and plants a few thousand years ago, the systematic use of crop rotations and other improvements in farming practice a few hundred years ago, or the “green revolution” with systematic breeding and the widespread use of man-made fertilizers and pesticides a few decades ago. Now agriculture is undergoing a fourth revolution triggered by the exponentially increasing use of information and communication technology (ICT) in agriculture.

The world's population is growing, but the area of farmland available per head is shrinking. Agricultural productivity will have to increase if we want to safeguard our food supply in the long term. Digitalization in farming can help us deploy our resources efficiently and sustainably, enabling farmers to get the best out of their fields with minimal environmental impact. Smart farming is more focused on the use of data acquired through various sources (historical, geographical, and instrumental) in the management of the activities of the farm.

Autonomous, robotic vehicles have been developed for farming purposes, such as mechanical weeding, application of fertilizer, or harvesting of fruits. The development of unmanned aerial vehicles with autonomous flight control, together with the development of lightweight and powerful hyper spectral snapshot cameras that can be used to calculate biomass development and fertilization status of crops, opens the field for sophisticated farm management advice. Moreover, decision-tree models are available now that allow farmers to differentiate between plant diseases based on optical information. Virtual fence technologies allow cattle herd management based on remote-sensing signals and sensors or actuators attached to the livestock.

Taken together, these technical improvements constitute a technical revolution that will generate disruptive changes in agricultural practices. This trend holds for farming not only in developed countries but also in developing countries, where deployments in ICT (e.g., use of mobile phones, access to the Internet) are being adopted at a rapid pace and could become the game-changers in the future (e.g., in the form of seasonal drought forecasts, climate-smart agriculture).

Ample Opportunities

Smart farming reduces the ecological footprint of farming. Minimized or site-specific application of inputs, such as fertilizers and pesticides, in precision agriculture systems will mitigate leaching problems as well as the emission of greenhouse gases. With current ICT, it is possible to create a sensor network allowing for almost continuous monitoring of the farm. Similarly, theoretical and practical frameworks to connect the states of plants, animals, and

soils with the needs for production inputs, such as water, fertilizer, and chemicals, are in reach with current ICT globally.

Smart farming can make agriculture more profitable for the farmer. Decreasing resource inputs will save the farmer money and labor, and increased reliability of spatially explicit data will reduce risks. Optimal, site-specific weather forecasts, yield projections, and probability maps for diseases and disasters based on a dense network of weather and climate data will allow cultivation of crops in an optimal way. Site-specific information also enables new insurance and business opportunities for the entire value chain, from technology and input suppliers to farmers, processors, and the retail sector in developing and developed societies alike. If all farming-related data are recorded by automated sensors, the time needed for prioritizing the application of resources and for administrative surveillance is decreased.

A Way Forward

There are various growing concerns over agricultural sustainability, including forecasted water shortages by 2030. In order to address this issue, a digital farming technology has been developed in Japan. Experienced farmers are able to use water and fertilizers more efficiently. By utilizing the IoT and AI to collect and analyze data from their farming practices and the surrounding environment, this technology enables even inexperienced growers to implement such intangible techniques. It can improve agricultural productivity even in areas with limited access to water. This technology is expected to bring a huge change to the future of sustainable agriculture. “Fertigation” is an agricultural technique created in Israel, which has a severe water shortage.

Water, fertilizer, experience and knowledge are essential to agriculture.

The results are already started to get in Japan, and the technologies are beginning to spread to Vietnam, China and elsewhere in Asia.

NIPHM also believe that these technologies will help make agriculture sustainable for the next generations. Establishment of drip and sprinkler irrigation in the entire field area and automation irrigation in the poly house are the few initiatives taken up. The Sewerage Treatment Plant (STP) was also initiated and few trials were conducted for irrigating the field crops. The main aim is to keep improving agriculture for the sake of our children’s future.

“Let’s all help raise the value of farming.”



NIPHM Smart farming



STP double filter for irrigation

Training Programs

Plant BioSecurity Division

The Plant Biosecurity Division has organized following training programmes during the months of **April-June, 2022**.

Capacity Building Programs:

S. No.	Name of The Programme	Duration	Date	
			From	To
Plant Biosecurity Division (PBD)				
1.	Fruit fly: Surveillance and Management	5 Days	04.04.2022	08.04.2022
2.	Invasive Alien Species: Introduced and Emerging Pests	3 Days	11.04.2022	13.04.2022
3.	Plant Quarantine Procedures for Import and Export	5 Days	18.04.2022	22.04.2022
4.	Refresher course for fumigation (Aluminium Phosphide and Methyl Bromide) - Payment Programme	15 Days	25.04.2022	30.04.2022
5.	Phytosanitary Certificate Issuing Authorities for Telangana State - Payment Programme	4 Days	18.04.2022	21.04.2022
6.	Forced Hot Air Treatment (FHAT)- Payment Programme	5 Days	18.04.2022	22.04.2022
7.	Stored Grain pest detection, identification and management	5 Days	09.05.2022	13.05.2022
8.	Pest Surveillance	15 Days	23.05.2022	27.05.2022
9.	Export promotions of agriculture and horticulture commodities in North Eastern states” (Tripura)	1Day	13.05.2022	13.05.2022
10.	Export promotions of agriculture and horticulture commodities in North Eastern states” (Sikkim)	1Day	13.05.2022	13.05.2022
11.	Export promotions of agriculture and horticulture commodities in North Eastern states” (Meghalaya)	1Day	17.05.2022	17.05.2022
12.	Export promotions of agriculture and horticulture commodities in North Eastern states” (Assam)	1Day	18.05.2022	18.05.2022
13.	Export promotions of agriculture and horticulture commodities in North Eastern states”(Arunachal Pradesh)	1Day	21.05.2022	21.05.2022
14.	Pest Risk Analysis	5 Days	06.06.2022	10.06.2022
15.	Phytosanitary treatment (methyl bromide and aluminium phosphide fumigation)- Payment Programme	15 Days	13.06.2022	27.06.2022

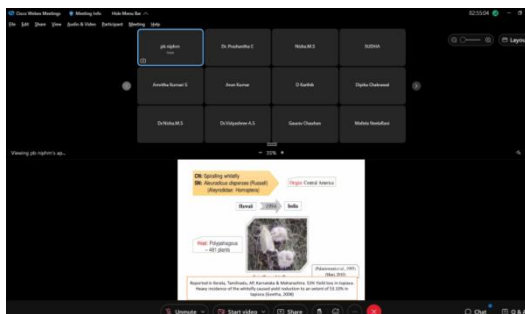
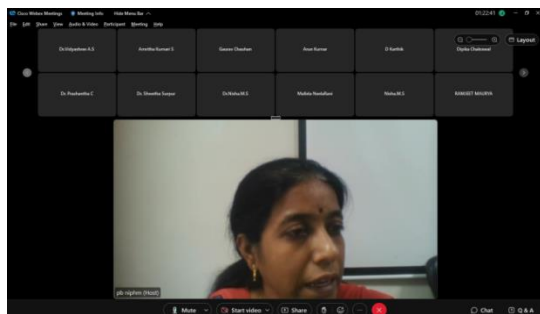
16.	International Programme on Plant Health Approaches, Plant Biosecurity and Food Safety	15 Days	07.06.2022	20.06.2022
Vertebrate Pest Management (VPM)				
1.	Rodent Pest Management	5 Days	18.04.2022	22.04.2022
2.	Annual conference for members of PMPWAM (Pest Management Professionals Welfare Association, Mumbai)	3 Days	07.04.2022	09.04.2022
3.	Certificate course on Urban Integrated Pest Management - Payment programme	15 Days	04.05.2022	18.05.2022
4.	Level 1 training on Urban Pest Management for Technicians- Payment programme	3 Days	20.06.2022	22.06.2022
5.	Vertebrate Pest Management wild boar, monkey and birds	3 Days	01.06.2022	03.06.2022
PBD Farmers Programme				
1.	Stored Grain Pest Management for Farmers	1 Day	23.06.2022	23.06.2022
2.	Farmers Awareness Programme on WDRA and benefits of NWR	1 Day	27.06.2022	27.06.2022
VPM Farmers Programme				
3.	Rodent Pest Management for farmers of Sillod, Maharashtra	1 Day	30.06.2022	30.06.2022
4.	Rodent Pest Management- YFA-KVK, Madanapuram, Telangana	1 Day	27.06.2022	27.06.2022

PLANT BIOSECURITY DIVISION

1. Fruit fly: Surveillance and Management: - A five days online program on “Fruit fly surveillance and management” was conducted from 04.4.2022 to 08.04.2022. Total 26 participants were participated from the State Horticulture department/ Universities/ ICAR/KVKs etc. Experts have been invited and different lectures were delivered for identification & detection of fruit fly species, lure preparation and other different aspects of fruit fly surveillance and management.



2. Invasive Alien Species: Introduced and Emerging Pests: - An online program was conducted for 3 days from 11.04.2022 to 13.04.2022. The program aimed to create awareness on prevention and management of Invasive Alien Species (IAS) relevant to plants. All the countries should assess, monitor and manage species that may be invasive and that directly or indirectly affect plants or plant products, or that are diseases of animals, in accordance with the relevant International Plant Protection Convention (IPPC) provisions, standards, guidelines and recommendations.



3. **Plant Quarantine Procedures for Import and Export:** - An online program was conducted from 18th to 22nd April, 2022. Forty five participants were attended the online training. The international regulation related to plant health, plant quarantine system in India, plant quarantine procedures involved in export and import of agricultural commodities meant for consumption, propagation, bio-control and germplasm, agency involved in export promotions were covered during scheduled sessions.
4. **Refresher course for fumigation (Aluminium Phosphide and Methyl Bromide) - Payment Programme:** - This course was conducted from 25th to 30th April, 2022 for private agencies, whose licences were suspended or revoked by National Plant Protection Organization (NPPO). A total 7 participants are attending the course. The trainees imparted specific knowledge on related phytosanitary standards viz. NSPM 11, 12 and 22.
5. **Phytosanitary Certificate Issuing Authorities for Telangana State - Payment Programme:** - A special program was conducted from 18.04.2022 to 21.04.2022 for 5 Telangana State officers of Horticulture Department, Agriculture Department and NBPGR. The training was focused on the Phytosanitary regulations and phytosanitary certification system for issuance of phytosanitary certificate. Actual procedure for issuance of certificate was also demonstrated at NBPGR and PQS, Hyderabad and export problems related to Phytosanitary certificate issuance were discussed.



Dr. Anitha Demonstrating Phytosanitary requirements for germplasm export

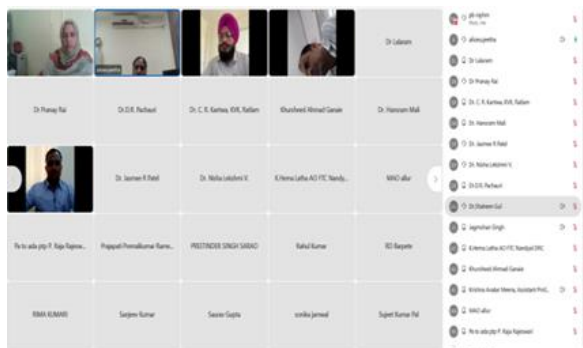


Trainees discussing the phytosanitary issues with Dr. K N Rao Director, Sam Agro Tech

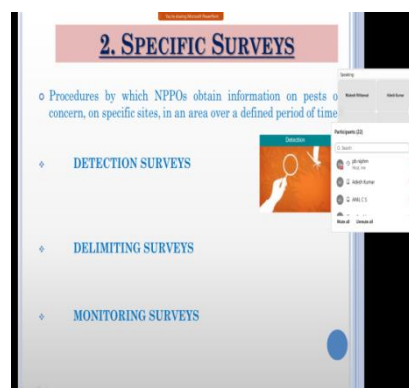
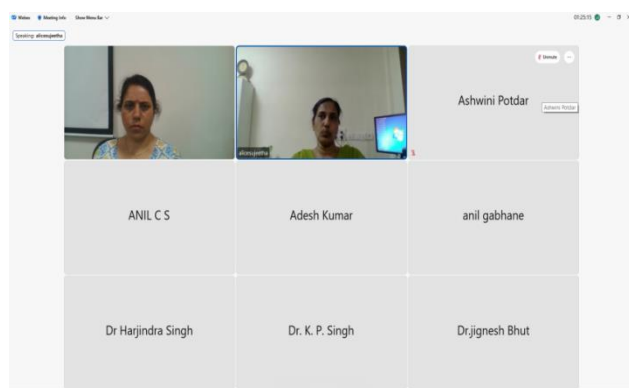


Trainees discussing the phytosanitary certification regulations and procedures and demonstration of procedures at PQS, Hyderabad

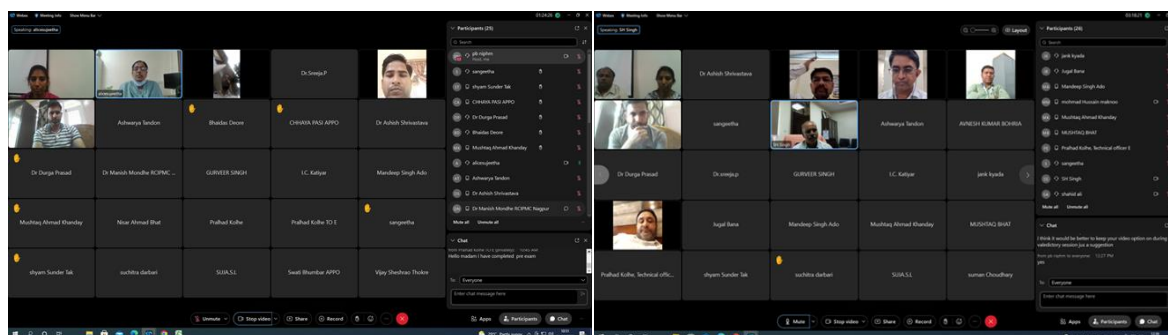
- 6. Forced Hot Air Treatment (FHAT) - Payment Programme:** - NIPHM is the only Institute in India to offer a specialized training programme on Forced Hot Air Treatment for industry stakeholders. In this regard, a special program was conducted from 18.04.2022 to 22.04.2022 in addition to the regular training programs. The participants learnt the critical requirements for establishing FHAT facilities, calibration of sensors, placement of sensors, identification of coolest point, safety precautions, conducting the treatments, use of appropriate mark and record keeping in accordance with ISPM – 15 and NSPM – 9..
- 7. Stored Grain pest detection, identification and management:** - A 5- Days online programme from 09.5.2022 to 13.05.2022 was organized and total 36 participants from state departments/ Universities/ ICAR/KVKs etc. were attended the programme.. The programme was organized with an objective to create awareness and to train the officials involved in storage of food grains at warehouse level to improve the technical efficiency in maintenance of the grain storage and other technical quality control aspects at godowns with respect to Prophylactic and Curative treatments (Fumigation with ALP)).



- 8. Pest Surveillance:** - Pest Surveillance plays a substantial role in promoting plant health which has become a trade policy issue. Pest surveillance provides insights into the health status of a country's agriculture and strengthens the stakeholder's preparedness for preventive actions both in addressing the problems due to domestic pests of serious concern as well as in protection of native agricultural biodiversity from the incursion threats of exotic pests. The participant learned different strategies (detection, monitoring and delimiting survey), tools required for surveillance of target pest including basic procedure to set up Pest Free Areas (PFA) and Area of Low Pest Prevalence (ALPP). Trainees learnt use of surveillance methodologies, online tools, traps and lures to carry out surveillance practices for insects, pathogens, weeds, rodents and fruit fly. This programme was conducted through virtual mode from 23.05.2022 to 27.05.2022 where in 28 participants were attended the programme.



9. Pest Risk Analysis: - Pest Risk Analysis (PRA) is an early warning tool to safeguard country's agriculture from pests that may be associated with imported Agricultural commodities. PRA facilitates evaluation of the likelihood of the entry, establishment, or spread of a plant pest and the associated potential biological and economic consequences. Further, it comes in handy to apply appropriate phytosanitary measures that can reduce the probability of a risk to an acceptable level by the importing country. PRA also assists in identifying the bottle necks to promote pest free exports of commodities and market access for new commodities in international trade. To build capacity in this area, NIPHM organised an online training programme on Pest Risk Analysis from 06th to 10th June, 2022. A total of around 33 participants attended the programme. The participants were exposed to International regulatory framework & National regulations, Phytosanitary terminology, PRA concepts & practices with added emphasis on detailed methodology. The trainees also actively participated in the group exercises organized.



10. Phytosanitary treatment (methyl bromide and aluminium phosphide fumigation- Payment Programme: - One programme of 15 days was conducted from 13.06.2022 to 27.06.2022 on payment basis and a total 17 participants were attended the programme. The participants got familiarized with physical and chemical properties of Phosphine and Methyl bromide, safety precautions to be followed while handling fumigants, mode of action of fumigants, principles of fumigation, monitoring the fumigant concentration, appropriate use and maintenance of fumigants and safety equipments. The participants were made to understand the guidelines laid in NSPM-11, 12 (MBr fumigation) and NSPM-22 (Phosphine fumigation) to conduct appropriate fumigation procedures as well as the accreditation procedure of fumigation operators prescribed by the DPPQ&S. The trainees gained hands-on practical experience in creating gas-tight enclosure, laying gas supply and monitoring lines, use of vaporizer, fan, leak detector and gas concentration monitor.



SPECIAL PROGRAMMES: Export promotion of agriculture and horticulture commodities in North Eastern states” (Tripura, Meghalaya and Assam): The North East Region (NER) of India, comprising of ‘Seven Sister’ states namely the states of Assam, Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland and Tripura along with Sikkim is an ocean of opportunity, resources and unexplored potential when it comes to agriculture. The region possesses several comparative advantages like fertile soils, favourable climatic conditions, rich biodiversity, forest wealth, educated manpower as well as a geographically strategic location acting as a gateway to the South East Asian countries and China. Given these comparative advantages, NER has all the potential to actively contribute to the betterment of farm incomes, reduce poverty and speedup the overall economic growth of the region. However, due to multitude of challenges at several levels, the true potential of the region is not getting harnessed and the region has not grown on par with the rest of the regions in the country. Realizing the same, NIPHM jointly with Agricultural & Processed Food Products Export Development Authority (APEDA) organised Training Programs on Export promotion for agri horti crops for tapping the export potential of the region at **KVK, Khowai, Tripura on 13.05.2022**; at **KVK Riboi, Meghalaya on 17.05.2022** and at **KVK, Nagaon, Assam on 18.05.2022**. A total of **40, 50 & 37 participants** attended the programmes, respectively.

11. Export promotion for agri horti crops of Tripura state conducted at Khowai district of Tripura on 13/05/2022



12. Export promotion for agri. horti crops of Meghalaya state conducted at Riboi district of Meghalaya on 17/05/2022



13. Export promotion for agri horti crops of Assam state conducted at Nagaon district of Assam on 18/05/2022



14. Export promotion of agriculture and horticulture commodities in North Eastern States (Arunachal Pradesh): One day programme on export promotion was conducted on 21.05.2022 at KVK, East Siang, Pasighat, Arunachal Pradesh. The programme was attended by 41 participants. The export procedures and Good agricultural practices for the exportable commodities in Arunachal Pradesh (Pine apple, Mandarin oranges, Ginger, Kiwi, King Chilli, Large Cardamom, Orchids, Medicinal plants (Coptis teeta), apple and other vegetables) was discussed during the sessions.



15. Export promotion of agriculture and horticulture commodities in North Eastern states” (Sikkim): National Institute of Plant Health Management, Hyderabad, Telangana in collaboration with APEDA, New Delhi and State Department of Agriculture, Krishi Bhawan, Tadong, Gangtok, Sikkim has organized an one day training program on 13.05.2022 at SMAETI, Tadong, Gangtok, Sikkim. The training program was inaugurated by Mr. Jagdish Pradhan, Additional Director (Agricultural Marketing) from Department of Agriculture, Gangtok, Sikkim and briefed about the faculty from NIPHM and Guest speaker Dr. Ramalingam, Deputy Director, Spices Board, Tadong, Gangtok, Sikkim.

Total 49 participants including Agriculture officials (Agriculture Inspectors) from various parts of Sikkim, entrepreneurs/exporters and other stakeholders were attended the program. The participants were learnt about requirement of GI tagging and good agriculture practices to enhance the production. Participants also get acquainted about the export promotions agencies including APEDA and their role in export promotions. Faculty from NIPHM also explained the benefits of farmer’s registration with APEDA which will help in market access of agricultural and horticultural commodities.



Participants attending the training sessions



Dr. Ramalingam, Deputy Director, Spices Board delivering the lecture



Group Photo

16. International Programme on Plant Health Approaches, Plant Biosecurity and Food Safety: - International Programme for the officials of various countries with partnership of Indian Technical and Economic Cooperation (ITEC) under the Ministry of External Affairs (MEA), Govt. of India 15 days training programme was organized at NIPHM. A total of 13 officials from different countries were nominated and has attended the training and were trained on vital aspects of plant health management, plant biosecurity, detection and diagnostics of Pests and food safety measures.

The valedictory session was graced by Dr. Hanuman Singh, IPoS, DG NIPHM, Guest of Honour Sh. Rohan Singh, Undersecretary (MEA), Chief Guest Dr. Rathnavathi, Director, (ICAR-IIMR) and Director, PBD (NIPHM).



Inaugural Session



Examination



Technical session



Field demonstration



Visit to FCI, Sanathnagar





Practical Exposure (Hands on training)



PQ Station visit

ICRISAT Visit



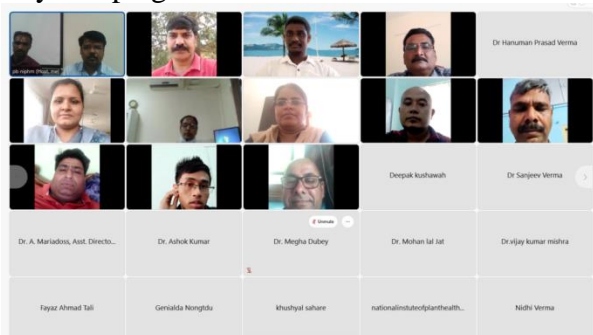
Valedictory Session: DG, NIPHM., Guest of Honour-Sh Rohan Singh, Under Secretary, MEA, Chief Guest Dr. Rathnavathi, Director, ICAR-IIMR

VERTEBRATE PEST MANAGEMENT

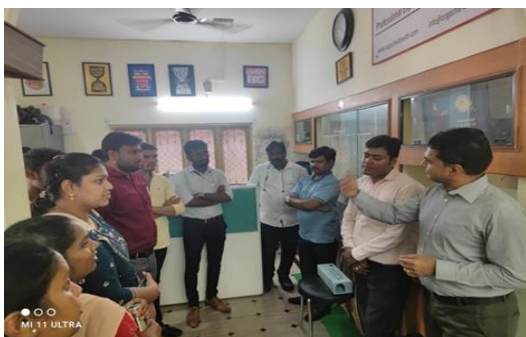
17. Annual conference for members of Pest Management Professionals Welfare Association, Mumbai (PMPWAM):- This program was conducted in association with PMPWAI (Mumbai) from 07.04.2022 to 09.04.2022. Total 120 participants were attended from different parts of the country. The deliberations were related to management of urban pests.



18. Rodent Pest Management: An online training of 5 –days was conducted from 18th to 22nd April, 2022 for the scientist and agri-officers. Total 35 agricultural officer/ scientists from various states were participated in the training. The trainees were imparted knowledge on various rodents and their management techniques such as major species of rodents in Indian, Rodent Borne zoonotic diseases, Non chemical management techniques and Breeding profile and community campaign etc.



19. Certificate Course on Urban Integrated Pest Management (Payment Programme):- Fifteen Days programme was organized for the structural pest management professionals from 04th to 18th May, 2022. Total 21 participants were attended the course from various states. The topics covered are Ecology and ethology of rodents, mosquitos, termites, cockroaches, bedbug and flies etc. and their management practices. In addition other relevant topics like safe and judicious use of pesticides, Care, handling and maintenance of pesticide application equipment, Food safety & standards in food processing industries and urban weed management etc. were also covered.

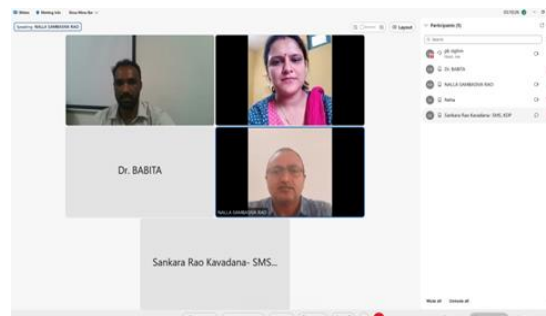


20. Level-1 training on Urban Pest Management for Technicians- Payment programme for Technicians was organized from 20th to 22nd, June 2022. Total 16 participants were attended the training from various states. During the programme the topics covered were; biology and ethology of rodents, mosquitos, termites, cockroaches, bedbug and flies etc. and their management practices. In addition other important topics like safe and judicious use of pesticides, Code of conduct for pest management were also covered. The participants were taken to pest control industry for exposure visit in pest control business.



21. Vertebrate Pest Management wild boar, monkey and birds:

Online training of 3- days was organised from 01st-03rd June, 2022. Total 5 officers, scientists were attended the training. The main objective of the training was to create the trained manpower and to create awareness about of the major vertebrate pests and management techniques to the extension functionaries. They participants imparted the various management practices against the wild boar, monkey and birds in agricultural crops, nilgai, birds, Elephant and their management techniques; and Indian wild life, 1972.



FARMERS PROGRAMMES

1. Stored Grain Pest Management for Farmers: The programme was organized for the farmers at Rythubharosa kendram, Pothyreddipalem village, Yelamanchili mandal, Anakapalli District, Andhra Pradesh wherein 23 farmers were attended the program. The Programme was organized with an objective to create awareness and to train the farmers involved in storage of food grains at consumers' level/in bulk at farm level. Faculty had explained about different aspects in order to improve their technical efficiency in grain storage management by imparting proper knowledge on detection and identification of the stored grain pests, rodent/ mycotoxins management in storage, prophylactic and curative treatments *etc.*

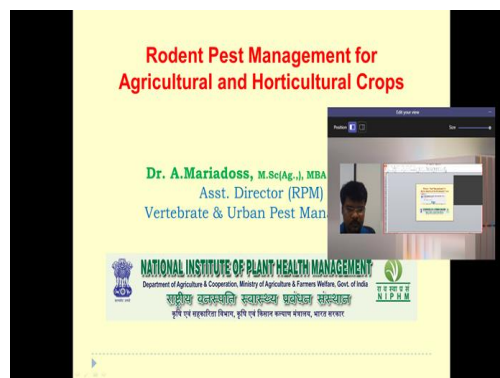
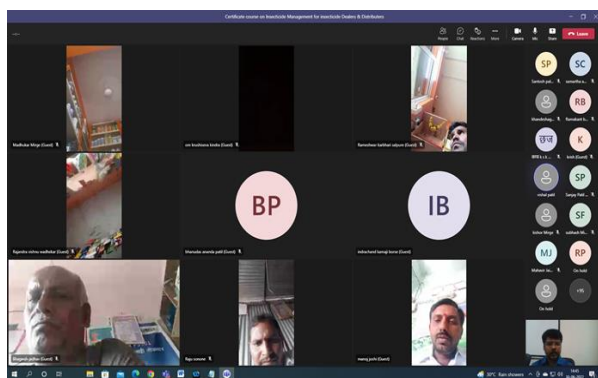


2. Farmers Awareness Programme on WDRA and benefits of Negotiable Warehouse Receipt (NWR): NIPHM is the premier Institute in India to offer specialized capacity building programs in the field of Plant Protection including warehousing and storage. WDRA is Warehousing Development and Regulatory Authority, a statutory authority under Dept. of Food and Public Distribution. As per the request from WDRA, one day farmers awareness training in collaboration with YFA- KVK, Madanapuram, Telangana was organized on 27th July, 2022 and educated the farmers on WDRA and benefits of Negotiable Warehouse Receipt. The programme was attended by 50 framers.



3. Rodent Pest Management: Two farmers programme were organized on 27th and 30th July, 2022 for the farmers of Telangana (at KVK, Madanapuram, Telangana) and Maharashtra (online). 40% of mammals in the animal kingdom and they cause heavy damages in agriculture & horticultural crops and also in storage. Their damage level ranges between 2% to 40% and sometimes 90-100% in case Jhoom rice (North Eastern Region). Besides causing damages they also transmit zoonotic diseases like plague, leptospirosis, salmonellosis etc to human beings. Understanding the ethology / behaviour is very much required for better management of rodents in crop fields and storage premises. Under this scenario, one day training was conducted on Rodent Pest Management. The programmes were attended by 50 & 108 farmers respectively.





Forthcoming Training PBD & VPM (July-September, 2022):

Division	Name of the programme	No. of Days	From	To
PBD	Introduction to Plant Biosecurity and Plant Quarantine	05 Days	04.07.2022	08.07.2022
	WTO & Agri Exports	03 Days	11.07.2022	13.07.2022
	Forced Hot Air Treatment	05 Days	18.07.2022	22.07.2022
	Pest Surveillance	05 Days	22.08.2022	26.08.2022
	Quarantine Pests: Detection and Identification	21 Days	06.09.2022	26.09.2022
	Awareness program on Pest Free Area	02 Days	12.09.2022	13.09.2022
	Quarantine pathogens: Seed Health Testing and Molecular Diagnostic Technique	05 Days	19.09.2022	23.09.2022
	Fumigation as a Phytosanitary Treatment (Methyl Bromide and Aluminium Phosphide)	15 Days	22.08.2022	05.09.2022
VPM	Non-Insect Pest Management – Mites, crabs, snails, slugs and avian	03 Days	05.07.2022	07.07.2022
	Rodent Pest Management	05 Days	22.08.2022	26.08.2022
	Certificate Course on Urban Integrated Pest Management	15 Days	03.08.2022	17.08.2022

Plant Health Management Division

S No	Name of the programme	No. of Days	From	To
I.	Officers programme			
1.	Farm level production of Bio-inputs	10	04.04.2022	13.04.2022
2.	Production protocol for microbial bio pesticides	5	18.04.2022	22.04.2022
3.	Good Agricultural Practices	5	25.04.2022	29.04.2022
4.	Conservation of insect pollinators in agriculture	3	04.05.2022	06.05.2022

5.	Locust pest management	3	09.05.2022	11.05.2022
6.	Organic farming and Certification process	3	17.05.2022	19.05.2022
7.	Plant Health Management in protected cultivation	5	23.05.2022	27.05.2022
8.	Integrated soil Nutrient and Rhizosphere Management	5	06.06.2022	10.06.2022
9.	Production protocol for biofertilizers	5	13.06.2022	17.06.2022
10.	Training to Pest Monitors on Field Diagnosis for IPM under CROPSAP (Maharashtra)	5	20.06.2022	24.06.2022
II.	Farmers training programme			
1.	Training cum demonstration on use of Biopesticides and Biofertilizers in FCV tobacco	1	12.04.2022	-
2.	Training cum demonstration on use of Biopesticides and Biofertilizers in FCV tobacco	1	13.04.2022	-
3.	Farmers training on training cum demonstration on Phosphate Solubilizing bacterial Biofertilizer	1	10.06.2022	-
4.	Farmers training on Biofertilizer and Biopesticides usage	1	16.06.2022	-
5.	Farmers training on Biofertilizer and Biopesticides usage	1	21.06.2022	-

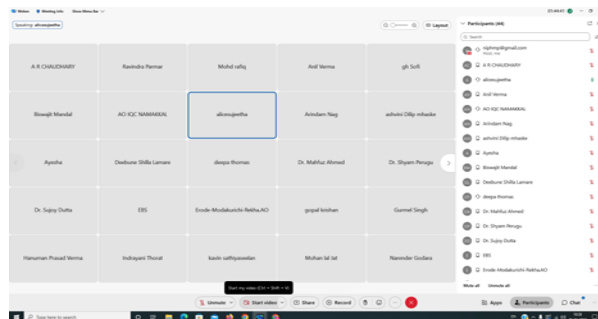
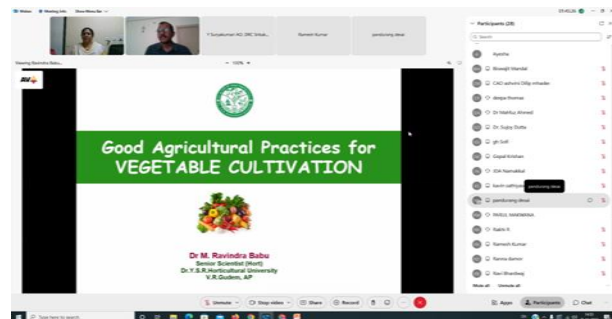
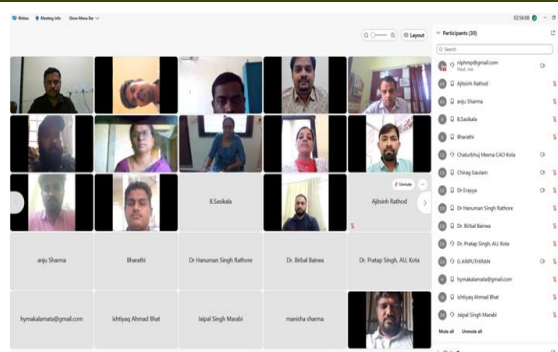
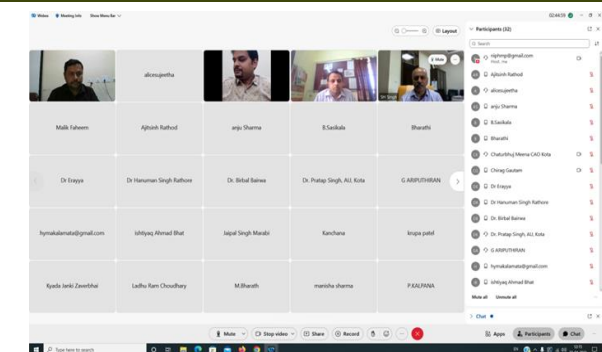
1. Farm level production of Bio-inputs : A training programme on “Farm Level Production of Bio-inputs” was organized by NIPHM from 04.04.2022 to 13.04.2022 (10 days). In this programme total of 17 officers/scientists from different SAUs, KVKs and ICAR institutes and state department are participated. In this 9 theory classes and 17 practical sessions and one institutional visit to Varsha Biotech Production Center was done. In practicals mass production techniques of different parasitoids along with their host, predators, NPV, Biopesticides, Biofertilisers, Entomopathogenic nematodes (EPN), Entomopathogenic fungus (EPF), and Vermicompost was shown.



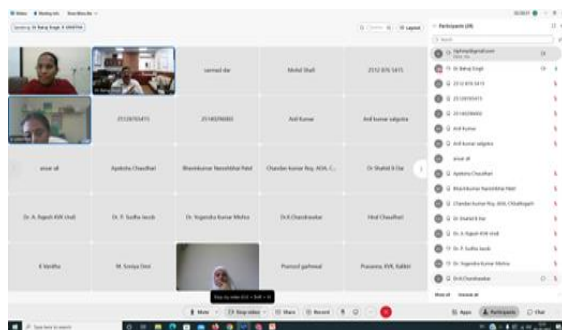


2. Production protocol for microbial bio pesticides: As per the training calendar of NIPHM 2022-23, the training program on “Production Protocol for Microbial and Biopesticides” was conducted from 18th April to 22nd April 2022 through online mode. A total of 36 participants from different organizations have attended this program. The training classes on Biological control of plant diseases, establishment of microbial bio-pesticide laboratory, biopesticides in plant disease management, preparation and maintenance of pure cultures of fungus and bacteria, role of EPNs in insect pest management, Mass production of EPNs, botanical pesticides in insect pest management, isolation, identification and production of *Trichoderma harzianum*, use of EPF’s in plant health management and their mass production techniques, determination of pH and moisture content, , production protocol for bacterial biopesticide used in plant disease management, production protocol for NPV were conducted.

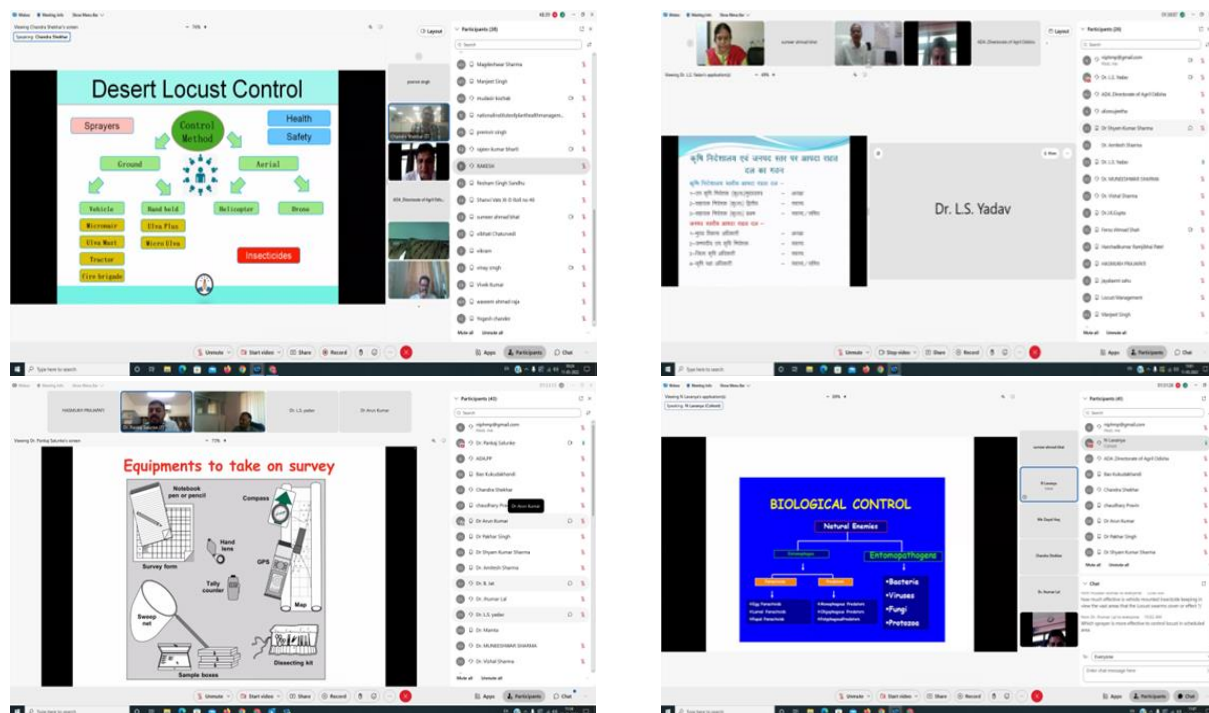
3. Good Agricultural Practices: As scheduled in the NIPHM training calendar 2021-22, an online training programme on ‘Good Agricultural Practices’ was organized by NIPHM from 25.04.2022 to 29.04.2022 (5 days). In this programme total of 54 officers/ scientists/ field level officers from different states & organizations have been participated. During this virtual training programme, the topics Introduction to India GAP-BIS, Role of Bio-control agents in insect pest management and conservation, Role of mycorrhiza and other biofertilizers in PHM & On farm production of biofertilizers , Good Agricultural practices for Paddy crop, Role of biopesticides in disease management & On farm production of *Trichoderma* and *Pseudomonas*, Good Agricultural practices for vegetables production , Role of AESA and EE based PHM to promote Sustainable Agriculture, Good Agricultural practices for soil health management, Significance of soil testing & soil test based nutrient management, Pesticide Application Techniques in GAP, Pesticides and Food Safety issues in relation to GAP, On farm production of Host culture (*Corcyra cephalonica*), predators and parasitoids, GAP for the management of Vertebrate pests, Good agricultural practices for Nematode Management, Mass production of EPF & NPV were covered. The programme has successfully completed after the participants presented their experience and taking feedback from the participants.



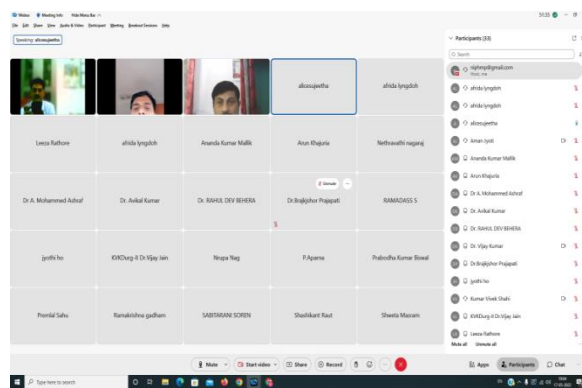
4. **Conservation of insect pollinators in agriculture:** An online training programme on ‘Conservation of insect pollinators in agriculture’ was organized at NIPHM from 4th to 6th May, 2022 (3 days). In this programme total of 30 officers/scientists from different states & organizations are participated. In this training program there were seven lectures Ecological engineering concepts to conserve beneficial insects and Effect of climate change on insect pollinators taken by Dr. E. Sreelatha, AD (PHM), Types of pollination and their pollinating agents in different crops and Role of pollinators in increasing crop production and mass production techniques of important beneficial insects taken by Dr. B. Shailaja, ASO (Ento.). Role of pollinators in protected cultivation taken by guest speaker Dr. Balraj Singh, Project Coordinator, AICRP on Honey bees and pollinators, New Delhi. Apiculture and the problems in apiculture and their management taken by guest speaker Dr. Ravindra Kumar, Director , Apiculture Technology Centre, NIRD, Hyderabad. Safe and judicious use of pesticides in agriculture and horticulture crops to conserve pollinators taken by Er. Govind Kumar Maurya, ASO(PHE).



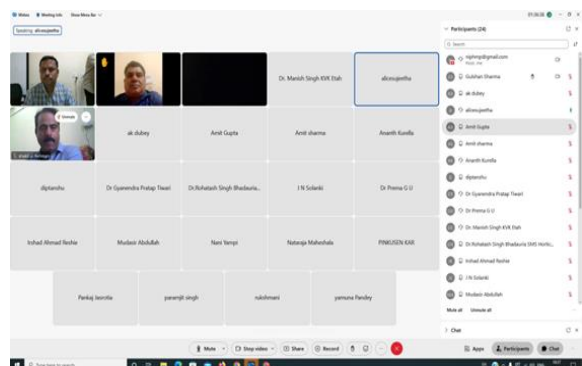
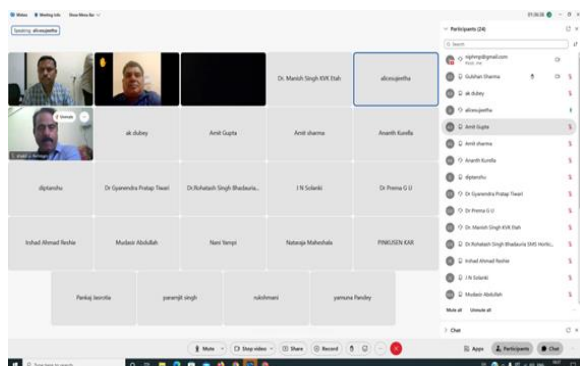
5. Locust pest management: As scheduled in the NIPHM training calendar 2022-23, an online training programme on ‘Locust pest management’ was organized at NIPHM from 09.05.2022 to 11.05.2022 (3 days). In this programme total 40 officers/scientists from different states & organizations have participated. The participants underwent various aspects of the Locust pest management such as an introduction to desert locust pest: Historical perspective and current status and Mechanical control methods of desert locust was taken by Dr. E. Sreelatha, desert locust biology, behaviour and critical factors leading to locust outbreak was taken by Dr. B. Shailaja, Classification, distribution and diversity of locusts, Mechanical control methods and biological control of desert locust was taken by Dr. S. Jesu Rajan, Biopesticides to control desert locust was taken by Smt. N. Lavanya, guest lectures on Surveillance of desert locust was taken by Dr. Pankaj Salunke and Management of desert locust using chemical methods was taken by Sh. Chandra Shekhar Sharma.



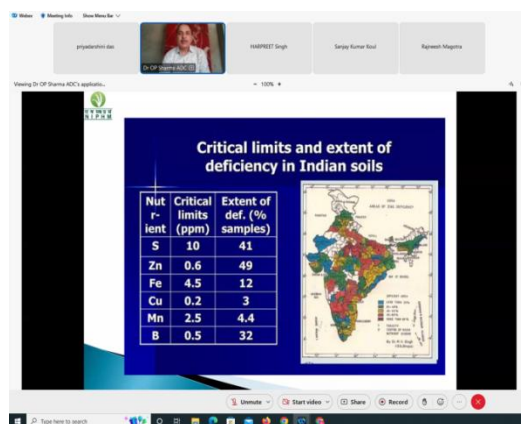
6. Organic farming and Certification process: As scheduled in the NIPHM training calendar 2022-23, an online training programme on ‘Organic farming and Certification process’ was organized at NIPHM from 17.05.2022 to 19.05.2022 (3 days). In this programme a total of 45 officers from different states & organizations have been participated. This training is helpful to the participants to knowledge on the organic farming practices for sustainable soil health management, importance of bioinputs in organic farming, and use of different organic manures land biofertilizers and below ground rhizospheric engineering for manipulation of the rhizosphere and certification process etc. During this programme, topics such as Principles, Development and Scope of Organic farming in India : issues and strategies, role of biofertilizers in organic farming, Ecological Engineering, its importance in organic farming for pest management, novel bio-inoculants for sustainable farming, NPOP , certification system, exports Imports and regulatory requirements, use of Microbial biopesticides in organic farming and Mass production, mass production of predators and parasitoids, internal control system management and PGS operation requirement are covered.



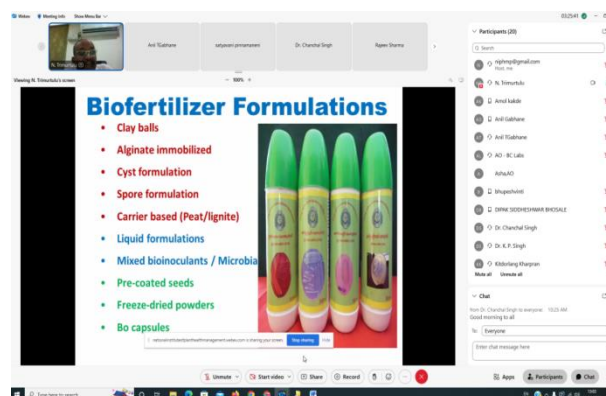
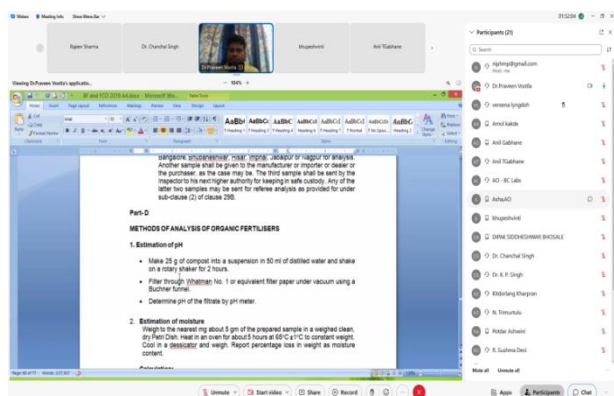
7. Plant Health Management in protected cultivation: An online training program entitled “Plant Health Management in protected cultivation” was conducted from 23-27 May, 2022 for officers as per the training schedule of NIPHM 2022-23. A total of 38 officers from different organisations like SAUs, KVKs and ICAR research institutes attended the training program. In this training program there were total of 12 lectures IPM in protected cultivation, Protected Cultivation of vegetables, Predators in protected cultivation, Role of parasitoids in protected cultivation, Scope of EPF in protected cultivation, Botanical and ITK consortia, IDM of vegetable crops in green house, Exploitation of NPV in protected cultivation, Nematode management in protected cultivation and Protected cultivation: Opportunity and challenges, Use of biofertilizers in Polyhouse cultivation. The topics were covered by both internal faculty and guest lectures.



8. Integrated soil Nutrient & Rhizosphere Management: Online training programme on ‘Integrated soil Nutrient & Rhizosphere Management’ was organized by NIPHM from 06.06.2022 to 10.06.2022 (5 days) In this programme total of 19 officers from different states & organizations have participated. This training is helpful to the participants to knowledge on the integrated soil nutrient management, soil health management, importance of soil testing, and use of different organic manures land biofertilizers and below ground rhizospheric engineering for manipulation of the rhizospheric. During this programme session such as role of biofertilizers in soil health management, rhizospheric engineering and ecological Engineering for soil Health management, Integrated Soil nutrient Management for sustainable farming, vermicompost technology, soil test-based nutrient Management, Integrated nematode Management, on-farm production of biofertilizers, role of biopesticides in control of soil borne diseases, role of botanicals in pest management, impact of agrochemicals on soil biological properties.



9. Production Protocol for Biofertilizers: Online training programme on ‘*Production Protocol for Biofertilizers*’ was organized by NIPHM from 13.06.2022 to 17.06.2022 (5 days). In this programme total of 18 officers/scientists/ field level officers from different states & organizations have been participated. In this training topics like, protocol for isolation, purification of microbial isolates used in biofertilizer production, mycorrhizae biofertilizer for sustainable agriculture, on-farm production of mycorrhizae biofertilizer, isolation and quality control of mycorrhizae biofertilizers, on-farm production of bacterial biofertilizers and application methods, mass production of carrier & liquid based biofertilizers, regulatory mechanisms for biofertilizers, quality control of bacterial biofertilizers, novel techniques in bio formulations development are covered.



10. Training to Pest Monitors on Field Diagnosis for IPM under CROPSAP (Maharashtra): NIPHM has been organized a training programme ‘Training to pest monitors on field diagnosis for IPM under CROPSAP (Maharashtra)’ from 20.06.2022 to 24.06.2022 (5 days). In this program, a total of 39 field level officers of Maharashtra have been attended. The training was focused on pest diagnosis, identification, AESA, ETL levels for various pests and their management mainly associated with paddy, cotton, soybean, pigeon pea, gram crops and vegetables, living soil concept, on farm production of biofertilizers and biopesticides, biocontrol agents etc. This training is helpful to the participants to knowledge on field diagnosis, Pest Surveillance, IPM practices, production aspects of bioagents and their application methods. In this training session like, Principles of IPM & insect pest management in rice, cotton and pulses, Integrated disease management in rice cotton and pulses, role of seed treatment in disease control, role of bio-fertilizers in PHM, field diagnosis of major insect pests, field diagnosis of major diseases, integrated nutrient management in field crops, use of entomopathogenic fungi (EPF) and NPV in pest management, Field diagnosis of pests: AESA exercise (field visit), On farm production of *Trichoderma* & *Pseudomonas*, On farm production of parasitoids, safe use of pesticides.

Glimpses of CROPSAP training 2022-23



Class room sessions



Group task and Assignment on IPM



Practical demonstration on On-farm production of EPF and NPV biopesticides



Conducted Field diagnosis visit to farmers field for disease and pest identification



Practical demonstration on On-farm production of Mycorrhizae (VAM) biofertilizers



Practical demonstration on On-farm production of biofertilizers and Biopesticides

Farmers training programmes

- 1. Training cum demonstration on use of Biopesticides and Biofertilizers in FCV tobacco :** On 11.04.2022, visited six villages in the Mysore region, (Kottegala, APF 62, Chilkunda, Sannenahally, APF 02, Hunsur, Shirenahally, APF 03, Hunsur, Marur, APF 64, Hunsur, Vasahalli, APF 1 H.D.kote, Kattemanuganahalli, APF 1 H.D.kote) and conducted demonstration cum training on use of Biopesticides (*Trichoderma* and *Pseudomonas*) and Biofertilizers (K-releasing bacteria) in FCV tobacco in different stages of the crop (nursery and main field application). Further visited different FCV tobacco nurseries of progressive farmers and diagnosed disease symptoms and suggested the recommendations. Shri K.V.Satya Prasad, RM, Mysore, Tobacco Board & other Auction Superintendents, field-level staff facilitated and arranged all the material required for the demonstration of the biopesticides and Biofertilizers application methods. In this program, about 150 FCV tobacco growers from different villages were covered.

Glimpses of training cum demonstration on use of Biopesticides and Biofertilizers in FCV tobacco



2. **On-farm production of Bio-fertilizers & Bio-control agents:** As approved by the competent authority, a training programme to farmers conducted from 11.05.2022 & 13.05.2022(3 days). About 24 progressive farmers from Andhra Pradesh and Telangana are attended. The farmers underwent different Plant Health Management practices such as Agro Ecosystem Analysis and Ecological Engineering in IPM in paddy, chilli and vegetable crops. Underwent hands-on training on on-farm production of Bio-fertilizers, Bio-pesticides, Bio-control agents, preparation of vermicompost, pheromone traps and lures, and their usage.



3. **Farmers training on training cum demonstration on Phosphate Solubilizing bacterial Biofertilizer:** As approved by the competent authority, faculty from NIPHM, Dr.Damodara chari visited and organized a off-campus training to farmers on 10.06.2022 (one day) at Regadi Myalavaram (V), Kodangal (M), Vikarabad (Dist), Telangana. About 50 progressive farmers are attended. The farmers underwent importance of different types of Biofertilizers and role of PSB biofertilizer in solubilisation of insoluble Phosphate from the soil and applications methods in paddy, cotton, red gram and vegetable crops. In this programme, DAO, ADA, AO's/AEOs of the respective mandal are attended. The liquid PSB inoculants produced by NIPHM, distributed by DAO, Vikarabad.



జీవన ఎరువులు వాడాలి

ఎన్ఐపీహెచ్ఐకో-అర్ధినేటర్ దామోదరాచారి

బొంరాస్పేట, జూన్ 10: పంటలను సాగు చేసే సమయంలో నేలలో భాస్కరాన్ని కరిగించే జీవన ఎరువులను వినియోగించాలని నేషనల్ ఇన్స్టిట్యూట్ ఆఫ్ ఫ్లాంట్ హెల్త్ మేనేజ్మెంట్(ఎన్ఐపీహెచ్ఐకో) కో-అర్డినేటర్ దామోదరాచారి అన్నారు. శుక్రవారం మండలంలోని రేడియోలారం రైతువేదికలో భాస్కరాన్ని కరిగించే జీవన ఎరువుల వాడకంపై రైతులకు అవగాహన కల్పించారు. భూమిలో నిల్వ ఉన్న నత్ర జని, భాస్కరం, పోటాషియం, సూక్ష్మ పోషకాలైన జింక్ను భూమి నుంచి పంటకు ఏ విధంగా అందించాలో వివరించారు. డ్రస్ రూపంలో ఉన్న పీఎస్బీని ఏ విధంగా విత్తనశుద్ధి చేయాలో తెలిపారు. అనంతరం జిల్లా వ్యవసాయాధికారి గోపాల్ మాట్లాడుతూ వ్యవసాయ శాస్త్రవేత్తలు, అధికారులు ఇచ్చే సూచనలు, సలహాలను రైతులు పాటించి పంట సాగులో అధిక దిగుబడులు సాధించాలన్నారు. అనంతరం ఆయన రైతులకు మందులు పంపిణీ చేశారు. కార్యక్రమంలో బొంరాస్పేట, కొడంగల్ మండలాల రైతుబంధు సమితి అధ్యక్షులు మహేందర్ రెడ్డి, బస్కరాజ్, ఎంపీ టీనే జగదీశ్, కొడంగల్ ఏడీఏ శంకర్, సుభాష్ చంద్ర, ఏవోలు పద్మావతి, బాలాజీ ప్రసాద్, ఏకావో సంతోష్ రైతులు, స్థానికులు పాల్గొన్నారు.



రైతుకు మందులు పంపిణీ చేస్తున్న జిల్లా వ్యవసాయాధికారి గోపాల్

- 4. Farmers training on Biofertilizer and Biopesticides usage:** As approved by the competent authority, faculty from NIPHM, Dr.Sreelatha, AD-PHM and Dr.Damodara chari ASO(Micro.) visited and organized an off-campus training to farmers on 16.06.2022 (one day) at Banigandlapadu (V), Errupalem (M), Khammam (Dist), Telangana. About 100 progressive farmers are attended. The farmers underwent importance of different types of Biofertilizers and Biopesticides, biocontrol agents, usage of pheromone traps, preparation of lures and applications methods in different crops. In this programme, AO's/AEOs of the respective Mandal are attended. The bio inoculants produced by NIPHM, distributed by AO.



5. Farmers Training on Biofertilizer and Biopesticide usage: Conducted a training on “On-farm production of biocontrol agents and microbial biopesticides” at KVK Tuniki with 33 trainees. In the training programme, the importance, on-farm production technology and field application methods of biopesticides viz., biocontrol agents and biopesticides were explained in detail to the farmers and also the information on mode of action and the diseases and pest that can be managed using the above biopesticides was also passed on to the farmers.



Forthcoming training programmes

S No	Name of the programme	No. of Days	From	To
I.	Officers training programmes			
1.	Production Protocol for Bio control agents (Predators, parasitods, microbial bio pesticides & Bio fertilizers)	21	29.06.2022	19.07.2022
2.	Study on impact of indiscriminate use of pesticides and fertilizers in agriculture	5	01.08.2022	05.08.2022

3.	On-Farm production of biocontrol agents and microbial biopesticides	10	16.08.2022	25.08.2022
4.	Production protocol for predator and parasitoids	5	05.09.2022	09.09.2022
5.	On-Farm production of biocontrol agents and microbial biopesticides	10	12.09.2022	23.09.2022
6.	Plant Health Management in Protected cultivation	5	26.09.2022	30.09.2022
II.	Farmers training programmes			
1.	Pest management in organic farming	3	25.07.2022	27.07.2022
2.	On farm production of bio control agents	3	16.08.2022	18.08.2022

Pesticide Management Division

Sl. No.	Name of the programme	No. of Days	From	To
1.	Pesticide Formulation Analysis	60 days (Offline)	26.04.2022	24.06.2022
2.	Inspection, Sampling and Prosecution Procedures under Insecticide Act, 1968	5 days (Offline)	30.05.2022	03.06.2022
3.	Laboratory Quality Management System and Internal Audit as per ISO/IEC 17025 2017	5 days (Offline)	13.06.2022	17.06.2022

- Pesticide Formulation Analysis:** A 60 days training on “Pesticide Formulation Analysis” was conducted from 26th April to 24th June, 2022 through physical mode. Twenty two participants from States Agriculture Department of Andhra Pradesh, Haryana, Jammu & Kashmir, Karnataka, Maharashtra, Tamil Nadu and Chhattisgarh were attended the training.

The aim of the training is to build the capacity of Insecticide Analysts undertaking the Quality Control analysis of Pesticide Formulations on different analytical technique such as volumetric analysis, Chromatographic and Spectroscopic techniques using High Performance Liquid Chromatography (HPLC), Gas Liquid Chromatography (GLC), UV-Vis Spectrophotometer and Fourier-transform infrared spectroscopy (FT-IR) as per Bureau of Indian Standard method.

The participants also acquired knowledge on laboratory quality management system and Internal Audit as per ISO/IEC 17025:2017 and procedure for accreditation during 60 days training.



Fig: Training on Pesticide Formulation Analysis

2. **Inspection, Sampling and Prosecution Procedures under Insecticide Act, 1968:** Five days training programme on “**Inspection, Sampling and Prosecution Procedures under Insecticide Act, 1968**” was conducted from 30th May to 3rd June 2022. A total of 33 participants were participated the training and participants are from State Agriculture Department of Tamil Nadu, Chhattisgarh, Andhra Pradesh, Karnataka and Telangana. The program is designed for the Insecticide Inspectors/Insecticide Analyst working at state Agriculture Department, Pesticide Testing Laboratories (PTLs) / Regional PTLs / Central Insecticide Laboratories to understand on various salient features of the Act 1968 and Rules 1971 and sampling of Pesticide Formulations as per BIS sampling of pesticides procedure to build the capacity of Insecticide Inspectors for enforcement of the Insecticide Act 1968.

3. **Laboratory Quality Management System and Internal Audit as per ISO/IEC 17025 2017:** : The Division has conducted five days training on “**Laboratory Quality Management System and Internal Audit as per ISO/IEC: 17025:2017**” from 13.06.2022 to 17.06.2022, through physical mode.

A total of 38 officials were participated the programme from various State Department of Agriculture, Pesticide testing/ Fertilizer testing laboratories of Andhra Pradesh, Chhattisgarh, Gujarat, Haryana, Jammu & Kashmir, Karnataka, Kerala, Maharashtra, Rajasthan and Tamil Nadu. The aim of the training is to understand the general requirement for the competence of testing and calibration laboratories in accordance with **ISO/IEC: 17025 2017**. The trainees



were trained on internal audit conduction procedure and other requirements. The training will be benefited to testing laboratories for accreditation and maintenance of laboratory as per ISO/IEC: 17025 2017 for generation of valid/reliable result.



Forthcoming training programmes:

Sl. No.	Title of the Programme	Duration	From	To	Eligibility Criteria
1.	Inspection, Sampling and Prosecution Procedures under Insecticide Act, 1968(ISPP)	5 days	25.07.2022	29.07.2022	Agricultural / Horticultural Officer (or equivalent position) working in State Department (or) designated Insecticide Inspector (Central / State)
2.	Pesticide Formulation Analysis	60 days	22.08.2022	20.10.2022	Analysts working at SPTLs / RPTLs/ CIL and other Government Labs engaged in Pesticide Formulation Analysis with educational qualification of Graduate in Chemistry / Agril / Hort
3.	Inspection, Sampling and Prosecution Procedures under Insecticide Act, 1968(ISPP)	5 days	05.09.2022	09.09.2022	Agricultural / Horticultural Officer (or equivalent position) working in State Department (or) designated Insecticide Inspector (Central / State)

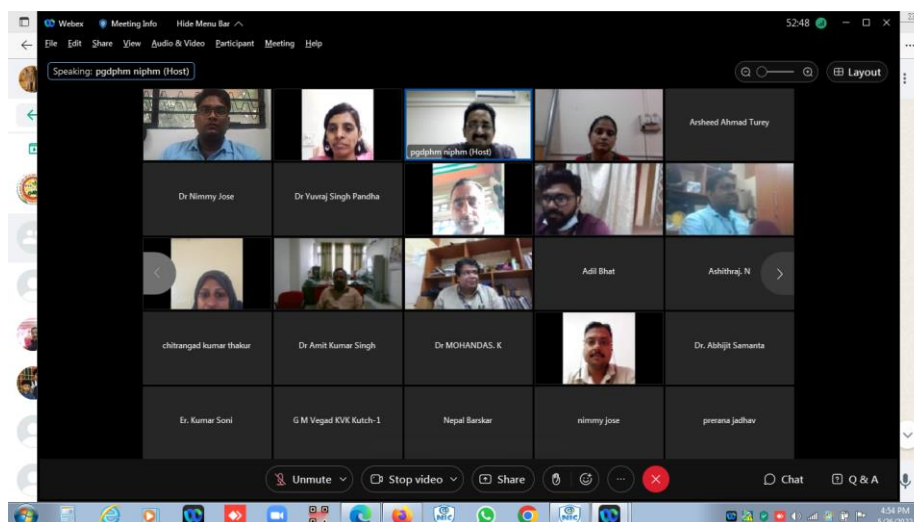
4.	Laboratory Quality Management System and Internal Audit as per ISO/IEC 17025: 2017	5 days	10.10.2022	14.10.2022	Science Graduate with knowledge in laboratory activities, working in analytical Laboratories of state govt. / central govt. / ICAR / Govt. Universities
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Plant Health Engineering Division

S No	Category	Name of the programme	No. of Days	From	To
1.	Officers	Remote Sensing & GIS application in Agriculture	03	24.05.2022	26.06.2022
2.	Officers	Pesticide Application Techniques and Safety Measures	05	20.06.2022	24.06.2022
3.	Farmers	Pesticide application Techniques and Safety Measures	01	19.05.2022	19.05.2022

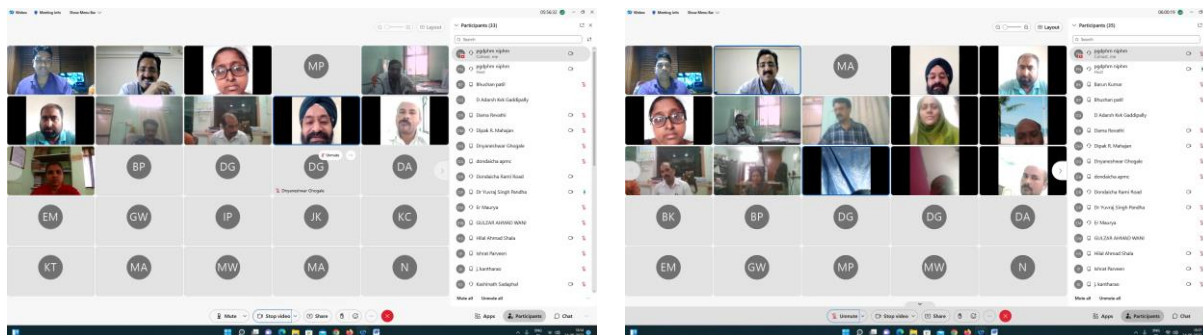
1. Remote Sensing & GIS applications in Agriculture: A 3 day virtual training program on “Remote Sensing and GIS applications in Plant Health Management” was organized from 24th May to 26th May 2022. 39 participants from 10 different states participated in the training program. Among them, 30 are Male and 9 are Female participants.

The participants were enriched with basic principle of remote sensing, applications of RS & GIS in agriculture and open source and commercial software’s available. Based on the participants request, demonstration of GPS and open source software QGIS were virtually taken up.



Glimpses of training programme

2. Pesticide Application Techniques and Safety Measures: In this five days training programme total 40 officers (30 Male and 10 fFemale) participants attended from eight states of the country, conducted during 20th to 24th June 2022. Lectures were arranged on basic principles of spraying, different spraying techniques, selection of nozzle, calibration of sprayers and nozzles, pesticide formulations and compatibility, safety precautions and minor maintenance. The participants enhanced their knowlgae and skills through this training.



Glimpses of training

3. Pesticide application Techniques and Safety Measures “(Farmers)”: PHE division conducted an online farmer interaction programme on “Pesticide Application Techniques and Safety measures” in association with KVK, Mehsana, Gujarat on 19th May 2022. Total twenty farmers (6 Male & 21 Female) attended the programme. Er. Sk Haneefa Begum, ASO(PHE) with the help of Shri. Mukesh R Patel, SMS (Ext.), coordinated this programme.



Glimpses of training

Educational Programs:

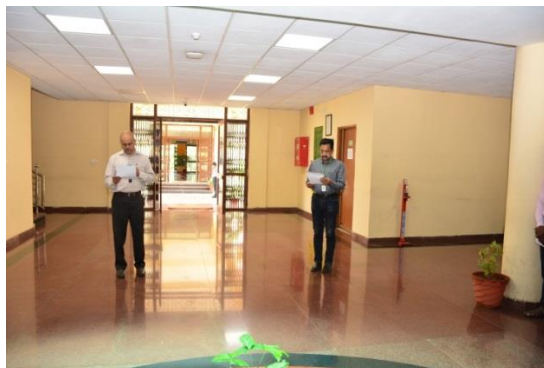
PGDPHM/DPHM: Theory and practical classes were handled on ‘Advancements in irrigation management’, ‘GPS application in agriculture’, and Post-harvest technology classes. Theory and practical examinations were also organized.

Forthcoming training programmes:

S.No	Title of the Programme	Division	From	To	Eligibility criteria	Course Coordinator & e-mail
1.	Irrigation systems and advancements	PHE	19.07.2022	21.07.2022	Extension officers from State Agriculture and Horticulture departments, Scientists of ICAR, SAUs and officials from KVKs, DPPQs. NGOs	Er. Govind Maurya Assistant Scientific Officer (PHE) asopeniphm1-ap@nic.in

2.	Digital Agriculture	PHE	25.07.2022	27.07.2022	Extension officers from State Agriculture and Horticulture departments, Scientists of ICAR, SAUs and officials from KVKs, DPPQs	Sk. Liyakhat Ali Ahamed, Assistant Director (ICT) adict-niphmhyd@gov.in
3.	Pesticide application techniques and safety measures	PHE	22.08.2022	26.08.2022	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 Scientific Officer (PHE) sopeniphm2-ap@nic.in
4.	Post-harvest management and storage techniques	PHE	19.09.2022	23.09.2022	Extension officers from State Agriculture and Horticulture departments, Scientists of ICAR, SAUs and officials from KVKs, DPPQs. NGOs	Er. Haneefa Begum Assistant Scientific Officer (PHE) asopeniphm2-ap@nic.in
5.	Pesticide application techniques and safety measures (Farmers)	PHE	19.07.2022	19.07.2022	Farmers	Er. M. Udaya Bhanu Scientific Officer (PHE) sopeniphm2-ap@nic.in
6.	Post-harvest management (Farmers)	PHE	04.08.2022	04.08.2022	Farmers	Er. Haneefa Begum Assistant Scientific Officer (PHE) asopeniphm2-ap@nic.in
7.	Pesticide application techniques and safety measures (Farmers)	PHE	22.09.2022	22.09.2022	Farmers	Er. M. Udaya Bhanu Scientific Officer (PHE) sopeniphm2-ap@nic.in

- Dr. Sagar Hanuman Singh, IPoS, DG, NIPHM administered pledge in connection with observance of Anti-Terrorism Day on 20.05.2022 (in view of closed holiday on 21.05.2022) at MG Block at 11:00 AM.



- The 8th International Day of Yoga was celebrated by NIPHM Rajendranagar on 21.06.2022. Yoga session was organised from 06:30 am to 07:10 am. The Staff and Trainees have attended the yoga session with full enthusiasm.





- International Day of Plant Health 2022 at NIPHM**

National institute of Plant Health Management (NIPHM), Hyderabad in collaboration with India Post released a special postal cover on the occasion of International day of Plant Health at NIPHM, on 12.05.2022. About 80 participants from NIPHM, neighbouring ICAR institutes and State Agriculture University attended the program. The programme was inaugurated by lighting the lamp by Sh. K. Prakash, IPoS, Chief Post Master General, Telangana Circle, Smt. T M Sreelatha, IPoS, Post Master General, HQR and Dr. Sagar Hanuman Singh, IPoS, Director General, NIPHM. The United Nations (UN) has unanimously adopted 12 May as International Day of Plant Health, an issue critical in addressing global hunger as plant pests and diseases cause massive crop losses and leave millions without enough food. Plant health is vital to the sustainable development of agriculture, required to feed a growing global population by 2050. In order to commemorate the International day of plant health 2022, NIPHM has released Special Postal Cover in collaboration with India Post on the International Day of Plant health 2022 to emphasize general public on the importance of Plant health and spread the message of protecting plant health. In the program the speakers emphasized on the importance of maintaining good plant health using available natural resources in order to have good human health as plants are the foundation of food pyramid.



Research & Development

1. Deciphering The Mechanism of Resistance to Root Lesion Nematode in Chickpea by Using Genetic and Genomic Approaches

Project progress during this quarter: Project completed and final report is submitted.

2. AICRP on Biological Control of Crop Pests (ICAR-AICRP-BC)-NIPHM, Hyderabad (Volunteer Centre)

a. Evaluation of NIPHM white media for the production of *Nomuraearileyi* (*Metarhiziumrileyi*) NIPHM MRF-1 strain for management of Maize Fall Army worm (*Spodopterafrugiperda*)

This project aimed for the production of *Metarhiziumrileyi* two media viz. NIPHM White media and broken rice were used. To standardize the production technology, the media under test were made into six treatments (Broken rice (without yeast extract), Broken rice (with yeast extract), 1% NIPHM white media, 2% NIPHM white media, 3% NIPHM white media, 4% NIPHM white media) and for each treatment two replications were maintained.

Project progress during this quarter: Mass production of *Metarhizium rileyi* on bio waste. Fresh preparation of SMAY broth (300ml). Inoculation of SMAY broth with *Metarhizium rileyi* slant culture. Overnight Soaking of biowaste in distilled water Sterilization of biowaste. Inoculated freshly prepared sporulating *Metarhizium rileyi* on biowaste. Incubated and kept under observation

3. IPM model villages under Tamil Nadu Irrigated Agriculture Modernization Programme (TN-IAMP)

NIPHM and Department of Agriculture, Tamil Nadu has entered into an MoU for take up the project on ‘Model IPM village’ under the scheme of TNIAMP with objectives like to provide technical assistance to all beneficiary farmers in 20 IPM villages under the Lower Palar Sub basin for the establishment of cost-effective sustainable Bio-control Agents’ production units in Kancheepuram District, Tamil Nadu, to train the farmers in the understanding of Good Practices in production and quality maintenance, to provide the mother culture and media initially based on the existing norms of the institution.

Project progress during this quarter:

- Project completion report prepared and submitted

4. Pesticide Formulation and Residue Analytical Centre:

The Pesticide Formulation and Residue Analytical Centre (PFRAC), Pesticide Management Division, is an accredited in accordance to ISO/IEC 17025:2017 laboratory.

The laboratory under Central Sector Scheme “Monitoring of Pesticide Residues at National Level (MPRNL)” has collected and analyzed about 340 samples (Fruits, vegetables, cereals, pulses, milk and water) for pesticide residues. A total of 203 samples were received from ANGRAU and analyzed during the period under MPRNL scheme.

The Laboratory received 20 samples from FSSAI and 78 samples from Tobacco Boards. All the samples were analyzed by GC-MS/MS and LC-MS/MS.

A total of 41 botanical/bio-pesticides samples were received from different state of Andhra Pradesh, Madhya Pradesh, Bihar, Gujarat, Telangana and Tamil Nadu and the samples were tested for pesticide contamination by GC-MS/MS and LC-MS/MS.



Fig: Sample preparation and analysis

5. Proficiency Testing Center (PTC):

PTC, PMD has initiated PT-PRA program on Chana Dal (PTC/PR/05/21-22), Water (PTC/PR/03/21-22) and orange (PTC/PR/04/21-22) during the month of January 2022, for pesticide residue analysis. The samples were dispatched to 41 participants on 14th February 2022. The results were received from the participants. Statistical evaluation of Chana Dal (PTC/PR/05/21-22), Water (PTC/PR/03/21-22) and orange (PTC/PR/04/21-22) were completed and interim reports were sent to 41 participants.

PTC, PMD has Organized PT PRA program on Mango and Wheat in the month of May 2022, and the samples were dispatched on 04th June 2022 through Blue Dart. PT items of Mango and Wheat for homogeneity study was conducted before sample dispatched.



Fig: Sample preparation for Mango Sample (PTC/PR/01/2022-23)



Fig: Sample preparation for Wheat Sample (PTC/PR/02/2022-23)

PTC, PMD has initiated PT PFA programme on chlorpyrifos technical, copper oxy chloride technical and propiconazole EC (PT/PF/04, 05 & 06/21-22) during November 2021. The final reports were prepared and sent to 48 participants along with feedback form during the period.

PTC, PMD has also initiated PT PFA programme on Cypermethrin Technical, Imidacloprid SL, Quinalphos EC (PTC/PF/01,02 & 03/2022-23) in the month of April 2022. Samples were prepared and packed for dispatched. Homogeneity study were conducted before sample dispatched.



Fig: Cypermethrin Technical sample preparation and packing PTC/PF/01/2022-23



Fig: Quinalphos sample preparation and packing PTC/PR/02/2022-23



Fig: Imidacloprid sample preparation and packing PTC/PF/03/2022-23

Samples of Cypermethrin Technical (PTC/PF/01/2022-23), Imidacloprid SL (PTC/PF/21/2022-23), and Quinalphos EC (PTC/PF/03/2022-23) were analysed for stability study in PFA laboratory. The results were received from the participants. Results data were entered in the excel sheet for statistical analysis.

PTC is accredited as per ISO/IEC 17043:2010 by NABL and Onsite assessment was conducted during the year 2021. Desktop Surveillance will be conducted during the year 2022 for assessment of laboratory compliance as per ISO/IEC 17043:2010. Hence, online filling of application form for Desktop Surveillance was completed for renewal of accreditation.

6. Construction and Evaluation of Zero energy cool chamber:

Zero Energy Cool Chamber is an eco-friendly storage system that doesn't require any type of energy to be adopted. A cool chamber was designed and constructed for the purpose of demonstration to trainees.

The performance evaluation of ZECC is under process to optimize the parameters of the chamber. The following are the parameters are measured to evaluate the ZECC.

- i. Outside temperature and RH
- ii. Inside temperature and RH

For performance evaluation of ZECC, the shelf life of commodities grown at NIPHM field were taken to evaluate the shelf of commodities in three different storage conditions of tomato were selected like control, refrigeration and ZECC.

The selected commodity was amaranths leaves: In three different conditions normal, wrapping in paper and placed plastic cover. In ZECC, the trays were placed 1 in row, 2 in a row and 3 in a row to study the shelf life of commodities with different conditions.



Tomato stored in ZECC



Leafy vegetables stored in ZECC

The selected commodity was cucumber: In ZECC, the trays were placed 1 in row, 2 in a row and 3 in a row to study the shelf life of commodities with different conditions.



Cucumber stored in ZECC

The selected commodity was okra: In ZECC, the trays were placed 1 in row, 2 in a row and 3 in a row to study the shelf life of commodities with different conditions.



Okra stored in ZECC

7. Feasibility studies on usage of treated sewage water for vegetables :

The spinach crop was irrigated time to time based on the soil moisture stress. The tensiometer was installed in the designated field for regular monitoring of moisture level in root zone. Based on that irrigation water has been supplied as flood irrigation.

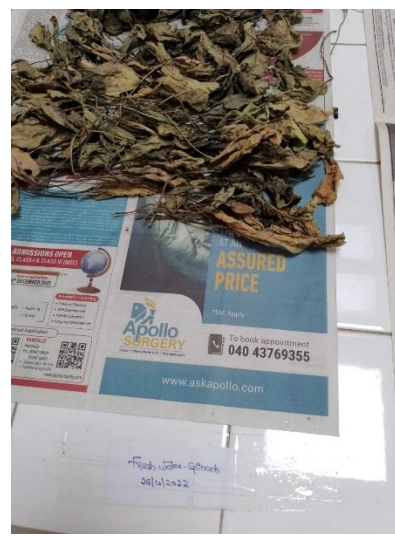
Further, the harvesting has been started when the crop reached to full maturity level. The first harvesting of fresh water irrigated plot done on 19th April, 2022. Approximate 20% crop has been harvested of plot-1, and 1 kg sample given to PM division for necessary analysis. In the Similar manner single treated water plot also been harvested and sample is given for analysis.



Single treated water produce



Double treated water produce



Fresh treated Water produce

8. Creation of spraying awareness & safe application of pesticides and their exposure to pesticide residue : Survey has been resumed by hiring the village level skilled persons. PHE officials visited to YFA – KVK where all the hired persons were asked to gather for preliminary skilling about *epicollect 5* for survey procedures. NIPHM officials thoroughly explained the survey procedure to all the hired surveyors.



Glimpses of Visit and explaining the survey procedures

Extension Activities / Village Adoptions

- As per the approval of the competent authority, NIPHM staff Mr.Lavanya, SO(BP& BC), visited the Mohammed village along with Ekalavya Foundation, KVK, Medak on 21.06.2022 and observed the progress of the biocontrol laboratory construction and guided for further improvements and facilities required for lab establishment.

Conducted a training on “On-farm production of biocontrol agents and microbial biopesticides” at KVK Tuniki with 33 trainees. In the training programme, the importance, on-farm production technology and field application methods of biopesticides viz., biocontrol agents and biopesticides were explained in detail to the farmers and also the information on mode of action and the diseases and pest that can be managed using the above biopesticides was also passed on to the farmers.



- In coordination with KVK, Mahaboobnagar, the survey for selecting spray men at 3 villages, Chennaram, Munnarur and Ramanpadu was taken up.



Glimpses of Visit and explaining the survey procedures

Faculty Achievements

- Dr. Vidhu attended and presented activities on drone at NIPHM during the one day conference on Kisan Drones. Industry and academia interactions were there to popularize and distribute the technology among farmers.
- Dr. Vidhu participated as Expert Panelist in the iConnect programme conducted by CSIR-CMERI, on sustainable farm mechanization on 26th May 2022.
- Dr. Vidhu Kampurath and Ms. Madhavi attended RPAS train the trainer training programme. The course was successfully completed and certified as authorized RPC holders along with trainers qualification.

Other Activities

- **MOOCs in Plant Biosecurity:** Twenty five participants enrolled for the course and are attending the course.
- **MOOCs in Rodents and Household Pest Management:** 40 participants are attending the course.
- **Kerala PGDPHM:**
 - The 3rd semester examinations for the V batch (2019-21) were conducted at SAMETI, Trivandrum during 6th to 8th April 2022.
 - The 4th semester theory classes for the Plant Health Management were organized at SAMETI Kerala from 5th to 7th May, 2022 and the practical classes were organised at NIPHM from 16th to 20th May, 2022. Total 25 officers from the Kerala Agricultural Department were attended the programme. Apart from the theory class the participants were taken to Fruit Research Station (Sangareddy), Varsha Bio Tech Pvt. Ltd., Poly house flower cultivation (Chevella) for practical exposure.
 - 4th semester end exams of Vth Batch are scheduled on 05.07.2022 at SAMETI, Kerala.
- **BRNS Project on Cut Flowers:** Received the grant for Board of Research on Nuclear Sciences (BRNS) project on “commercial scaling up of irradiation protocol as phytosanitary measure for major cut flowers” from BARC, Mumbai.
- **BRNS Project on SIT:** Received the sanction letter for Board of Research on Nuclear Sciences (BRNS) project on “Sterile Insect Technique” from BARC, Mumbai.
- **Farmer Advisory Cell Activities:** During this quarter the advisories related to Good Agricultural Practices (GAP), preparation and installation of fruit fly traps, vermicomposting, biofertilizers, biopesticides, pest management in crops etc. was provided to the 730 farmers and other stakeholders.
- **Lab Activities:**
 - Maintaining/Rearing of stored grain insect cultures
 - Rearing of fruit fly culture
 - Fruit fly lure preparation

- Maintenance of vermicompost unit at NIPHM and Staff Quarters
- ASO (PP) delivered a lecture on “Plant Quarantine” on 19.04.2022 in Induction Training Programme for Newly Recruited Custom Inspectors at NACIN, Hyderabad, Telangana.
- Based on the request received from Dr. Luwieke Bosma, Meta Research, Nepal, the faculty attended a virtual meeting on 22.04.2022 to discuss issues related to the rodents and the role of NIPHM in rodent pest management across the country.
- Director–PB and SO (PRA) visited ICRISAT to attend the seminar on “Global Issues in Plant Biosecurity” by Dr. SB Sharma, President of the UK-based World BioProtection Forum and attended the meeting with Dr. SB Sharma and representatives of ICRISAT & NBPGAR-RS to explore out the areas of interest in plant biosecurity for collaborative project.



- PBD Faculty attended the meeting organized with Federation of Seed Industry of India.
- AD (PD) attended the Seed Mela organized by PJTSAU, Rajnedranagar, Hyderabad on 24th May, 2022.
- AD (RPM) visited WDRA, New Delhi on 19.05.2022 and attended Indian Grain Storage Working Group meeting on 20.05.2022.

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A #meeting was held on 19.5.22 between officers of WDRA & National Institute of Plant Health Management (NIPHM) to plan various outreach and training programmes for F.Y 2022-23.



• **NIPHM Instructional farm:**

Weeding , irrigation and harvesting was done in Groundnut, Okra, Tomato and Ridge gourd. Weeding and irrigation was done in Sunflower and Bottle gourd. Applied nutrient fertilizers Harvested ridge gourd, bottle gourd, sunflower and groundnut. Ploughed harvested fields. Maintaining sunhemp in ploughed fields. Prepared beds and bunds for sowing. Sowing of ridge gourd, bottle gourd, bitter gourd, red gram and paddy was done. Irrigation was given to the sown crops.



Weeding in cucurbits



Groundnut harvesting



Weeding in okra



Millets Harvesting

- **Polyhouse (Protected cultivation)**

During this quarter (2022), the following farm activities are performed under protected cultivation.

Sowing followed in beans and leafy vegetables. Steaking was done in Cucumber, Beans and Tomato. Harvested cucumber and leafy vegetables. Weeding and irrigation done in cucumber, beans, tomato, brinjal and leafy vegetables. Sprayed neem oil @5% for the management of leaf miner in beans. Applied nutrient fertilizers. Harvested tomato, brinjal, beans and leafy vegetables. Ploughed the harvested bunds. Sown chilli, brinjal, tomato, broccoli and cabbage for raising nursery. Watering to the nursery plants has done.



Sowing of ridge gourd, bitter gourd and bottle gourd Nursery of tomato, chilli, brinjal, broccoli and cabbage

- **Pesticide Dealers courses**



Glimpses of training programme

- **Demonstration of Automated Irrigation systems-** M/s Navariti team demonstrated the automated irrigation system installed in Polyhouse to all the staff of NIPHM. They explained the working principle, trouble shooting methods to be carried out and extraction of cloud data.



Demonstration of Automated Irrigation systems

- A team from DGCA and state Telangana aviation visited NIPHM for NIPHM Drone academy certification and all related, required arrangements were made for certification.
- Urban pest management trainees visited PHE workshop and got acquainted with plant protection and urban pest management equipment.



Glimpses of demonstration

Hindi Activities

राजभाषा कार्यान्वयन समिति की प्रथम बैठक एवं अन्य गतिविधियां संपन्न

राजभाषा कार्यान्वयन समिति (राकास) की प्रथम बैठक वर 2022-2023 हेतु दिनांक 18-07-2022 को डॉ. सागर हनुमान सिंह, भा.डा.से, महानिदेशक, एनआईपीएचएम की अध्यक्षता में आयोजित हुई। बैठक में महानिदेशक के समक्ष अप्रैल-जून, 2022 की तिमाही हिंदी प्रगति रिपोर्ट प्रस्तुत की गई। उन्होंने उक्त रिपोर्ट की समीक्षा करते हुए संस्थान में राजभाषा अधिनियम की धारा (3)3 के पूर्णतः अनुपालन किये जाने के निदेश दिये। एनआईपीएचएम के सभी प्रौद्योगिकी वीडियो एवं किसानों से संबंधित अन्य प्रौद्योगिकी वीडियो को हिंदी में बनाया जाए। महानिदेशक ने निदेश दिया कि संस्थान के वार्षिक प्रतिवेदन 2021-22 का हिंदी में अनुवाद किया जाए। हिंदी पखवाड़ा 2022-के आयोजन हेतु योजनाएं तैयार की जाए।

संस्थान की गतिविधियां :

श्री अमित प्रकाश, निदेशक) राजभाषा(, राजभाषा प्रभाग, कृषि एवं किसान कल्याण विभाग, नई दिल्ली ने 28 जून, 2022 को एनआईपीएचएम का दौरा किया। उन्होंने एनआईपीएचएम में प्रगामी राजभाषा की उपयोग की स्थिति का निरीक्षण किया। इस निरीक्षण के दौरान उन्होंने एनआईपीएचएम के सभी प्रभागों एवं अनुभागों का भी निरीक्षण किया।



(एनआईपीएचएम में राजभाषा हिंदी का निरीक्षण करते हुए श्री अमित प्रकाश, निदेशक) राजभाषा)

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