

राष्ट्रीय वनस्पति स्वास्थ्य प्रबंधन संस्थान  
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Promoting Plant Health Management  
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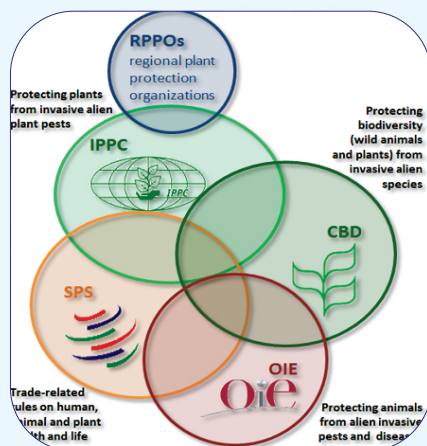
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Plant Health

# NEWS LETTER

JULY - SEPTEMBER, 2020

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## From the Director General's Desk

India is one of the recognized mega-diverse countries of the world, harbouring nearly 7-8% of the recorded species of the world, and representing 4 of the 34 globally identified biodiversity hotspots. Invasive alien species have dreaded and devastating impacts on native biota (both flora and fauna), causing decline or even extinctions of native species, and negatively affecting ecosystems.

The introduction of several plant pests into India in the 19th century with disastrous consequences called for the development of plant quarantine measures to prevent the spread and introduction of pests of plants and plant products. With the purpose of harmonising these measures, and of promoting measures for pest control, the International Plant Protection Convention (IPPC) has developed to address organisms that are both directly and indirectly injurious to plants. The examples of introduced invasive alien species are discussed inside the newsletter.

Numbers of different legislations related to invasive species are available. The list includes; The Plant Quarantine (Regulation of Import into India) Order 2003, The Destructive Insects and Pests Act, 1914 (and amendments): Livestock Importation Act 1898 and the Livestock Importation (Amendment) Ordinance, 2001: Environment Protection Act 1986 and The Biological Diversity Act 2002.

After post WTO regime, there is an increase in transport of goods and travels, has facilitated the movement of live species over long distances and beyond borders. Few organisms only become invasive, they have a tremendous impact on the plant, animal health and food safety and ecosystem health. Their negative impact on the economy costs countries to spend billions of dollars worldwide annually. If it is established, eradication is the most desirable solution, but it can be very expensive to do. Prevention is better than cure is the best solution. The negative effects of invasive alien species on biodiversity can be intensified by global warming, climate change, habitat destruction and pollution.

The United Nations General Assembly declared 2020 as the International Year of Plant Health (IYPH). The year is a once in a lifetime opportunity to raise global awareness on how protecting plant health can help end hunger, reduce poverty, protect the environment, and boost economic development. In this context NIPHM has conducted a series of webinars in current quarter like plant health management, biosecurity strategies for sustainable plant health, pesticide management, engineering interventions in plant health.

Plant Health Clinic was established at NIPHM and through the clinic advisories were given regularly to the farmers. Due to the current COVID 19 pandemic situations, NIPHM conducted all training programmes in online mode.

भारत विश्व में मान्यता प्राप्त वृहद् विविध देशों में से एक है, जहाँ दुनिया में दर्ज प्रजातियों में से लगभग 7 से 8 प्रतिशत प्रजातियाँ भारत में मौजूद हैं। इसके अलावा, विश्व भर में पहचाने जाने वाले जैवविविधता हॉटस्पॉट आक्रमक विदेशी प्रजातियों के 34 में 04 प्रजातियों का प्रतिनिधित्व कर रहा है। मूल प्रजातियों में गिरावट या विलुप्त होने के कारण आक्रमण विदेशी प्रजातियाँ खतरनाक हो चुकी हैं एवं पारिस्थितिक-तंत्र को नकारात्मक रूप प्रभावित करती हैं।

१९वीं सदी में भारत में कई पौध पीड़कों का फ़ैलना शुरू हुआ है, जिसके परिणामस्वरूप वनस्पति संरक्षण उपायों के विकसित होने से इनके फैलने एवं पौधों तथा पौधों से बने उत्पादों में पीड़कों के प्रवेश की रोकथाम करना है। इन उपायों को लोकप्रिय बनाने तथा पीड़क नियंत्रण को बढ़ावा देने के लिए अन्तर्राष्ट्रीय वनस्पति सम्मेलन (आईपीपीसी) ने प्रत्यक्ष एवं अप्रत्यक्ष दोनों तरह से पौधों को क्षति होने वाले जीवों के बारे में जानकारी विकसित की है। इस समाचारपत्र में आक्रमण विदेशी प्रजातियों के बारे में उदाहरण सहित चर्चा की गई है।

आक्रमण प्रजातियों से संबंधित कई विधान उपलब्ध हैं। सूची में वनस्पति संरक्षण (भारत के भीतर आयात विनियम) आदेश 2003, विनाशकारी कीट एवं पीड़क अधिनियम, १९१४ (एवं संशोधन) : लाइव स्टॉक आयात अधिनियम 1898 एवं लाइव स्टॉक विनाशकारी आयात (संशोधन) अध्यादेश, २००१ : पर्यावरण संरक्षण अधिनियम १९८६ एवं जैविक विविधता २००२ है।

विश्व व्यापार संगठन के दौरे के बाद, माल और यात्रा के परिवहन में वृद्धि हुई है, जिसके कारण लंबी दूरी पर और सीमाओं से परे जीवित प्रजातियों की आवाजाही को सुविधाजनक बनाया है। कुछ जीव केवल आक्रमक हो जाते हैं। वे पौधे, पशु स्वास्थ्य और खाद्य सुरक्षा और पारिस्थितिकी तंत्र स्वास्थ्य पर बुरा प्रभाव डालते हैं। अर्थव्यवस्था पर उनके नकारात्मक प्रभाव से देशों को दुनिया भर में सालाना अरबों डॉलर खर्च करना पड़ता है। यदि यह स्थापित होते हैं, तो उनका उन्मूलन सबसे वांछनीय समाधान है। लेकिन, यह करना बहुत महंगा हो सकता है। रोकथाम इलाज से बेहतर और अच्छा समाधान है। ग्लोबल वार्मिंग, जलवायु परिवर्तन, आवास विनाश और प्रदूषण से जैव विविधता पर आक्रमक विदेशी प्रजातियों के नकारात्मक प्रभावों को तीव्र बल मिलता सकता है।

संयुक्त राष्ट्र महासभा ने वर्ष 2020 को अन्तर्राष्ट्रीय वनस्पति स्वास्थ्य वर्ष (आईवाईपीएच) के रूप में घोषित किया है। यह वर्ष पौधों की स्वास्थ्य रक्षा, भूख मिटाने, गरीबी कम करने, पर्यावरण की रक्षा और आर्थिक विकास को बढ़ावा देने संबंधी मुद्दों को वैश्विक जागरूकता के लिए यह जीवन का सुनहरा अवसर है। इस संदर्भ में, एनआईपीएचएम ने चालू तिमाही में वनस्पति स्वास्थ्य प्रबंधन, सतत वनस्पति स्वास्थ्य हेतु जैव-सुरक्षा संबंधी रणनीतियाँ, पीड़कनाशी प्रबंधन, वनस्पति स्वास्थ्य में इंजीनियरिंग हस्तक्षेपों से संबंधित वेबिनार श्रृंखला का आयोजन किया है।

एनआईपीएचएम में वनस्पति स्वास्थ्य क्लिनिक की स्थापना की गई है और इसके माध्यम से किसानों को नियमित रूप से क्लिनिक सलाह दिया गया। वर्तमान में कोविड-19 महामारी परिस्थिति के कारण, एनआईपीएचएम ने ऑनलाइन माध्यम से सभी प्रशिक्षण कार्यक्रमों का आयोजन किया।

(G. Jayalakshmi, IAS)  
Director General



## Invasive Alien Species: Major Threat To Biodiversity

*Dr. Jyoti Bhardwaj, Dr. Girish A.G. and Dr. J. Alice R.P. Sujeetha*

### Introduction

In the era of globalization, the substantial growth in trade of agricultural products has gradually amplified the economies, brought prosperity and benefits to societies around the world, much of which would be impossible without the exchange of goods, including food crops, fish and livestock products, raw materials, manufactured items, etc. The negotiation of multilateral and regional trade agreements, including the World Trade Agreements in 1994, reflects a consistent effort by countries to expand and facilitate international trade across national borders. Conversely, the movement of goods through such trade has provided pathways for invasive alien species to spread and colonize new areas. Trade is a major means (or “pathway”) in which alien species can be introduced into new habitat. In recent decades the world has almost crossed the threshold and entered in a new phase of biological invasions. Associated pests are expanding their horizon around the world and our biodiversity are on alarming stage. Intentional and unintentional movement of exotic pest species beyond their natural geographical barriers has increased due to recurrent travel, trade, and tourism.

### Alien species:

It is defined as “a species, subspecies or lower taxon, introduced outside its natural past or present distribution; includes any part, gametes, seeds, eggs, or propagules of such species that might survive and subsequently reproduce” {*Source: Convention on Biological Diversity (CBD)*}.

### Invasive species:

It is described as “animals, plants or other organisms introduced by man into places out of their natural range of distribution, where they become established and disperse, generating a negative impact on the local ecosystem and species.” {*Source: International Union for Conservation of Nature (IUCN)*}.

### Invasive alien species (IAS):

It is defined as "an alien species whose introduction and/or spread threaten biological diversity" (*source: CBD, 2002*). It is also called as alien invasive species.

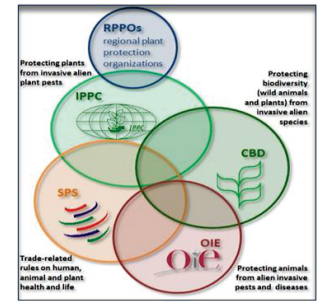
“Alien” species are those that are introduced into new habitats; they are “invasive” if they thrive so much that they threaten biodiversity, which includes agricultural and domestic species as well as wildlife. The threats include competition for food, the spread of disease or the spread of predators. Species that are in balance in one environment can become invasive if they are introduced into another habitat. Invasive species are non-native or exotic that occurs outside their natural adapted habitat and dispersal potential. Many of these alien species have become invasive. Trade is considered as one of the main pathway through which IAS can be introduced. Introductions of IAS are very often linked to trade in agricultural commodities, as well as transportation and shipping. These species poses an enormous threat to biodiversity, agricultural system and directly or indirectly damage the nature, environment and destroys the ecological system.

## International Appliances Pertaining To The Management of Invasive Alien Species

Convention on Biological Diversity (CBD), adopted in 1992 is the foremost international convention obliging its contracting parties to take action on invasive alien species. The objectives of the convention are

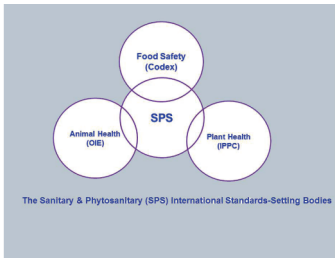
the conservation and sustainable use of biological diversity and the fair and equitable sharing of benefits arising out of the utilization of genetic resources. Article 8(h) of the CBD requires contracting parties to prevent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats or species.

The Cartagena Protocol on Biosafety, negotiated under the CBD's auspices, addresses the international movement of living modified organisms (LMOs) with the aim of minimizing the chance that such organisms might present an invasive threat to the environment. Source:



*International mandate on IAS,  
Source: Lopian, 2005*

**WTO- SPS Agreement-** The Agreement on the Application of Sanitary and Phytosanitary Measures (the "SPS Agreement") entered into force in year 1995 with the establishment of the World Trade Organization. It concerns the application of food safety and animal and plant health regulations. The Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement) is the WTO agreement that most directly relates to prevention efforts, although other WTO agreements, including the General Agreement on Tariffs and Trade (GATT), the Agreement on Technical Barriers to Trade (TBT Agreement), and the General Agreement on Trade in Services (GATS) also affect these efforts. The WTO- SPS Agreement superseded the GATT, TBT & GATS as the umbrella organization for international trade and institutes the basic international framework structure, requirements and legal obligations for how countries can regulate imports of products that may contain alien species harmful to public health, animals or plant life.



**International Plant Protection Convention (IPPC)-The International Plant Protection Convention,** which came into force in 1952, also contains provisions applicable to invasive alien species when the species concerned are pests of plants or plant products. The IPPC aims to prevent the spread and introduction of pests of plants and plant products, and to promote appropriate measures for their control. The IPPC definition of a quarantine pest covers much, but not all, of what is considered as an invasive alien species under the CBD. Both definitions refer to any organism that is injurious to plants and that has an environmental impact. Although sometimes perceived as limited to the protection of agricultural and forestry plants, the IPPC covers all plants, including those found in natural and semi-natural habitats.

### Three IPPC recommendations related to IAS legislation

- "...contracting parties and NPPOs enhance plant protection laws and policies, where needed, to include the protection of wild flora and biodiversity from pests of plants (including plants that are invasive alien species)".
- "...contracting parties and NPPOs promote the IPPC and participate in broader national strategies to address threats to biodiversity posed by invasive alien species, so that maximum advantage can be taken of existing structures and capacities under the IPPC".
- "...contracting parties and NPPOs reinforce efforts to apply and utilize relevant ISPMs and related phytosanitary measures to address threats to biodiversity posed by invasive alien species that are pests of plants (including plants that are invasive alien species)". (IPPC, 2005b).

**Regional Plant Protection Organizations (RPPOs)** are the integral part of international framework dealing with IAS i.e. plant pests. RPPOs function as regional coordinating bodies and participate in various activities to achieve the objectives of the IPPC. There are ten RPPOs who works to secure the plant health and biodiversity of their respective regions by monitoring NPPOs activities to implement and promote the IPPC guidelines/activities/international standards of phytosanitary measures and cooperating with other



regions to promote harmonized phytosanitary measures for environmental protection.

**Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)** -The Parties to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), which primarily addresses trade in endangered species, have specifically called for consultations among Parties' CITES management authorities on how to prevent or better regulate the transfer of endangered species that may be invasive.

**International Union for Conservation of Nature (IUCN)** -The International Union for Conservation of Nature, established in 1964 provides the Red List of Threatened Species which has been evolved as world's most comprehensive information source on the global conservation status of animal, fungi and plant species. It is an ample store house and powerful tool which provides information about range, population size, habitat and ecology, use and/or trade, threats, and conservation actions required for conservation. Furthermore, in obedience with well time honored principles of customary international law, the exporting countries have a general responsibility to ensure that activities within their jurisdiction would not harm the environment of other States or to areas beyond the limits of their national jurisdiction.

### National Obligations & Framework Against Invasive Alien Species

**National Plant Protection Organization (NPPO)**, The NPPOs are representatives of the Contracting Parties to the IPPC and therefore responsible for various activities to prevent the entry and establishment of exotic pests in respective country. NPPOs play crucial role in reporting the occurrence, outbreak and spread of pests, inspecting consignments of plant and plant products and other regulated items, managing treatments related to plant health (either disinfections or disinfestations) of consignments, surveillance and maintenance of pest free areas (PFA) and areas of low pest prevalence (ALPP), issuance of phytosanitary certificates to fulfill the phytosanitary requirements of importing country and conducts pest risk analysis for import of new commodities.

**The Plant Quarantine (Regulation of Import into India) Order, 2003**, regulates import and prohibition of import of plants and plant products into India. To prevent the entry, establishment and spread of exotic pests in India as per the provisions of sub-section (1) of Section 3 of the ***Destructive Insects and Pests Act, 1914 (2 of 1914)*** and the notifications issued there under this act, the government of India has acquaint with a mandatory Pest Risk Analysis for any new agricultural product or an already imported product being sourced from a new country. The analysis is carried out to predict the possibility of a consignment carrying a potential pest entering the country may along and associated with the imported product.

### INVASIVE ALIEN SPECIES IN INDIA

Invasive alien species are a major driver of species extinction and also threaten agriculture, forestry production at large scale. About 40% of the species in the Indian flora are alien; of which 25% are invasive. The frequency of introductions and spread of IAS are inherently variable but it has been increased substantially during the last decades. A number of alien species introduced in India during the time being and few recent intrusions are detailed further-

#### Introduced Invasive Insect pests

***Spodoptera frugiperda* J.E. Smith, Fall Armyworm (FAW)**: Native to Tropical America, reported first time in India from Chikkaballapur, Karnataka during 2018 and now it covers almost all the states of India. This is a perilous trans-boundary insect with a high potential & efficacy to spread promptly due to its natural distribution capacity and opportunities offered by international trade of agricultural commodities.

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The fall armyworm is a lepidopteran pest that feeds in large numbers on leaves and stems of more than 80 plant species, causing major damage to maize, rice, sorghum, sugarcane but also other vegetable crops and cotton. Large pest population can cause defoliation and resulting yield losses; larvae migrate to adjacent areas in true armyworm fashion. Infestations during the mid to late whorl stage of maize development caused yield losses of 15-73%.



Source: CABI

**Table 1. List of Major Introduced Insect Pests in India**

S.No	Common name	Scientific name	Year of Introduction	Country of Origin/ Native
1	Soft green scale	<i>Coccus viridis</i> (Green)	1889	South Africa
2	Woolly apple aphid	<i>Eriosoma lanigerum</i> Hausm	1889	Eastern North America
3	San Jose scale	<i>Quadraspidiotus perniciosus</i> (Comstock) Cockerell	1911	China
4	Lantana bug	<i>Insignorthezia insignis</i> (Browne)	1915	Sri Lanka
5	Cottony cushion scale	<i>Icerya purchasi</i> Maskell	1921	Australia
6	Potato tuber moth	<i>Phthorimaea operculella</i> Zeller	1937	South or North America
7	Diamond back moth	<i>Plutella xylostella</i> (Linnaeus)	1914	Europe, South Africa or East Asia
8	Sugarcane woolly aphid	<i>Ceratovacuna lanigera</i> Zehntner	1958	Indonesia
9	Pine woolly aphid	<i>Pineus pini sensu lato</i>	1970	Western and Central Europe
10	Litter beetle	<i>Luprops tristis</i> (Fabricius)	1970-80	Malaysia
11	Subabul psyllid	<i>Heteropsylla cubana</i> D.L. Crawford	1988	Central America
12	Serpentine leaf miner	<i>Liriomyza trifolii</i> Burgess	1991	USA
13	Coffee berry borer	<i>Hypothenemus hampei</i> Ferrari	1990	Northeast Africa
14	Spiralling whitefly	<i>Aleurodicus disperses</i> Russell	1995	Central America and Caribbean Region
15	Coconut eriophyid mite	<i>Aceria guerreronis</i> Keifer	1997	Mexico
16	Silver leaf whitefly	<i>Bemisia tabaci</i> (Gennadius, 1889) -biotype B	1999	United States
17	Defoliating tortoise beetle	<i>Trachynela tinctorialis</i>	2000	Australia
18	Erythrina gall wasp	<i>Quadrastichus erythrinae</i> Kim	2005	Taiwan
19	Cotton mealy bug	<i>Phenococcus solenopsis</i> Tinsley	2005	New Mexico, USA
20	Lotus lily midge	<i>Stenochironomus nelumbus</i> Tok et Kur	2005	China
21	Eucalyptus gall wasp	<i>Leptocybe invasa</i> Fisher & La Salle	2006	Australia
22	Erythrina gall wasp	<i>Quadrastichus erythrinae</i> Kim	2006	Africa
23	Papaya mealybug	<i>Paracoccus marginatus</i> Williams & Granara de Willink, 1992	2007	Mexico or Central America
24	Madeira mealybug Green	<i>Phenococcus madeirensis</i> Green, 1923	2012	Neotropical in origin
25	Solanum mealybug	<i>Phenacoccus solani</i> Ferris	2012	Northern America
26	Tomato pinworm	<i>Ageratum conyzoides</i> L. Tuta absoluta (Meyrick)	2014	Peru
27	Rugose spiralling whitefly	<i>Aleurodicus rugioperculatus</i> Martin	2016	Central America
28	Western flower thrips	<i>Frankliniella occidentalis</i> (Pergande, 1895)	2016	Northern America



29	Stem borer or longhorn beetle	<i>Phenacoccus solani</i> Ferris	2017	China or Myanmar
30	Peach black aphid	<i>Pterochloroides persicae</i> (Cholodkovsky)	2018	Eastern Asia
31	Fall army worm	<i>Spodoptera frugiperda</i> J.E. Smith	2018	Tropical and subtropical regions of the Americas
32	Bondar's Nesting Whitefly	<i>Paraleyrodes bondari</i> Peracchi	2019	Southern America
33	Nesting whitefly	<i>Paraleyrodes minei</i> laccarino	2019	Southern America
34	Palm infesting whitefly	<i>Aleurotrachelus atratus</i> Hempel	2019	Brazil
35	Woolly whitefly	<i>Aleurothrixus floccosus</i> (Maskell, 1895)	2019	Southern America
36	Cassava mealybug	<i>Phenacoccus manihoti</i> Matile Ferrero	2020	Southern America

## Introduced Pathogens-

***Hemileia vastatrix* (Coffee rust)**, originated in Sri Lanka/Ethiopia and first noticed in India during 1879. At present the pest is present in Andaman & Nicobar, Karnataka and Tamil Nadu. Host list of this pest ranges from *Coffea arabica* (arabica coffee), *Coffea canephora* (robusta coffee), *Coffea liberica* (Liberian coffee tree). Coffee rust is the most economically important coffee disease in the world, and in monetary value, coffee is the most important agricultural product in international trade. Even a small reduction in coffee yields or a modest increase in production costs caused by the rust has a huge impact on the coffee producers, the support services, and even the banking systems in those countries whose economies are absolutely dependent on coffee export.



Source: CABI

It affects the fruits, leaves and stems of the plant. A rust epidemic caused by a fungal pathogen (*Hemileia vastatrix*) was responsible for replacing the once predominant coffee crops in Sri Lanka with tea plantations.

**Table 2. List of Major Introduced Fungi, Bacteria, Viruses & Nematodes**

S.No	Common name	Scientific name	Year of Introduction	Country of Origin/ Native
<b>Fungi</b>				
1	Coffee rust	<i>Hemileia vastatrix</i>	1879	Sri Lanka
2	Late blight of potato	<i>Phytophthora infestans</i> (Mont.) de Bary	1883	North America
3	Flag smut of wheat	<i>Urocystis tritici</i> Koran	1906	Australia
4	Grapevine downy mildew	<i>Plasmopara viticola</i> (Berk. & M.A. Curtis) Berl. & de Toni	1910	North America
5	Powdery mildew of cucurbits	<i>Erysiphe cichoracearum</i> DC.	1910	Not Known
6	Downy mildew of Maize	<i>Peronosclerospora philippinensis</i> (W. Weston) C.G. Shaw, 1978	1912	Philippines
7	Paddy blast	<i>Magnaporthe oryzae</i> B.C. Couch [teleomorph] B.C. Couch	1918	South East Asia
8	Powdery mildew of rubber	<i>Oidium heveae</i>	1938	Malaya
9	Black shank of tobacco	<i>Phytophthora nicotianae</i> Breda de Haan	1938	Indonesia
10	Potato wart disease	<i>Synchytrium endobioticum</i> (Schilb.) Percival	1953	Netherlands
11	Onion smut	<i>Urocystis cepulae</i> Frost	1958	Europe
12	Leaf spot of sorghum	<i>Phyllachora sorghi</i>	Not known	Exact origin not known
13	Apple scab	<i>Venturia inaequalis</i>	1978	Central Asia
14	Downy mildew of sunflower	<i>Plasmopara halstedii</i> (Farl.) Berl. & De Toni	1985	North America

S.No	Common name	Scientific name	Year of Introduction	Country of Origin/ Native
<b>Bacteria</b>				
1	Bacterial leaf blight of paddy	<i>Xanthomonas oryzae</i> pv. <i>oryzae</i> (Ishiyama 1922) Swings et al. 1990	1959	Asia
2	Crown gall of apple/pear	<i>Rhizobium radiobacter</i> (Beijerinck and van Delden 1902) Young et al. 2001a	Not known	Exact origin not known
3	Hairy root of apple/pear	<i>Agrobacterium rhizogenes</i> (Riker et al. 1930) Young et al. 2001	Not known	Exact origin not known
4	Fire blight of pear	<i>Erwinia amylovora</i> (Burrill 1882) Winslow et al. 1920	Not known	North-Eastern USA
5	Black rot of crucifers	<i>Xanthomonas campestris</i> pv. <i>campestris</i> (Pammel 1895) Dowson 1939	1910	Exact origin not known
<b>Viruses</b>				
1	Bunchy top of banana	<i>Banana bunchy top virus</i>	1940	Fiji
<b>Nematodes</b>				
1	Potato golden nematode	<i>Globodera rostochiensis</i> (Wollenweber, 1923) Behrens, 1975	1961	Andes region of South America
2	White potato cyst nematode	<i>Globodera pallida</i> (Stone, 1973) Behrens, 1975	1961	Andes region of South America

**Introduced Invasive Weeds-** Weeds pose a major threat to world agriculture by reducing adversely crop production and quality of the produce. The weeds are major inter linked and parallel components of the agroecosystems which are spoiling the ecology due to their intrusive behaviour of spread.

Some of India's most notorious invasive include lantana, parthenium, siam weed, mexican devil and mesquite. The water hyacinth (*Eichhornia crassipes*) has invaded many inland water bodies, while alligator weed (*Alternanthera philoxeroides*) invades both aquatic and terrestrial habitats in India.

***Lantana camara* L. (Spanish flag)**, Native to Mexico, Central America, the Caribbean and tropical South America and naturalized in Africa, Australia, India, south-eastern Asia and many oceanic islands with warm climates. Its Pathway of introduction is through seed contamination in Agricultural and Horticultural Trade. *Lantana camara* is a significant weed of which there are some 650 varieties in over 60 countries. It is established and expanding in many regions of the world, often as a result of clearing of forest for timber or agriculture. It impacts severely on agriculture as well as on natural ecosystems. The plants can grow individually in clumps or as dense thickets, crowding out more desirable species. In disturbed native forests it can become the dominant understory species, disrupting succession and decreasing biodiversity (<http://www.iucngisd.org/gisd/species.php?sc=56>)



Source: CABI

Seeds are readily dispersed into new areas by birds. *L. camara* is one of the most problematic invasive plants in many parts of the world. It forms extensive, dense and impenetrable thickets in forestry plantations, orchards, pasture land, waste land and in natural areas.

It has been nominated as among 100 of the "World's Worst" invaders by the IUCN Invasive Species



Specialist Group and it has been listed as a noxious weed in many countries and states including South Africa and Australia.

***Mikania micrantha* Kunth**, (Mile\_a\_minute weed, bittervine), is native to Central America, South America and the Lesser Antilles. *M. micrantha* is widely introduced in various parts of Africa, Asia, Indonesia and the Pacific Islands and very quickly became a bad pantropical weed. Once established it spreads at an alarming rate, readily climbing and twining on any vertical support, including crops, bushes, trees, walls and fences. Its shoots have been reported to grow up to 27m a day. *M. micrantha* damages or kills other plants by cutting out the light and smothering them. In this respect it is especially damaging in young plantations and nurseries. It also competes for water and nutrients, but perhaps even more importantly, it is believed that the plant releases substances that inhibit the growth of other plants. *M. micrantha* is one of the three worst weeds of tea in India and Indonesia and of rubber in Sri Lanka and Malaysia. It also causes serious problems in oil palm, banana, cacao and forestry crops, and in pastures. (<http://www.iucngisd.org/gisd/species.php?sc=42>)



Source: Indian Biodiversity Portal

**Table 3. List of Major Introduced Weeds in India**

S.No	Common name	Scientific name	Year of Introduction	Country of Origin/ Native
1	Perennial ragweed	<i>Ambrosia psilostachya</i> DC.	2012	Central and North America
2	Alligator weed	<i>Alternanthera philoxeroides</i> (Mart.) Griseb	1960	South America
3	Kariba weed	<i>Salvania molesta</i> D.S. Mitch.	1955	Brazil
4	Parthenium weed	<i>Parthenium hysterophorus</i> L.	1951	North America (Mexico)
5	Bitter – vine	<i>Myrcia micrantha</i> Kunth	1918	Central and South America
6	Black wattle	<i>Acacia mearnsii</i> De Wild	19 <sup>th</sup> century	Australia
7	Siam weed	<i>Chromolaena odorata</i> (L.) R.M. King & H. Rob.	19 <sup>th</sup> century	South and Central America
8	Sensitive plant , Touch-me-not	<i>Mimosa pudica</i> L.	19 <sup>th</sup> century	South and Central America
9	Water hyacinth	<i>Eichhornia crassipes</i> (Mart.) Solms 1883	1895	South America
10	Lantana	<i>Lantana camara</i> L.	1809	Central and South America
11	Mexican poppy	<i>Argemone maxicana</i> L.	1753	Mexico
12	Billy goat weed Central	<i>Ageratum conyzoides</i> L.	1860	America & Caribbean
13	Mile_a_minute weed, bitter	<i>Mikania micrantha</i> Kunth	1918	Central and South America
14	Littleseed canarygrass	<i>Phalaris minor</i> Retz. (1783)	1961	Mediterranean region
15	Mesquite Mexico	<i>Prosopis juliflora</i> (Sw.) DC.	1870s	Mexico, Central and Northern South America

## Challenges & Management to Overcome the Invasion of Invasive Species

The prevention and management of IAS relevant to plants necessitates coherent cooperation among the national, regional and international organizations. 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 IPPC provisions and standards, guidelines and recommendations. Countries should use existing phytosanitary control and quarantine systems and procedures to prevent the introduction of IAS, in line with their obligations under the SPS Agreement, also in order to minimize trade repercussions. Plant health authorities and other relevant stakeholders, as appropriate, should be engaged in policy and strategy formulation related to IAS at an early stage. Activities should be coordinated in such a manner that it creates coherence and efficiencies to increase the use and effectiveness of existing SPS regulatory frameworks and institutions to address the control and management of Invasive species.

A national level, cooperation and transparency should be promoted to prevent the entry and spread of exotic pests by proper surveillance, inspection, testing and diagnosis of the exotic pest at the point of entry (airports, seaports, land frontiers, inland containers, etc.). Conquering with the effective quarantine system and implementation of all phytosanitary measures, the responsibility has to be enduring by the Central Government, State/ Union Territory, Research Institutes, Agricultural Universities, Private/ Public sectors, Farmers and Public. To overcome the destructive consequences of these notorious tiny entities, on plants, human, animals, environment an emergency plant pest incursion management system is much needed. Governments should come forward and put efforts to enhance the frequency of trades through additional trade, environmental and transport-related agreements to develop standard operating procedures (SOPs) and additional phytosanitary support system to avert introduction of invasive alien species.

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- Global Invasive Species Database <http://www.iucngisd.org/gisd/>
- Global Biodiversity Information Facility <https://www.gbif.org/>
- ICAR- National Bureau of Agricultural Insect Resources (NBAIR) <https://www.nbair.res.in/>
- Indian Biodiversity Portal <https://indiabiodiversity.org/>
- Plantwise Knowledge Bank <https://www.plantwise.org/knowledgebank/>



## Banana Leaves Exported to Dubai with Strict Phytosanitary Measure

Food served on the banana leaves absorbs the polyphenols which are said to prevent many lifestyle diseases. They are also said to have anti-bacterial properties that can possibly kill the germs in food. Banana leaves contain large amounts of polyphenols that are natural antioxidants. These are found in many plant-based foods and green tea.

Most people use banana leaves to serve an authentic south Indian spread on festivals and family get-togethers. They are also considered quite sacred and are often used for offering Prasad to the deities. These thick leaves are big enough to serve a multi-course meal ranging from sambhar to chutneys. You can also cut these leaves in different sizes and place them on platter of any size. Banana leaves are loaded with nutrients we bet you didn't know about. Food when served on banana leaves gets enriched with several nutrients that we would otherwise miss.

With the demand for banana leaves soaring in Dubai during April for the festival season, exporters from Kerala thronged the valley to buy them in bulk.

“The domestic market will not be affected much by the exports as they are sending matured leaves. Local people prefer tender light green leaf of any variety of banana. But for export prefer fully matured leaves as they have longer shelf life.” Mr Sudhakaran said. They are sending one tonne of leaves to Dubai every day during those days. The leaves will hit the Dubai market within 24 hours.”



**Grading and packing of banana leaves for export to Dubai (Source: Chander Mohan, 9 April, 2018)**

### Phytosanitary measure adopted:

- The plants are also given support using casuarina poles to prevent damage. Such measures prevent leaf damage, says S. Karuppan, a farmer of Kullapuram.
- The leaf should not have any black dots or yellow spots. It should be dark green.
- Workers grade the leaves, process and pack them in cartons for which ISPM 15 is excluded at the farms and transport them to Cochin airport for export.

Though it is peak season in April, exports prefer to buy banana leaves in large numbers during Christmas too. “They sent a small quantity last December. But they have a bulk order for year 2019 year’s Vishu. They procure the leaves from Kullapuram in Periyakulam block to Goodalur near Lower camp.

(Source : Chander Mohan-Kerala)

## Webinars

- **Webinar on Plant Biosecurity Strategies for Sustainable Plant Health: Protect domestic plant health promote export (as part of IYPH 2020 Series Webinars):**

One Day Webinar under IYPH, 2020 series on “Plant Biosecurity Strategies for Sustainable Plant Health: Protect domestic plant health promote export” conducted on 29th August, 2020. More than 305 participants attended the webinar. The programme was graced with Inaugural address by Smt. G Jayalakshmi, IAS Director General, National Institute of Plant Health Management, Hyderabad and in

presence of Director Plant Biosecurity Division, Dr. Alice RP Sujeetha

## **Theme: “Engineering Interventions in Plant Health Management**

### **Sub-theme: “Farm Machinery for Plant Health Management”**

The United Nations General Assembly declared 2020 as the International Year of Plant Health (IYPH). The year is a once in a lifetime opportunity to raise global awareness on how protecting plant health can help end hunger, reduce poverty, protect the environment, and boost economic development. FAO estimates that up to 40% of food crops are lost due to plant pests and diseases annually. This leaves millions of people without enough food to eat and seriously damages agriculture - the primary source of income for rural poor communities.

Protecting plants from pests and diseases required skills based training on farm machinery which to be used to protect the plants starting from sowing to harvesting, not only harvesting their processing should also be more cost effective manners. For every event during growth of the plants/crops we required some types of specialized equipment.

In the views of the above NIPHM-PHE division conducted two day webinar from 27th -28th July, 2020 on “Farm Machinery for Plant Health Management”. Total six speakers from national and international institutes shared their experiences through lectures.

The Director General, Ms. G Jayalakshmi inaugurated the webinar. In her speech, she gave the background of the webinar and stressed on practice of innovative and workable ideas for better plant health management. The technical session of first day started with “Precision Spraying for Sustainable Agriculture and Environment” which was engaged by Dr. Pradeep Rajan, Principal Scientist, CSIR-CMERI Centre of Excellence for Farm Machinery, Ludhiana. In this session he has elaborated, how precisely spraying can be possible with latest developed machinery.

The second session was engaged by Er. Anobik Dey, Asst General Manager, Eicher Tractors, Faridabad on “Plant Protection and Productivity Enhancement through Mechanization”. He focused on mechanization in various parts of our country and how farm mechanization enhanced the productivity. He also showed some of the latest technology which plays important role in Indian agricultural economy.

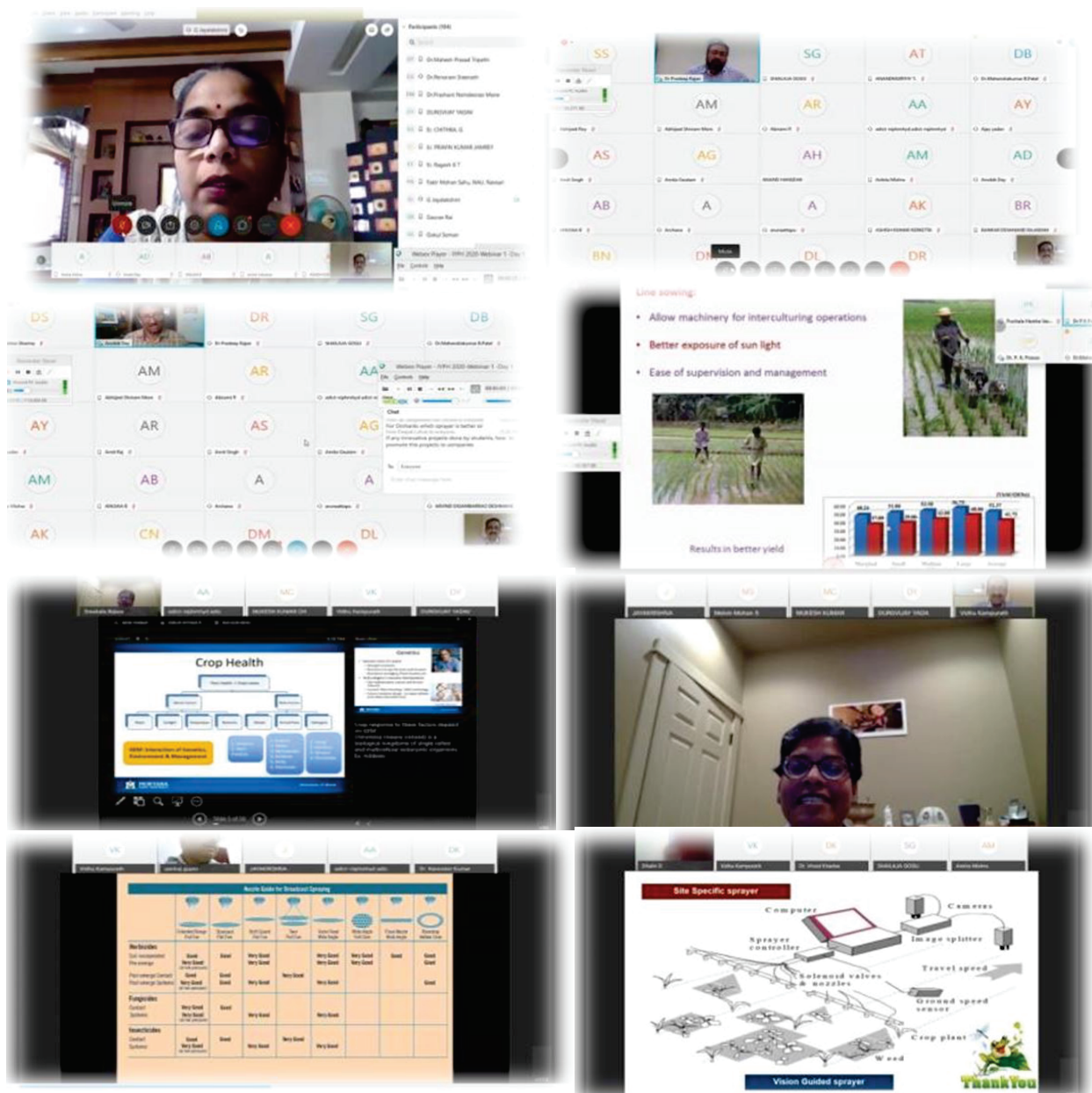
At the last session of day was “Safe Use of Machinery for Plant Health” which was engaged by Dr. P. K. Pranav, Associate Professor, Dr. Rajendra Prasad Central Agricultural University, Pusa, Samastipur, Bihar. Dr. Pranav completely focused on safe use of machinery including operator along with plant safety during field operations.

On the second day of the webinar, the session started with talk by Dr. Sreekala Bajwa Vice President, Dean, and Director, College of Agriculture & Montana Agricultural Experiment Station, Montana State University, Bozeman, Montana, USA. The topic presented was 'Technologies for Plant Protection and Health'. She focused on optical based sensor, biological sensor to detect the stress, genetic manipulation and precision technology. Dr. Bajwa, also discussed uses of robo-technology in farming system.

The second session of the second day was engaged by Dr. Pankaj Gupta, Professor, College of Agricultural Engg & Tech, Anand Agricultural University, Godhra, Gujarat on the topic of 'Sprayer- A Plant Protection Equipment'. Dr. Gupta briefed the plant protection appliances, their uses, precautions and operating principal. He introduced the factors governing the selection of equipment, photonic fence and UV light for weed control.

The last session was on 'Carbon Foot Print of Sprayers' which was dealt by Dr. D Dhalin, Associate Professor, College of Agriculture, Kerala Ag University, Vellayani, Kerala. Dr. Dhalin spoke on corban emission of sprayers manufacturing, pesticides manufacturing and then after its uses at field level. For manufacturing of herbicides total energy emission 246.5 MJ. He also spoke about greenhouse gases and others industrial production plants.

The webinar witnessed about 250 participants actively involving in all the sessions. The group contained graduate, post graduate students and young professionals. Sizable representation from industry was also witnessed in the webinar.





## **Webinar on Engineering Interventions in Plant Health Management**

### **Sub theme: Water management for plant health**

An International webinar on “Engineering Interventions for Plant Health Management” was organized for two days with a theme “Water Management for Plant Health” by Plant Health Engineering division, NIPHM from 03.08.2020 to 04.08.2020 through video conference (Cisco Webex). In the webinar, officers from different institutions and students actively participated.

The webinar was inaugurated Ms. G. Jayalakshmi IAS, Director General, NIPHM. The technical session started the guest speaker Dr. Igathinathane Cannayen, Associate professor, Agricultural and Biosystems Engineering, North Dakota State University, USA, who delivered lecture on “Image processing for Assessing crop Health and Phenology”. He explained the image processing procedure and methods such as collection of ground data, data smoothing and data fusion, phenology detection and accuracy assessment.

Dr. R. Suresh, Professor from Dr. Rajendra Prasad Agricultural University, Pusa, Bihar delivered the lecture on “Scope and challenges of precision farming technology in Indian Agriculture”. Another lecture on “Increasing water productivity in agriculture” was delivered by Dr. Ravish Chandra, Scientist from Dr. Rajendra Prasad Agricultural University, Pusa, Bihar, who explained estimating and enhancing efficiency of surface irrigation methods, increasing efficiency and area under micro irrigation and scope and utilization of solar energy for ground water pumping.

On the second day of webinar, session started with introducing the guest speaker Dr. Srinivasulu Ale, Associate Professor, Department of Biological and Agricultural Engineering, Texas A&M University, USA. He delivered lecture on “Evaluation of efficient crop and Irrigation Management strategies for sustaining crop production under changing climate”. He explained variations of crop yield due to climate change and irrigation strategies such as crop growth stage and soil water deficit for different crops such as sorghum, cotton and groundnut.

The lecture on “Fundamentals of precision farming” was delivered by Dr. Abdual Hakeem V M, Professor from Kerala Agricultural University. He narrated the importance of precision farming and why India needs precision farming and how small farmers can adopt the precision farming techniques. Precision agriculture consists of mainly three components, namely, 'Single Precision Agriculture technology', 'Precision Agriculture technology package' and 'Integrated Precision Agriculture technology', have been identified as part of the general adoption strategies of Precision Agriculture in developing countries.

Final lecture of the webinar was delivered by Dr. Mukesh Kumar Tiwari, Assistant Professor & HOD from Anand Agricultural University, Gujarat on “Applications of RS and GIS in agriculture and soils”. He explained the role of Remote sensing (RS) and Geographical Information System (GIS) for identification of crops and areas where changes in cropping patterns occur. He identified it as a useful tool to carry out crop surveys and mapping.

A total of 350 participants registered for the programme. Those who fulfilled the minimum attendance criteria were awarded with certificate.

Why Crop Health?

- Increasing world population
  - Increasing demand for food, water, energy
- Yield gap: Crop loss to various stressors (ex)
  - Global av crop loss due to pests: 50% (Wheat) to 80% (Cotton) [1]
  - Weed the largest culprit (34%) and animal pests and pathogens (18% and 16%)
    - Weeds: \$11 B/year in India [2] & \$33 B in US [3]
  - Soil erosion can cause 2-40% yield loss [4]
- One third is lost to farm to table processes

During my lifetime, world population increased from 3.6 B to 7.8 B, a 120% growth. India saw a 154% growth. Current annual soil loss is 75 Billion tonnes globally. Soil loss from agricultural areas is 10-40 times faster than soil formation. Currently 10 million ha of crop land are lost due to soil erosion (Pimental & Burgess, 2013). Globally, 20% of the irrigated land (450,000 sq km) is salt.

[1] Dorio, 2004 [2] Ghosh et al., 2018, [3] Pimental et al., 2005, [4] Panigrahi et al., 2018

### Need of Precision Agriculture

- India gained 'Green revolution' – in the year 1960's and made the country self sufficient in food production.
- In 1947 – it was little more than 6 million tonnes of wheat.
- In 1999 it became over 72 million tonnes and put the country at 2nd rank in wheat production in the world.
- The food grains production in five decades has increased more than three fold.
- All these was possible due to high input of fertilizers, irrigation, pesticides, along with higher use of HYV's, increase in cropping intensity and mechanization of agriculture.

### Summary

- Digital image processing – cost-effective solution to several agricultural applications
- If a practical problem (that can be solved by visual methods) is identified – image processing can be applied
- Simple image processing can be performed by existing tools
- Knowledge of algorithm development, mathematics, and computer programming is necessary for advanced solutions
- Open source tools offer a definite advantage
- Notes: Writing is an important skill and effort should be diverted to it

### Evaluation of Efficient Crop and Irrigation Management Strategies for Sustaining Crop Production under Changing Climate

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### REMOTE SENSING PROCESS




### PRECISION FARMING



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### Agro-Horticulture Agro-ecosystem (High Resolution Data)

Pixel-based classification





The 74<sup>th</sup> Independence Day has been celebrated at NIPHM on 15-08-2020. Ms. G Jayalakshmi, I.A.S., Director General, NIPHM has hoisted the National Flag in the office campus. The event was organized through webcast this year in view of the pandemic Covid 19.

## 2. OTHER ACTIVITIES

### Plant Bio Security Division

- **Plant Health Activities:** Plant Health Clinic was established at NIPHM and visited by a team of experts viz., NABCONS officials Sh. Buchareddy (Sr. Consultant), Sh. Bharat (Consultant) & Dept. of Hort. Officials Sh. Venugopal, (Deputy Director) & Dr Sunanda, DHSO, Rangareddy on 7th July, 2020.



**Inspection team (NABCONS/ Dept. of Horticulture) visit to PHC established at NIPHM**



- **Visit to Lemur on 21.07.2020 along with NBPGR Scientist:** As per the request from DHSO, NIPHM faculty along with NBPGR-RS Scientist visited the fields of Lemur guava farmers which were infected with nematodes and have given suggestions to the farmer and the same has been circulated in the group of Rangareddy farmers.



*Visit to Guava fields, Lemur Village along with NBPGR Scientist*

- Dr. Pyla Jyoti, and Ms. Madhubala of Plant Biosecurity Division and officers from Department of Horticulture, Telangana visited the Sparsha Hydroponic Farms, Salapur village, Padakal on 19<sup>th</sup> August, 2020, where the firm was growing cherry tomatoes under Hydroponics. Based on the observation, a report was prepared and given recommendation also.



- **Visit to DHSO office of Rangareddy:** NIPHM Faculty visited the DHSO of Rangareddy and discussed about on-going activities under plant health clinic in Rangareddy district. We discussed about the establishment of Plant Health Clinic and shown the items and posters to be set in PHC. DHSO suggested that PHC to establish in DHS office and one set of posters also to be displayed at Papareddygudda village, Hyderabad. Discussed about the export related training programs to the farmers of Mango, chilli and Okra.

## Plant Health Management Division

### Polyhouse management under Protected cultivation

- Maintaining the nursery of cherry tomato, cabbage, cauliflower, broccoli, and capsicum
- Arranged beds and sowed of cucumber and capsicum
- Arranged weed mat
- Mixing of cocopeat and vermicompost for filling of grow bags and rings
- Coriander, Garlic and Palak leafy vegetable seeds are sown at bulk places of polyhouse.
- Seed of coriander, carrot and beetroot are sown at rings



### **Village Adoption Programme**

#### **NIPHM outreach programme on Promotion of organic farming at Mohammed Nagar (Village) Medak district**

- As per the instructions by Director PHM, under the village adoption program, communicated through a telephone conversation to collect crop status information with selected chilli farmers and with Ekalavya Foundation, KVK staff.
- **NIPHM Staff:** Ms. N. Lavanya SO BP&BC), Dr. M. Narsi Reddy, ASO (Ento) and Dr. Vijay SRF
- **KVK staff:** Mr. Ravi, Scientist (Ento)
- NIPHM staff communicated with selected chilli farmers KVK officers to know Chilli crop status.
- Mr. Ravi Scientist KVK, communicated and requested to visit chilli farmers field regarding crop updates.

The following updates were observed:

1. IIHR and Non-IIHR varieties are seen as good crop growth and development.
2. Whereas Non-IIHR variety superior in showing healthy growth than IIHR variety (Arka Khyati)
3. Harvest of red chilli as on 27.05.2020

Farmers Name	Non-IIHR yield (kg)	IIHR (kg)
Bhoopal reddy	35	15
Veera reddy	30	20
Raghu reddy	30	20

- Veera reddy farmer filed showing good crop growth and development compare remaining farmers
- The following crop photographs were collected during this period from farmers.





*Project: AICRP on Biological Control of Crop Pests  
(ICAR-AICRP-BC) NIPHM, Hyderabad*

**I. Name of the project: Studies on biodiversity of natural enemies in Maize ecosystem**

**In- Charge: Dr.Jesurajan, SO (Ento)**

**Progress :**

- Maize field recorded maize stem borer (*Chilo partellus*)
- Natural enemies: Coccinellids and dragonfly

**II. Name of the Project:**

**Evaluation of NIPHM white media for the production of *Nomuraea rileyi* (*Metarhizium rileyi*)  
NIPHM MRF-1 strain for management of Maize Fall Armyworm (*Spodoptera frugiperda*)**

**In-charge: Mrs.N.Lavanya, SO(BP&BC)**

**Progress:**

- Subculturing of *Nomuraea* was done
- Observations noted on *Nomuraea rileyi* on NIPHM white media.
- Maintenance of *Spodoptera frugiperda* and *Spodoptera litura* cultures



**Plant Biosecurity division**

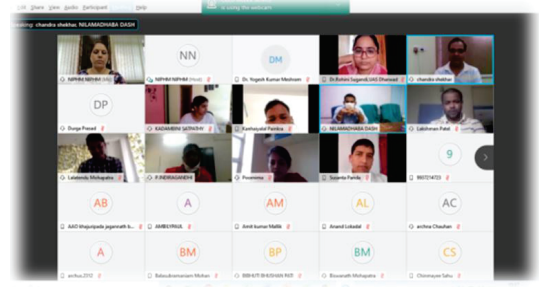
The Plant Biosecurity Division has organized following training programmes during the months of **July-September, 2020**.

**Capacity Building Programmes:**

Sl. No	Name of The Programme	Duration (Days)	Date	
			From	To
On-line training programmes (Officers)				
Plant Biosecurity Division (PBD)				
1	Pest Surveillance	5	17.08.2020	21.08.2020
2	Plant Quarantine Procedures for Import and Export	5	24.08.2020	28.08.2020
3	Impact of Climate Change on Pests	5	07.09.2020	11.09.2020
4	Fruitfly Surveillance and Management	5	21.09.2020	25.09.2020
5	Scientific and Safe Fumigation Practices for Practitioners off campus at BSD, Cherlapally	3	28.09.2020	30.09.2020
	Vertebrate Pest Management (VPM)			
1	Vertebrate pest Management - wild boar, monkey and birds	3	29.07.2020	31.07.2020
2	Non- insect pest Management – Slug, Snails and Birds	3	11.08.2020	13.08.2020
3	Rodent Pest Management	5	24.08.2020	28.08.2020
4	Rodent Pest Management in store houses of food grains	5	14.09.2020	18.09.2020
	Webinar			
	Plant Biosecurity Strategies for Sustainable Plant Health	1	29.08.2020	
	Farmers Programme (Off- campus)			
1	Fruitfly management/ demonstration on fruitfly lure preparation at <b>Kanduwada</b>	1	04.09.2020	
2	Awareness programme for farmers of polyhouse (flower crops) on different integrated management practices at <b>Chanvelli, Telangana</b>	1	07.09.2020	
3	Farmers training on Low cost fruit fly trap and lure preparation and management – <b>KVK, Mandsaur, MP</b>	1	09.09.2020	
4	Training programme on “ on-hand training on mass production of Bio-control agents (Trichoderma and Pseudomonas) to the progressive farmers of <b>Papireddyguda, Telangana</b>	1	09.09.2020	
5	Training programme for farmers on Awareness on Detection and diagnosis of field pests (Vegetable crops) at <b>Peddashapur, Telangana</b>	1	14.09.2020	
6	Training programme on “on-hand training prog. on mass production of Bio-control agents (Trichoderma and Pseudomonas) to the progressive farmers of <b>Kanduwada, Telanagana</b>	1	21.09.2020	
7	Farmers training on Low cost fruit fly trap and lure preparation and management – <b>KVK, Tarn-Taran, Punjab</b>	1	24.09.2020	
8	Farmers training on Rodent pest management – <b>KVK, Gobichettipalayam, Tamil Nadu</b>	1	29.09.2020	

## 1. Details of Training Programmes (On -line programmes)

- Pest Surveillance:** Five days programme on Pest Surveillance from 17<sup>th</sup> -21<sup>st</sup> August, 2020 was organized. The **83 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 Surveillance (ALPP). Trainees learnt adequate use of various traps and lures to carry out surveillance practices and management tactic for various crop specific pests.
- Plant Quarantine Procedures for Import and Export:** Five days training programme on plant quarantine procedures was conducted from 24<sup>th</sup> - 28<sup>th</sup> August, 2020. The **55 participants** learnt SPS agreement, international conventions, National regulations, SOPs on export and import, procedure for export and import of agriculture commodities through different provided scenario exercises for export and import of seeds, plants, grains, fruits, GMOs, germplasm and bio-control agents.
- Impact of Climate Change on Pests:** A five days' training programme on Impact of Climate Change on Pests was conducted from 7<sup>th</sup> -11<sup>th</sup> September, 2020 by NIPHM through online platform and the programme was attended by total **46 Govt. officers** of different departments.



- Fruitfly Surveillance and Management:** A five days' training programme on Fruit fly was conducted from 21<sup>st</sup> -25<sup>th</sup> September, 2020 at NIPHM. The programme was attended by **66 officers**. During the training period the participants got well conversant with identification & detection of fruit fly species, lure preparation and other different aspects of fruit fly surveillance and management. Beside lectures trainees were also given hands-on experience for identification, taxonomy, exotic fruit flies

and their pathway of entry and spread and fruit fly surveillance

- Scientific and Safe Fumigation Practices for Practitioners off campus at BSD, Cherlapally:** Total 16 trainees have attended 3 days special programme conducted at BSD Cherlapally, Telangana. During this programme participants learnt adequate use of fumigants, principles, their properties, handling, monitoring and appropriate use and maintenance of equipments. Trainees had an overview of guidelines of NSPM-11, 12 (MBr fumigation) and NSPM-22 (Phosphine fumigation) to conduct fumigation accurately and effectively



- Vertebrate pest Management - wild boar, monkey and birds 5 Days:** A five days programme on management of wild boar, monkey and birds to discuss different measure to manage at various levels was

**Plant Health Management Division**
**Online Trainings**

Sl. No	On-line mode	Name of the programme	No. of Participants State-wise/ Country wise	Qual.	Profession/ Occupation
<b>Officers' training</b>					
1	Yes	Production protocol for Predators and Parasitoids (20.07.2020 to 24.07. 2020)	T o t a l : 3 8 , A . P - 01, Andaman & Nicobar-01, Chatgr-07, GUJ-06, HAR-01, M.P-02, MS-07, MGLA-03, PNDCRY-01, PB-02, TN-02, TS-02.	M.Sc.(Ag)/ B.Sc.(Ag)	Agril.Officers/ Assist. Dir. of Agri./Asst.Profess ors/field officers
2	Yes	Production protocol for Biofertilizers(17.08.2020 to 21.08. 2020)	Total:58, A P-11, TS-4, BIH-4 KTKA-6, T N-2, MS-8 U P-1, J& K-7, RAJ-3, GUJ-4, WB-1, PORT BLAIR-1, KER-5	M.Sc.(Ag)/ B.Sc.(Ag)	Agril.Officers/ Assist. Dir. of Agri./Asst.Profess ors/field officers
3	Yes	On-Farm Production of Bio control Agents and Microbial Bio pesticides (14.09.2020 to 18.09.2020)	45(Andhra Pradesh Assam, Bihar, Chattishghar, Haryana Kerala, Jammu & Kashmir, Karnataka Maharashtra, Rajasthan Tamil Nadu, Telangana UP, West Bengal Andaman & Nicobar Islands	M.Sc.(Ag)/ B.Sc.(Ag)	Agril.Officers/ Assist. Dir. of Agri./Asst.Profess ors/field officers

**Off-Campus Farmers Training Programs**

Sl. No	On-line mode	Name of the programme	No. of Participants State-wise/ Country wise	Qual.	Profession/ Occupation
<b>Officers' training</b>					
1	Yes	On-farm production of bio control agents, bio fertilizers & bio pesticides (15.09.2020)	88(different villages of Warangal distrcit)	SSC	Farming

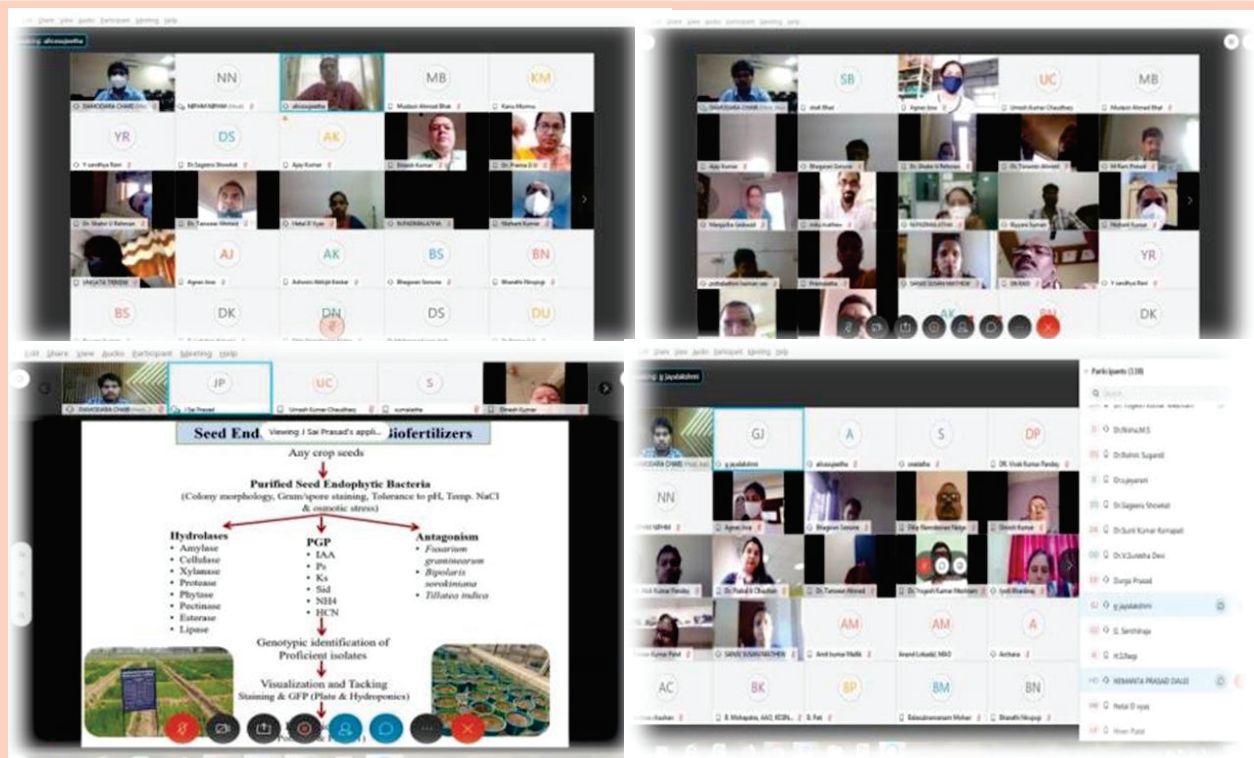
**iii. Production Protocol for Biofertilizers(online mode)**

The participants underwent various aspects of the Production Protocol for Biofertilizers such Role of Biofertilizers in Soil and Plant Health Management, Protocol for establishment of Biofertilizer production unit as per FCO 1985, Isolation & purification of microbial isolates used in biofertilizer production, Isolation & identification of Mycorrhiza, Characterization of microbial isolates used in biofertilizer production. Protocol for production of carrier & liquid based biofertilizers Quality Control of Biofertilizers and low-cost On-farm production of biofertilizers, Rhizoshere engineering etc.

During the online sessions, shown the technology videos of on-farm production of biagents to participants . The average score in post course was quite higher (16.00) as compared to precourse score



(13.36). All participants submitted their assignments and feed back.



#### iv. Farmers training programs

As approved by competent authority, the following team of NIPHM visited KVK, Warangal, the Bala Vikasa Social Service Society and organized one day farmers training programme on '*on-farm production of bio control agents, bio fertilizers & bio pesticides*' on 15.09.2020. and 18.09.2020



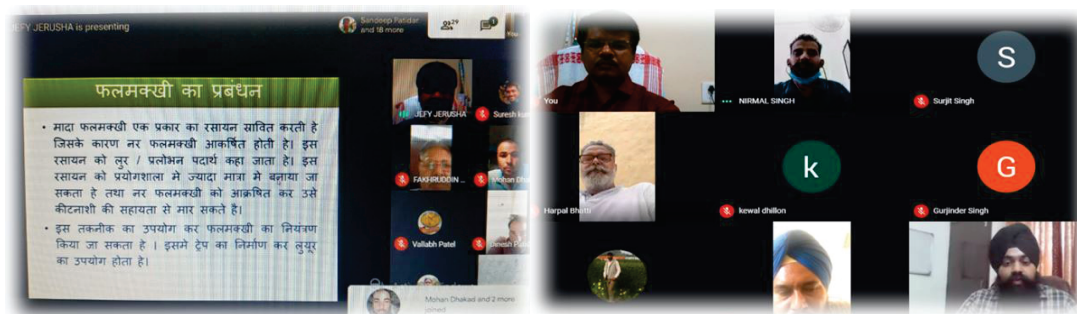
organized by NIPHM from 29<sup>th</sup> – 31<sup>st</sup> July, 2020. The programme was attended by total of 44 officers during the period.

- **Non- insect pest Management – Slug, Snails and Birds:** A three days programme on non-insect pest management to practice different measure to manage at various levels was organized at NIPHM from 11<sup>th</sup> – 13<sup>th</sup>, August, 2020. The programme was attended by total of 74 officers during the period.
- **Rodent Pest Management:** Sixty one officers have attended 5 days training programme on rodent pest management from 24<sup>th</sup> – 28<sup>th</sup> August, 2020. The participants were trained on various aspects like biology, ethology and integrated rodent management principles. The participants acquired skills in safe and judicious preparation and application of poison baits. Participants were exposed to crop fields and carried out exercises on diagnosis of rodent pest species, measurement of their infestation and crop damage. Participants were also involved in preparing action plans for organizing mass rodent control campaigns for endemic districts of their jurisdictions.
- **Rodent Pest Management in store houses of food grains:** Five days training programme on Rodent Pest Management in Food Grain Warehouses was conducted during 14<sup>th</sup> - 18<sup>th</sup> September, 2020. The programme was attended by 42 officers and they were imparted skills in diagnosis of rodent pest species, infestation measurement, bait preparation and baiting techniques.



## 2. Farmers Trainings:

During 2<sup>nd</sup> quarter total 8 training programmes were conducted for the farmers of Punjab, Madhya Pradesh, Tamil Nadu and Telangana.



*Farmers training on Low cost fruit fly trap and lure preparation and management – KVK, Tarn Taran, Punjab on 24.09.2020*



*Farmers training on Rodent pest management – KVK, Gobichettipalayam, Tamil Nadu on 29.09.2020*



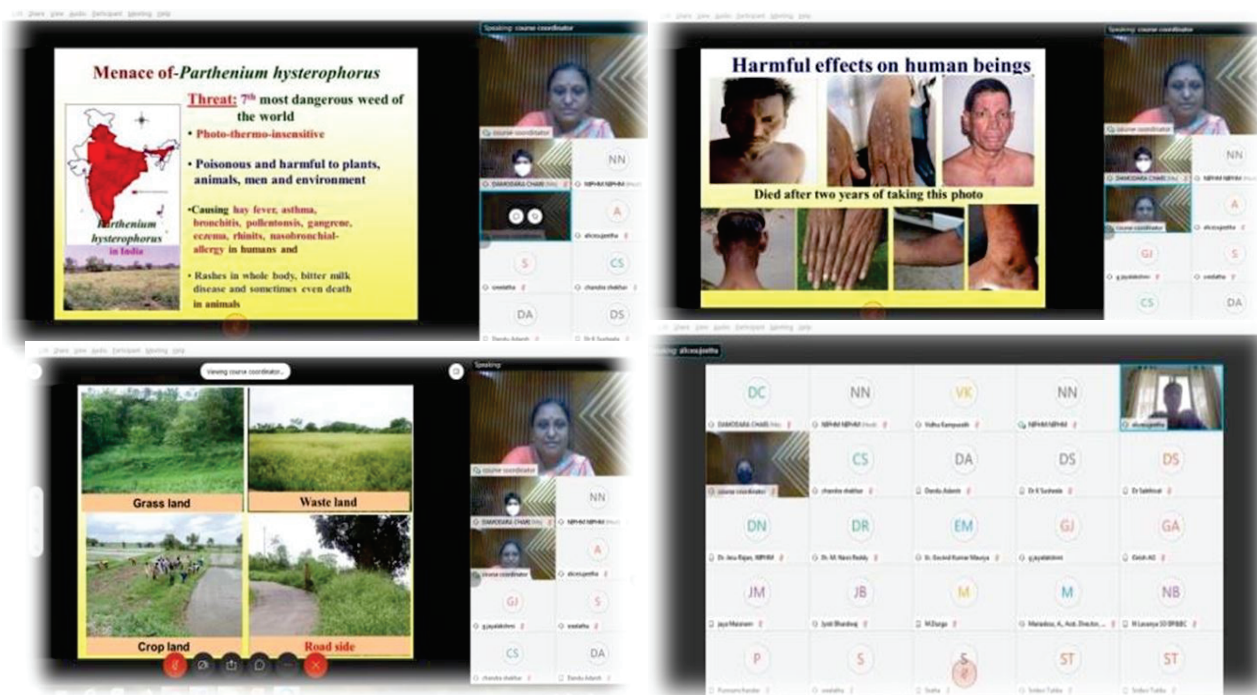
## v. Off-campus PGDPHM

The II semester contact classes of V batch (2019-21) off-campus PGDPHM (Kerala) for the three courses viz., KRPHM 03:Ecological Engineering for Plant Health Management; KRPHM 04:Pest Surveillance, Detection and Diagnosis & KRPHM 05:Agricultural Input Management will be organized in three slots (1st slot from 14<sup>th</sup> to 19<sup>th</sup> September 2020; 2<sup>nd</sup> slot from 12.09.2020 to 17.09. 2020; through online platform (Google Meet). All the faculties taken classes as per the schedule and distributed course materials.

As part of the awareness week, NIPHM has also observed the 'Parthenium Awareness Week' from 16-22 August, 2020. During this week on day guest lecture organized to create awareness about ***Integrated weed management practices for Parthenium control*** to all faculty of NIPHM.

The programme inaugurated by honorable Director General of NIPHM, Smt.G.Jayalakshmi, IAS. The all faculty of NIPHM were attended the programme. The Director PHM. Dr. Alice. R. P. Sujetha, led the programme with assistance by AD(PHM) & ASO(Micro). The guest speaker Dr. M. Madhavi, Principal Scientist (Agro) & Head, AICRP on Weed Management Rajendranagar, Hyderabad-30, PJTSAU has delivered the lecture through online mode on 19.08.2020. She covered the lecture on history of weed, harmful effects of Parthenium, mechanical, chemical and biological control methods to control Parthenium.

Director General addressed the gathering on the occasion and shared her views on how to focus on control of Parthenium in the campus to lead the campus with Parthenium free campus in upcoming years. She emphasised on continuous monitoring of new initiatives to reduce the Parthenium weed in the campus.



## Pesticide Management Division

### 1. Training:

PMD conducted two online training programs on “**Laboratory Quality System Management and Internal Audit as per ISO/IEC 17025:2017**” through the platform of Cisco Webex during the period. A total of 82 trainees were trained on general requirements for the competence of testing and calibration



laboratories as per the new standard guidelines ISO/IEC 17025:2017.

### i. Proficiency testing activities:

Dr. Nirmali Saikia, JD (Chem.) has attended a virtual meeting held on 1st July 2020 for all the Proficiency Testing Centre (PTPs) on behalf of PTC, NIPHM.

Proficiency testing center, PMD has conducted three PT programme (PTPFA-01 to 03/20-20) for 67 laboratories (PTPFA-01 to 03/20-20) during the period. Interim reports for three PT programme were communicated to all the participants.

### ii. Testing of samples:

During the period, a total of 411 samples viz. fruit, vegetables, cereals, pulses, spices and water were collected from Hyderabad and analyzed under the scheme “Monitoring of Pesticide Residues at National Level”

Samples of cauliflower and brinjal were collected from Hyderabad under How Safe are Your Veggies and a total of 20 cauliflower and 40 brinjal samples were analyzed during the period. About 50 bioproduct samples received from Insecticides Inspector were also analyzed. During the month of September, one pesticide formulation sample for quality test received from Andhra Pradesh was also analyzed.

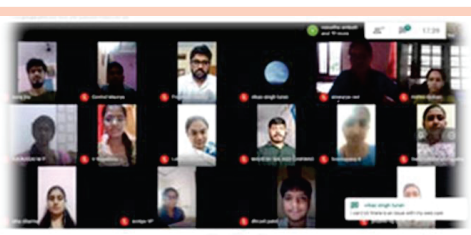
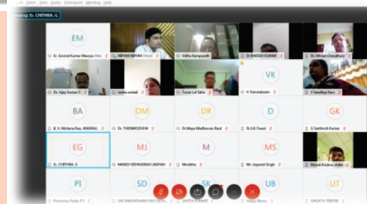
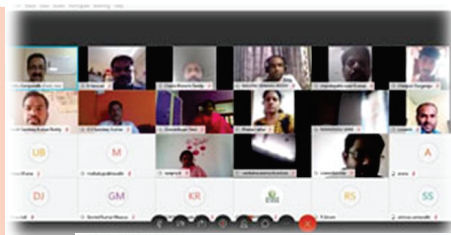


## Plant Health Engineering Division

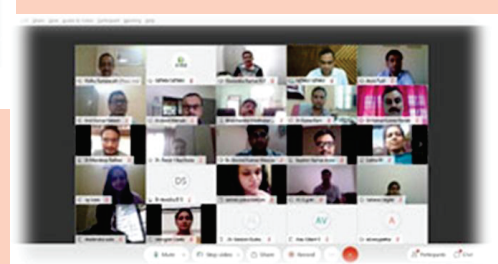
### Details of training programmes/webinars conducted during the period:

Sl. No	Name of The Programme	Target participants	Duration (Days)	Date		No. of participants
				From	To	
Training programmes						
1	Pesticide Application Techniques and Safety Measures	Private participants	3	06.07.2020	08.07.2020	38
2	Pesticide Application Techniques and Safety Measures	Officers from Telangana State	3	05.08.2020	07.08.2020	19
3	Pesticides Application Techniques and Selection of Nozzles	Better Cotton Initiative Officials – South India	1	22.08.2020	11.09.2020	145
4	Irrigation Systems and Advancements	Officers	3	31.08.2020	02.09.2020	37
5	Post-Harvest Management and Storage Techniques	Officers	5	07.09.2020	11.09.2020	53
6	Pesticides Application Techniques, Selection of Nozzles & Calibration	Better Cotton Initiative Officials – North India	1	28.09.2020		296
Webinar Details of training programmes/webinars conducted						
1	Engineering Interventions in Plant Health Management -Farm Machinery for Plant Health Management	Open to all	2	27.07.2020	28.07.2020	125
2	Engineering Interventions in Plant Health Management - Water management for plant health	Open to all	2	03.08.2020	04.08.2020	101

Due to the current COVID 19 situations, the division conducted all the training programmes in online mode. All the lectures were delivered through online and assignments were prepared and shared to participants for submission. Assessment of the trainees were checked through submitted assignments/ pre- and post-course evaluation and attendance. Eligible participants were provided with e-certificate.



### Glimpses of Trainings



## Organizational Events



On the occasion of Independence Day celebrations, the competitions were conducted through online mode for the staff and family members on Painting competition for staff kids, Essay writing for staff, Picture reading competition for staff/family members.



## राजभाषा कार्यान्वयन समिति की द्वितीय बैठक एवं अन्य गतिविधियां संपन्न

राजभाषा कार्यान्वयन समिति (राकास) की द्वितीय बैठक वर्ष 2019-20 हेतु दिनांक 23-10-2020 को श्रीमती जी.जयलक्ष्मी, भा.प्र.से., महानिदेशक, एनआईपीएचएम की अध्यक्षता में आयोजित हुई। बैठक में महानिदेशक के समक्ष जुलाई से सितंबर, 2020 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।

### संस्थान की गतिविधियां:

राष्ट्रीय वनस्पति स्वास्थ्य प्रबंधन संस्थान (रावस्वाप्रसं) में हर वर्ष की भांति इस वर्ष भी वनस्पति स्वास्थ्य प्रबंधन संस्थान (एनआईपीएचएम) में हिंदी पखवाड़ा-2020 एवं 14 सितंबर, 2020 हिंदी दिवस मनाया गया। उक्त कार्यक्रमों एवं समारोह का आयोजन एनआईपीएचएम के महानिदेशक श्रीमती जी. जयलक्ष्मी, भा.प्र.से. की अध्यक्षता एवं उनके दिशा-निर्देशानुसार किया गया। इस वर्ष वैश्विक महामारी कोविड के चलते गृह मंत्रालय, भारत सरकार द्वारा सभी मानक प्रचालन मानदंडों का अनुपालन करते हुए हिंदी दिवस एवं हिंदी पखवाड़ा का आयोजन सफलतापूर्वक किया गया।

### दिनांक 31-08-2020 को हिंदी पखवाड़ा उद्घाटन समारोह:

संस्थान में दिनांक 31-08-2020 से 14-09-2020 तक 'हिंदी पखवाड़ा-2020' मनाया गया। दिनांक 31-08-2020 को महानिदेशक श्रीमती जी.जयलक्ष्मी, भा.प्र.से. की अध्यक्षता में 'हिंदी पखवाड़ा-2020' का उद्घाटन समारोह आयोजित किया गया। महानिदेशक श्रीमती जी.जयलक्ष्मी, भा.प्र.से. ने उद्घाटन समारोह में कर्मचारियों एवं अधिकारियों को संबोधित करते हुए कहा कि 14 सितंबर, 1949 को हिंदी को राजभाषा के तौर पर घोषित किया गया। सरकारी कामकाज में राजभाषा हिंदी का अधिक से अधिक इस्तेमाल करें एवं अपने दैनिक व्यवहार में हिंदी का अधिक उपयोग करें।

दिनांक 31-08-2020 से 14-09-2020 तक हिंदी पखवाड़ा के दौरान विभिन्न प्रतियोगिताएं जैसे हिंदी निबंध लेखन, टिप्पण एवं मसौदा लेखन प्रतियोगिता, प्रशासनिक शब्दावली लेखन, एवं हिंदी नारा एवं हिंदी स्व रचित-कविता लेखन प्रतियोगिता का आयोजन सफलतापूर्वक किया गया। सभी प्रतियोगिताएं ऑन-लाइन के जरिए सूचारू रूप से आयोजित की गईं और कर्मचारियों ने प्रतियोगिताओं में बढ़-चढ़ कर भाग लिया। हिंदी पखवाड़ा के दौरान आयोजित प्रतियोगिताओं का विवरण निम्नलिखित है।

- हिंदी निबंध लेखन प्रतियोगिता:** दिनांक 31-08-2020 को आयोजित हिंदी निबंध लेखन प्रतियोगिता में दो शीर्षक विषय क्रमशः (1) 'कृषि अर्थव्यवस्था क्षेत्र में भारत की आत्मनिर्भरता संबंधी चुनौतियां एवं इसके समाधान' (2) 'राजभाषा हिंदी में कामकाज करने में आ रही कठिनाइयां एवं इसके निराकरण हेतु सुझाव' थे, जिसमें किसी एक विषय पर प्रतिभागियों को अपनी इच्छानुसार निबंध लिखना था। जिसमें श्रीमती नंदूरी श्रीदेवी, प्रवर श्रेणी लिपिक, लेखा अनुभाग ने प्रथम पुरस्कार, श्री विश्वम्भर जाखड़, कार्यालय अधीक्षक, लेखा अनुभाग ने द्वितीय पुरस्कार, श्री बोडा मधु, एमटीएस, पीएचई प्रभाग ने तृतीय पुरस्कार एवं सांत्वना पुरस्कार सुश्री प्रियंका फुले, जेआरएफ, पीएमडी प्रभाग ने प्राप्त किया।
- हिंदी में टिप्पण एवं मसौदा लेखन प्रतियोगिता:** दिनांक 04-09-2020 को आयोजित 'हिंदी में टिप्पण एवं मसौदा लेखन प्रतियोगिता' में सुश्री प्रियंका थोटा, अवर श्रेणी लिपिक, स्थापना अनुभाग ने प्रथम स्थान, डॉ. ए.जी. गिरीश, उप निदेश (पीपी) पीबीडी ने द्वितीय पुरस्कार, श्रीमती जी. उषा, अवर श्रेणी लिपिक, स्थापना अनुभाग ने तृतीय पुरस्कार एवं सांत्वना पुरस्कार के रूप में श्रीमती सैयद नाजिया, कार्यालय अधीक्षक, स्थापना अनुभाग प्राप्त किया।
- प्रशासनिक शब्दावली प्रतियोगिता:** हिंदी पखवाड़ा के तहत दिनांक 07-09-2020 को 'प्रशासनिक शब्दावली प्रतियोगिता' आयोजित की गई। जिसमें श्रीमती एस प्रमिला रानी, प्रवर श्रेणी लिपिक, भंडार अनुभाग ने प्रथम स्थान, श्रीमती एन. लावण्या, वैज्ञानिक अधिकारी, पीएचएम प्रभाग ने द्वितीय पुरस्कार, तृतीय पुरस्कार के रूप में इंजी गोविंद कुमार मौर्या, सहायक वैज्ञानिक अधिकारी, पीएचई प्रभाग एवं सांत्वना पुरस्कार के रूप में सुश्री ज्योत्सना जी, एसआरएफ, पीएमडी ने प्राप्त किया।
- हिंदी नारा एवं हिंदी स्व रचित कविता लेखन प्रतियोगिता:** हिंदी पखवाड़ा की चौथी एवं अंतिम प्रतियोगिता हिंदी नारा एवं हिंदी स्व रचित कविता लेखन प्रतियोगिता दिनांक 09-09-2020 को आयोजित की गई। जिसमें डॉ. चंद्रशेखर गुप्ता, सहायक वैज्ञानिक अधिकारी, पीबीडी प्रभाग ने प्रथम पुरस्कार, श्री मारिया दास, सहायक निदेशक (कृतक पीड़क प्रबंधन) ने द्वितीय पुरस्कार, श्री प्रदीप झलके, एसआरएफ, पीएमडी ने तृतीय पुरस्कार एवं श्री सैयद विकार अहमद, एमटीएस, स्थापना अनुभाग ने सांत्वना पुरस्कार प्राप्त किया।

प्रतियोगिता में सभी सफल प्रतिभागियों को हिंदी दिवस समारोह के अवसर पर श्रीमती जी.जयलक्ष्मी, भा.प्र.से., महानिदेशक, एनआईपीएचएम ने अपने कर कमलो से नकद पुरस्कार एवं प्रमाणपत्र प्रदान कीं।

## हिंदी दिवस समारोह का आयोजन :

दिनांक 14-09-2020 को हिंदी दिवस के अवसर पर हिंदी पखवाड़ा का संमापन समारोह एवं हिंदी दिवस समारोह को ऑनलाइन के माध्यम से महानिदेशक श्रीमती जी.जयलक्ष्मी भा.प्र.से कि अध्यक्षता में आयोजित किया गया । इसके साथ ही इस शुभ अवसर पर एक हिंदी कार्यशाला का आयोजन ऑनलाइन के माध्यम से किया गया । जिसके अतिथि वक्ता श्री जयशंकर प्रसाद तिवारी, सहायक निदेशक, केन्द्रीय हिंदी प्रशिक्षण उप संस्थान, राजभाषा विभाग, कवाड़ीगुड़ा, सिकंदराबाद थे ।

हिंदी दिवस के शुभ अवसर पर महानिदेशक श्रीमती जी.जयलक्ष्मी भा.प्र.से ने संस्थान के कर्मचारियों एवं अधिकारियों को हिंदी दिवस की शुभकामनाएं दी एवं उन्होंने कर्मचारियों को संबोधित करते हुए कहा कि संस्थान राजभाषा विभाग, गृह मंत्रालय, भारत सरकार, नई दिल्ली द्वारा समय-समय पर जारी वार्षिक कार्यक्रम के अनुसार हिंदी के क्रियान्वयन हेतु प्रयासरत है एवं निर्धारित लक्ष्यों को हासिल कर रहा है । इस संस्थान से इस वर्ष 18 कर्मचारियों को प्राज्ञ प्रशिक्षण हेतु एवं हिंदी टंकण प्रशिक्षण हेतु 07 कर्मचारियों को नामित किया गया है । संबंधित कर्मचारी ऑनलाइन के जरिए प्रशिक्षण प्राप्त कर रहे हैं । उन्होने कहा कि इसके इतर राजभाषा हिंदी को बढ़ावा देने के लिए अलग हिंदी संबंधी क्रियाकलापों द्वारा निरंतर प्रयास किया जाना चाहिए ।

संस्थान के हिंदी अनुवादक राठौड़ मोहन नारायण ने हिंदी पखवाड़ा-2020 के दौरान आयोजित विभिन्न प्रतियोगिताएं (हिंदी निबंध लेखन प्रतियोगिता, हिंदी में टिप्पण एवं मसौदा लेखन प्रतियोगिता, प्रशासनिक शब्दावली प्रतियोगिता, एवं हिंदी नारा एवं हिंदी स्व रचित-कविता लेखन प्रतियोगिता) का विवरण प्रस्तुत किया ।

## हिंदी कार्यशाला :

इस समारोह के पहले सत्र में हिंदी कार्यशाला का आयोजन किया गया जिसमें अतिथि वक्ता ने ऑनलाइन के माध्यम से व्याख्यान दिया । उन्होंने कार्यशाला के दौरान कर्मचारियों को हिंदी में लिखी जाने वाली टिप्पणी एवं मसौदा पत्र, आवेदन पत्र एवं इससे संबंधित समस्याओं तथा लेखन पद्धतियों के बारे में विस्तार रूप से जानकारी दी । उन्होंने सरकारी कामकाज के दौरान कार्यालय में प्रयोग होने वाले क्रियाकलापों एवं उसकी संरचनाओं के बारे में भी बारीकी से जानकारी दी । कार्यशाला के अतिथि वक्ता ने अपने संबोधन में कहा कि कोई भी व्यक्ति अपनी मातृभाषा में अभिव्यक्ति को सहजता से व्यक्त करता है, क्योंकि यह भाषा उसकी अपनी पैतृक संपत्ति या धरोहर के तौर पर प्राप्त होती है । हिंदी ने भारत को एकता के सूत्र में पिरोने का काम किया है । हिंदी भाषा और अन्य भारतीय भाषाओं ने मिलकर भारत की सांस्कृतिक विविधता को आगे ले जाने में बहुत बड़ा योगदान दिया है । हिंदी के साथ अन्य भारतीय भाषाओं एवं बोलियों का भी विकास होना चाहिए, जिसमें हमारी सांस्कृतिक और भी समृद्ध एवं मजबूत बन सके ।



(ऑनलाइन के माध्यम से 'हिंदी दिवस' समारोह एवं 'हिंदी कार्यशाला' का आयोजन)

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