

# **ICT based Pest Surveillance and Advisory Services For Horticultural Crops in Haryana**

**A Collaborative Programme  
By**

Haryana State Horticulture Development Agency (HSHDA)  
ICAR- National Research Centre for Integrated Pest Management (NCIPM),  
New Delhi

Funded by:

**Directorate of Horticulture (DOH)  
Government of Haryana**

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## **ICT based Pest Surveillance and Advisory Services For Horticultural Crops in Haryana**

### **Introduction:**

Haryana is fast and rapidly emerging as a major horticultural state particularly in vegetable and fruits production. Tomato, cucurbits, crucifers (cabbage/cauliflower) and kinnow are important horticultural crops widely grown throughout the State. Area & production under these crops have witnessed sharp increase in the recent past in Haryana and it is further expected to go up further in near future. Per cent of horticultural area over cropped area has increased to 7.58 per cent in last one and a half decade which was 3.08 % during 2001-02. Karnal, Kurukshetra, Sonapat, Gurgaon, Panipat and Mewat are the leading vegetable growing areas while Kinnow is widely grown in Hisar and Fatiabad Districts. In general, the area under horticultural crops is rapidly increasing especially with the launch of Mission for Integrated Development of Horticulture (MIDH) by Haryana State Horticulture Development Agency (HSHDA). The pest status/scenario has also changed accordingly and the lepidopteran pests especially *Helicoverpa armigera* in tomato and tobacco caterpillar *Spodoptera litura* in rainy season cauliflower, fruit fly in cucurbits and citrus psylla in kinnow, apart from diseases like leaf curl, early & late blight in tomato, *Alternaria* leaf spot and bacterial black rot in cauliflower/cabbage, greening in kinnow, mosaic virus complex in cucurbits have attained the status of regular and serious pests of these horticultural crops. The epidemic appearance and vast devastation of these crops by these pests are regular features causing severe yield losses. Epidemic scenario of white fly and so the leaf curl in tomato, bacterial black rot in cauliflower, downey mildew in cucurbits and greening in kinnow in these Districts are noticed regularly resulting in losses of crores of rupees. Establishment of an intensive pest monitoring mechanism and advisory / awareness system, if put in place, would help in overcoming such unmanageable pest situations.

Pest surveillance or monitoring is the cornerstone of the philosophy of Integrated Pest Management (IPM) as compared to calendar-based treatments. IPM stresses monitoring of pest and determines when the action is necessary to be taken. The basic purpose of surveillance is to determine whether pests are present in the field at a level to initiate pest management interventions. Through regular and systematic pest surveillance, epidemic situations can be avoided by detecting damage before endemic establishment of a pest in any area. New technologies have made significant impact in the field of pest management but not much of ICT technologies are being used in India.

Use of Information and Communication Technology (ICT) for pest surveillance constitutes e-pest surveillance that is basically an internet based system of capturing pest information from fields and producing — instant and customized pest reports to the plant protection experts so as to advise the state agriculture agencies who further advise the concerned farmers and the same information is available for agricultural policy planners. The term ‘ICT Based Pest Surveillance or e-Pest Surveillance’ encompasses computer based storage, transfer, retrieval, sharing, and reporting of pest data for appropriate and timely decision-making for better pest management.

Keeping above in view, a collaborative initiative “ICT based Pest Surveillance and Advisory Services for horticultural crops; Tomato, Cucurbits, Crucifers and Kinnow in Haryana” for selected districts; Karnal, Kurukshetra, Panipat, Sonapat, Gurugram, Mewat, Fatehabad and Hisar is proposed.

## Objectives of project:

- To provide correct and timely pest management advice to the farmers on the basis of field-pest situation.
- To promote IPM through implementation of ICT based pest surveillance system in selected horticultural crops viz; tomato, cauliflower/cabbage, cucurbits (bitter gourd & bottle gourd) and kinnow in Haryana
- To create awareness about IPM among the farmers and field functionaries.

## Area of Operation:

In Haryana, tomato, cucurbits, cauliflower, and cabbage are the important vegetable crops which are grown during *rabi* and *kharif* seasons, and require almost same alluvial soil conditions. The major area of operation of the project would be in the eight Districts of Karnal, Panipat, Sonapat, Kurukshetra, Gurugram and Mewat growing tomato, cucurbits, cauliflower, and cabbage vegetable crops in wider area while Kinnow fruit crop would be taken in Hisar and Fatiabad districts where it is grown extensively. In this programme, the main emphasis would be placed on these crops as these are hosts for the major pests such as *H. armigera*, leaf curl, fruit fly, white fly, early blight, citrus psylla, greening, mosaic virus complex and tobacco caterpillar etc.

District	Villages cluster	Vegetables	Major insects & diseases
Kurukshetra	Babain	Tomato	Fruit borer, leaf curl, early blight, white fly
	Khedi, Dadlan, Sambhalka, Sura, Bakoli, Banchandi	Tomato	Fruit borer, leaf curl, early blight, white fly
	Ladwa	Cauliflower	<i>Alternaria</i> leaf spot, <i>Spodoptera litura</i> , aphids
Karnal	Padhana, Gangar, Takhana	Tomato, Bitter gourd	Fruit borer, Leaf curl, white fly, early blight, Fruit fly, mosaic complex
	Badagaon, Geed, Kunjpura	Cucurbits, cauliflower	Fruit fly, red pumpkin beetle, mosaic complex, <i>Alternaria</i> leaf spot, <i>Spodoptera litura</i>
	Gularpur	Tomato	Fruit borer, leaf curl, early blight, white fly
	Dhanora, Kalra Dhanokheri, Kinori	Tomato, cauliflower	Fruit borer, leaf curl, early blight, white fly, <i>Alternaria</i> leaf spot, <i>Spodoptera litura</i>
	Mubarakbad, Bastara, Chaura	Cauliflower	<i>Alternaria</i> leaf spot, <i>Spodoptera litur</i> , aphids
Panipat	Ugrakhedi, Nibri, Rajakhedi	Cabbage/cauliflower, cucurbits	Fruit fly, <i>Alternaria</i> leaf spot, <i>Spodoptera litura</i> , aphids, red pumpkin beetle
	Ganjbar, Babarpur	Cucurbits	Fruit fly, red pumpkin beetle, Fusarium wilt, mosaic virus complex
	Bapauli, Jalalpur, Nawadarpur, Jaghpur	Cucurbits, cabbage	Fruit fly, red pumpkin beetle <i>Alternaria</i> leaf spot, <i>Spodoptera litura</i> , aphids
Sonapat	Gohana, Barota, Rukhi, Nagar	Cauliflower/cabbage	Tobacco caterpillar, <i>Alternaria</i> leaf spot, aphids

Gurugram	Tajnagar, Jamalpur, Jonawas, Sanpka, Fazilpur, Badli, Jatali, Hazipur	Tomato, cucurbits	Fruit borer, leaf curl, early blight, white fly, Fruit fly, Fusarium wilt, virus complex
	Pataudi, Narehera, Janala, Rampur, Mumtajpur	Tomato, cauliflower, cabbage	Fruit borer, leaf curl, early blight, white fly, Tobacco caterpillar, <i>Alternaria</i> leaf spot
	Sohna, Baluda, Sanpka, Dhani	Tomato, cabbage/cauliflower	Fruit borer, leaf curl, early blight, white fly, Tobacco caterpillar, <i>Alternaria</i> leaf spot
	Iccha puri, Khod, Pahari, Dadawas, Sherpur	Tomato, cauliflower, cucurbits	Fruit borer, leaf curl, early blight, white fly, Tobacco caterpillar, <i>Alternaria</i> leaf spot, Fruit fly
	Chand nagar, Sultanpur	Cucurbits	Fruit fly, mosaic virus complex, white fly, red pumpkin beetle
Mewat	Goyla, Dalawas, Padeni	Cucurbits	White fly, Fruit fly, mosaic virus complex
	Sadai, Bada alimuddin	Tomato, Cucurbits	Fruit borer, leaf curl, early blight, white fly, Fruit fly, mosaic virus complex
	Gaghas, Kansali	Tomato	Fruit borer, leaf curl, early blight, white fly
	Gumat Bihari, Khori	Tomato, Bottle gourd	Fruit borer, leaf curl, early blight, white fly, Fruit fly, red pumpkin beetle, <i>Cercospora</i> leaf spot
	Firojpur, Jhirka, Dhond, Bhond, Nangal	Tomato	Fruit borer, leaf curl, early blight, white fly
	Hasanpur, Bilonda, Sdrawat	Tomato	Fruit borer, leaf curl, early blight, white fly
		<b>Fruits</b>	
Hisar	Daroli, Siswal, Kishangarh	Kinnow	Citrus psylla, citrus white fly, Greening, Phytophthora
	Jeowara, Bhubana, Sarsod, Barwala	Kinnow	Citrus psylla, citrus white fly, Greening, Phytophthora
	Aryan agar, Rawalwas, Sundabas, Kaimri	Kinnow	Citrus psylla, citrus white fly, Greening, Phytophthora
Fatiabad	Bhuna, Jandikalan, Janglikheda, Gurbanpur, Dult	Kinnow	Citrus psylla, citrus white fly, Greening, Phytophthora

### **Mode of Operation:**

The programme consists of two parts i.e., pest monitoring-cum-surveillance and advisory system & awareness creation. At the State level, the Steering committee would be formed with the members from different organizations and responsibilities as given below;

### **Steering Committee:**

Representatives from

1. Directorate of Horticulture, Haryana
2. ICAR-National Research Centre for Integrated Pest Management (NCIPM), New Delhi

## Responsibilities:

- To coordinate the overall programme through monthly meetings
- To assign the work to different stake holders of the programme and to supervise its' proper implementation

## Steering Committee Constitution:

**Chairman** Dr Arjun Singh Saini, Director-General (Horticulture), Government of Haryana

**Co-Chairman** Director, National Research Centre for Integrated Pest Management, New Delhi

### Members :

Dr B.S. Sehrawat, Director, Mission for Integrated Development of Horticulture (MIDH), Haryana

Dr Ranbir Singh, Joint Director, Directorate of Horticulture, Panchkula, Haryana

Dr Deepak Kumar, Deputy Director, Directorate of Horticulture, Panchkula, Haryana

### Member-secretary

Dr Pratap Singh, Plant Protection Officer (PPO), Panchkula

### Technical Coordinators

Dr H. R. Sardana, Principal Scientist, NCIPM, New Delhi -110012

Sh Niranjana Singh, Scientist, NCIPM, New Delhi -110012

Dr M.N. Bhat, Principal Scientist, NCIPM, New Delhi 110012

Sh Manoj Choudhry, Scientist, NCIPM, New Delhi -110012

**District Horticulture Officers** from Karnal, Panipat, Sonapat, Kurukshetra, Gurugram, Mewat, Hisar and Fatehabad, Haryana

## Stakeholders and their Responsibilities:

Sr. No.	Organisation	Responsibility
1	ICAR-NCIPM, New Delhi	<ul style="list-style-type: none"><li>• To develop e-pest surveillance and advisory system/software</li><li>• To develop Google map based module for the system</li><li>• To impart training to the pest scouts and other project staff</li><li>• To collaborate in developing IPM capsules for selected crops</li><li>• To develop popular dissemination material</li><li>• Overall coordination and facilitation in implementation of the programme.</li></ul>
2.	Directorate of Horticulture, Haryana	<ul style="list-style-type: none"><li>• Execution and supervision of field pest surveillance activity</li></ul>

		<ul style="list-style-type: none"> <li>• Data entry into pest surveillance system</li> <li>• Regular viewing of pest reports and issuing pest management advisories to the farmers</li> <li>• To assist in organising training programmes for project staff</li> <li>• To train the Master Trainers of State Horticulture Department in eight selected districts.</li> </ul>
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## **Hierarchical structure of Pest Surveillance and Awareness Programmes**

### **1. Pest Monitoring**

#### **Coordinator cum supervisor**

(District Horticultural Officer)

- To facilitate between the surveillance team and the steering committee
- To monitor the duties of pest scouts and ensure the online feeding of the data in time



#### **Scout**

(@ One per 5 villages selected form clusters, to be engaged on contract)

- To scout crop fields @ 4 fields per village. and one village per day for five days i.e. Monday, Tuesday, Wednesday, Thursday and Friday
- To entre data regularly into the system through mobile Application

### **2. Awareness creation**

#### **Coordinator**

(District Horticultural Officer)

- To facilitate between the SHD personnel and Steering Committee
- To nominate the Master Trainer's for training
- To coordinate the trainings to Master Trainers and further to SHD field staff & elite farmers



#### **Master Trainer**

(Ten per district and SDHOs from ST. HORT. DEPT.)

- To obtain training organised by SHD with NCIPM
- To train the field staff of SHD & elite farmers



#### **Field Staff & Elite Farmers**

- To obtain training from Master Trainers
- To disseminate the knowledge to other farmers

## **Execution Procedure**

### **Pest Scouting and Advisory:**

Field pest surveillance activity is implemented and organised through DHO offices across the selected districts. DHO will supervise field pest surveillance and data entry into e-pest surveillance system activities assigned to the scouts. Cluster of villages for pest surveillance are selected by DHO based on area of selected crops. Each DHO office will be provided required number of pest scouts (@ one for 5 villages selected from clusters). Scouts will be equipped to have internet access for regular pest data entry into the system through their mobiles.

**Pest scouts** have to collect data from 5 villages selected from different clusters in a district in each week. In each village the observation is to be taken on 2 fixed plots and 2 random plots (each field of tentatively one acre to be selected depending on the proportionate area of the crop i.e. one fixed and random plot each for crop to be allocated by DHO). Scout will be taking observations in four fields per village per day for five days (Monday, Tuesday, Wednesday, Thursday and Friday). In this manner he will be taking observations from minimum 20 fields in a week.

The data thus collected by scouts is fed into mobile app of e-pest surveillance and advisory system and subsequently sent to DHO account for approval. DHO will approve the data after verification. If DHO finds any mistake in the data, he may ask the scout for correction OR if he is not satisfied with the correctness of the data, he may physically verify through field visit.

Once data is approved by the DHO, it is transferred to the centralised database hosted on NCIPM server. Pest experts from SDH can view the reports of the pest data in various formats such as tabular, graphical or on Google map generated by pest reporting module of the system. Two types of pest reports are generated ETL based pest reports and general pest reports. On the basis of ETL based pest report, experts will issue the pest management advisory to the registered farmers through SMSs in Hindi and English languages. Mobile nos. of the farmers from selected and not-selected village are collected by the pest scout at the start of the activity and registered into the system for receiving pest management advisory through SMSs. The advisory will be of two types, i.e. one in detailed form to be disseminated to the villages through field staff of State Horticulture Department and also popularized through other means. Another in the form of short SMS which is to be disseminated through SMS to registered farmers.

### **Emergency Situations:**

In case of visibly epidemic situations pest scouts will immediately raise the alarm through website as well as direct report to DHOs at district level. On hearing of the epidemic report the DHO has to assess the situation by on spot visit and also will arrange the visit of district teams for monitoring the situations. Depending on the situations, the district team declares the epidemic situations and in consultation with NCIPM. Efforts by DHO office will be done on war footing to contain the epidemic at the location level. More efforts also will be made through trained field staff and elite farmers for creating awareness at the epidemic area. The epidemic has to be declared if a single pest is severe in more than 10 % of fields in a village.



## Awareness creation through trainings:

NCIPM and SHD will be giving trainings on selected vegetables and Kinnow fruit Package of Practices for two days of duration. The staff will be deputed by State Horticultural Department (senior district level staff and DHOs). The Master Trainers in turn will be training the field staff and elite farmers from the selected district.

## Important yearly time lines

Period	Activity	Action By
2 <sup>st</sup> Fortnight of July, 17	• Engagement of contractual staff (RA, SRF & Pest scouts)	NCIPM & SHD
2 <sup>nd</sup> Fortnight of July, 17	• Purchase of ICT equipment	NCIPM & SHD
1 <sup>st</sup> Fortnight of Sept, 17	• Development and implementation of ICT based pest surveillance system	NCIPM
2 <sup>nd</sup> Fortnight of Sept, 17	• Training of Pest scouts & other project staff and	NCIPM & SDH
	• Formulation of IPM capsule	NCIPM
1 <sup>ST</sup> Fortnight of Oct, 17	• Development of popular materials on IPM	NCIPM & SHD
Oct, 17 to Sep, 19	• Regular pest monitoring, data feeding and issuance of pest management advisories to the farmers	SHD
August, 17 to March, 19	• Popularisation of IPM, awareness creation and production and distribution of popular materials through electronic and print media	SHD