National Pest Surveillance System (NPSS)

A Collaborative Initiative
By

Directorate of Plant Protection, Quarantine & Storage

And

ICAR-National Research Centre for Integrated Pest Management

Funded by:

Department of Agriculture & Farmers Welfare,
Ministry of Agriculture & Farmers Welfare, GOI

Project	:	**National Pest Surveillance System**
Collaborator	:	Directorate of Plant Protection, Quarantine & Storage, Faridabad & ICAR-National Research Centre for Integrated Pest Management, New Delhi
Report Duration	:	Jan, 2022–Dec, 2024
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Funded by	:	Department of Agriculture & Farmers Welfare, Ministry Of Agriculture & Farmers Welfare, GOI
Implementing agency	:	Directorate of Plant Protection, Quarantine & Storage, Faridabad

Introduction:

Agriculture is an important sector of Indian economy and is considered as its backbone. Agriculture contributes 16% of the overall GDP and accounts for employment of approximately 52% of the Indian population. By considering the rise in Indian population, the need of doubling the food production is of utmost importance. The sustainable food production has to be maintained in order to feed the rising population. However, Agriculture is prone to several challenges which hinder the production. One of such challenges is pest attacks which causes losses up to 20% in food production.

India is a vast country with diverse agro-climatic conditions, numerous varieties of crops and cropping systems. Expectedly, crops face diverse biotic and abiotic stresses. Thus it is imperative for different state agencies to record and monitor the pest population to advise the farmers for effective and timely pest mitigation measures at state as well as at national level. Regular wide-area pest surveillance/monitoring is the cornerstone of Integrated Pest Management (IPM), through which epidemic situations can be avoided by detecting damage prior to establish at a higher pest population. The basic purpose of pest surveillance is to determine whether pests are present in the field at a level to initiate pest management action and if required to initiate action, what is the appropriate management option. For effective pest management, farmers need timely access to expert support on pest identification or pest surveillance based expert decisions as advice. In the absence of knowledge and expertise, farmers are over dependent on pesticide dealers for pest management decision-support in the country, which results in excessive, injudicious, and irrational use of chemicals for the pest control. Timely availability of expert support on pest identification and pest surveillance based expert decisions as advice can either result in saving crop worth several crores of rupees or in non-application of pesticides saving cost involved and the environment through regular and systematic pest surveillance, epidemic situations can be avoided by detecting damage before endemic establishment of a pest in any area.

Application of modern technologies such as Artificial Intelligence (AI) and Information and Communication Technology (ICT) can automate and speed up the process of regular and systematic wide-area pest surveillance.

Keeping above in view, a collaborative initiative "National Pest Surveillance System' for key pests of selected crops i.e. **Rice, Cotton, Maize, Mango and Chilies**, is proposed. The proposed system will not only provide nation-wide view of pest and disease infestations at field level. The envisioned platform will leverage digital technologies such as Artificial Intelligence (Al) and smart phones, to automate the process of providing expert support on pest identification and timely delivery of pest surveillance based advisory to the farmer, specific to his/her need.

Objectives of project:

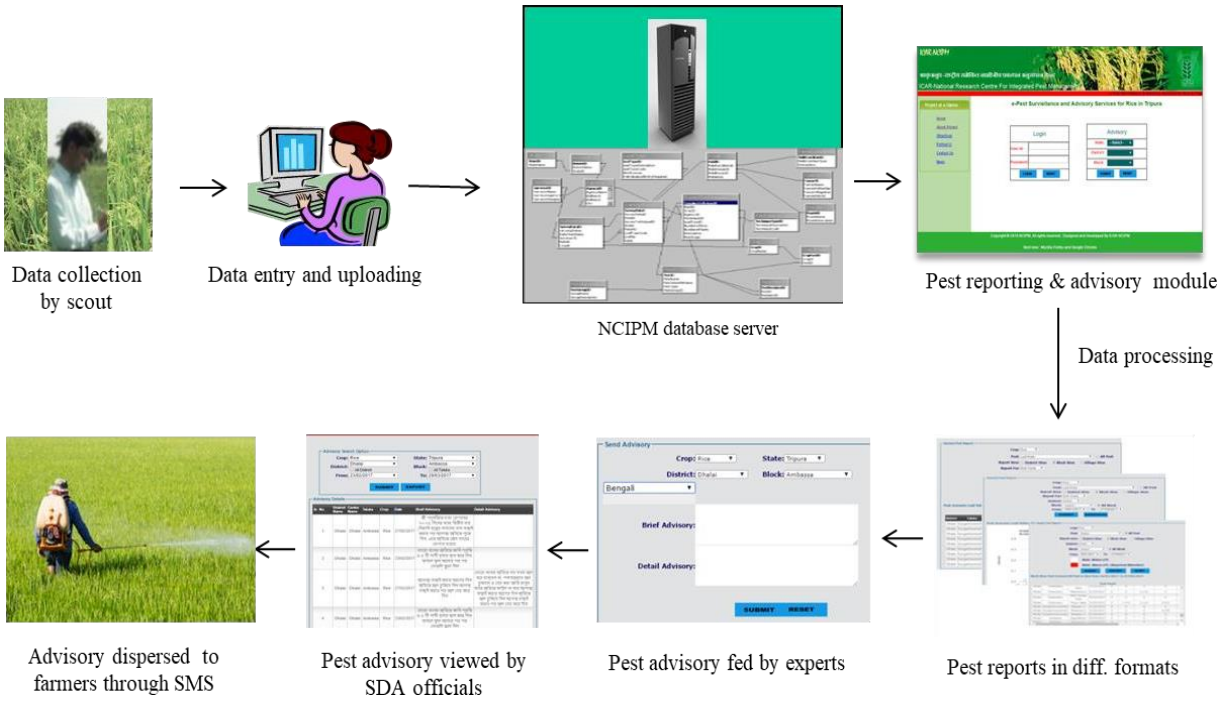
- Design, development and implementation of National Pest Surveillance System
- Implementation of the system so as to provide regular correct pest management advisories to the farmers
- Promotion of IPM through implementation of the system

Stakeholders and their Responsibilities:

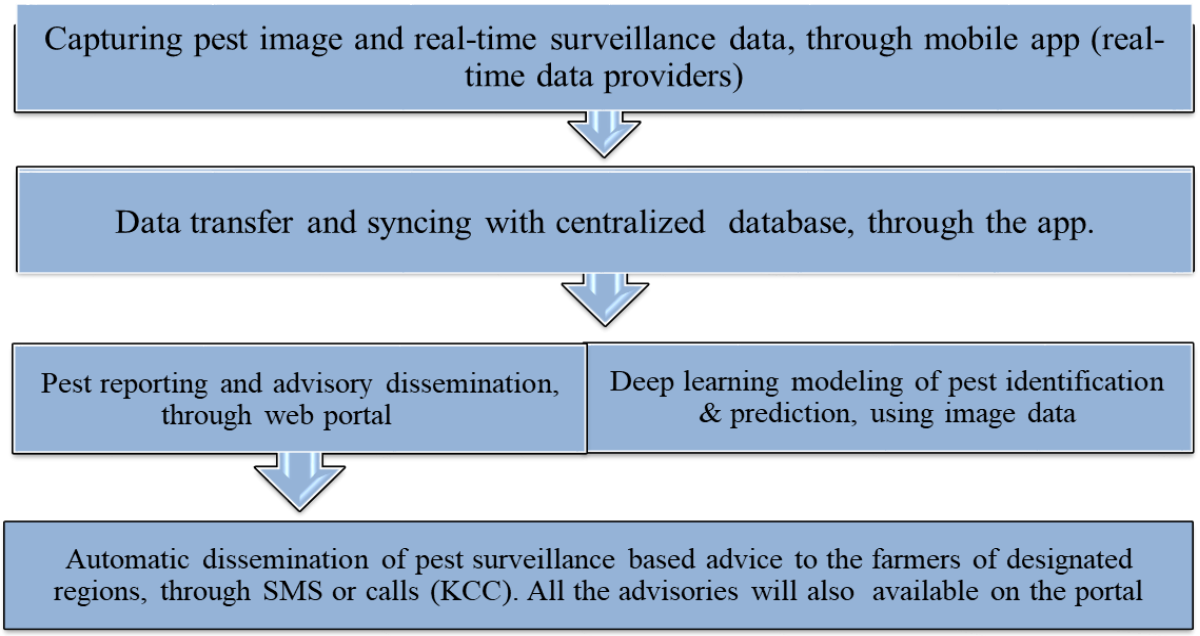
Sr. No.	Organisation	Responsibilities
1.	DPPQ&S	• Preparation of critical master data, formats and registries • Development of Pest management knowledgebase • Regular field pest surveillance/scouting and collection of pest image data • Implementation of the system • Imparting training to the project staff • Overall coordination and facilitation in development and implementation of the system.
2.	ICAR-NCIPM	• Preparation of critical master data, formats and registries • Design and Development of ICT based pest surveillance and advisory system • Development of Pest management knowledgebase • Implementation and functional maintenance of the system • Imparting training to the project staff • Development of CNN model of pest identification.

Data providers: DPPQS (CIPMCs), State Agriculture/Horticulture Departments, ICAR Institutes/ SAUs/ KVKs

Structure of proposed NPSS



Flowchart of the system



Important time lines

Period	Activity	Action By
By 15th Jan, 23	Preparation of data formats, registries and pest management knowledge base	DPPQ & ICAR-NCIPM
By 30th March, 23	Design and development National Pest Surveillance System (both mobile and web-based)	ICAR-NCIPM
By 30th April, 23	Implementation of the of National Pest Surveillance System for selected crops	DPPQ & ICAR-NCIPM
By 15h May, 23	Initiation of providing pest surveillance based pest management advisories to the farmers	DPPQ & its centers
By 31th Dec, 23	Image data processing and its augmentation	ICAR-NCIPM
By 31th March, 24	Deep learning model for identification of key pests of Rice crop	ICAR-NCIPM
By 14th Dec, 24	Integration of developed deep learning model into mobile app	ICAR-NCIPM

Proposed outcome:

A National System of Pest Surveillance to provide easy and timely access to expert support for pest identification and pest surveillance based pest management advice to farmers of the country. This will not only assist in avoidance of pest epidemics but will also help in minimizing the crop loss due to pests with the real data submission by Government, resources & lead farmers. Moreover, a repository of national pest scenario will also be available to various public agencies, working in the field of plant protection to identify the pest hotspots and thus to formulate plant protection policies.

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Approved

13/01/2023