



ePest Surveillance System at KEPHIS

Pest surveillance plays an important role in plant protection and has a direct impact in increasing agricultural yields.

ePest from Infronics will play a pivotal role in transforming the way pest surveillance is done by automating and standardizing the way field data is captured and enabling easy which in turn help build better and more reliable expert systems over a period of time on the data captured.

Currently there is no effective method of surveillance and database on pest build up. The surveillance apparatus in the field is poor due lack of an easy system for capturing field observations in a standard format and immediately transmitting the data to a central location for analysis by experts. ePest from Infronics is aimed at meeting such expectations which will help in achieving high level of pest surveillance and issue of farm advisories for effective pest management.

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I. Introduction

The CABHORT (Capacity Building for Effective Phytosanitary Checks and Systems to Enhance Market Access of Kenya's Horticultural Produce) project was developed in the context of the conclusions and decisions made at the World Summit on Sustainable Development (WSSD) to improve access for food and agricultural products to European markets through enhanced cooperation in areas such as plant health and food safety. Within Sub-Saharan Africa, Kenya is by far the largest exporter of cut flowers and fresh vegetables to the EU market. Over the years Kenya has gained a reputation as a reliable supplier of high quality roses and other horticultural produce. However, the number of phytosanitary interceptions at the EU borders dramatically increased due to some plant health problems arising from infestation by *Helicoverpa armigera*, *Bemisia tabaci*, *Liriomyza* spp. and *Spodoptera*.

On 24th May 2007 the main stakeholders in Kenya's horticulture sub-sector came together for a one-day workshop to develop a project to address these concerns. The outcome of this workshop formed the basis for the formulation of the project proposal in line with WSSD initiatives. The expected outputs of the project were the development and implementation of an effective Early Warning System (EWS) to meet the following objectives:

- List the various export relevant quarantine pests in horticultural production
- Monitor reduction in percentage of notifications of interceptions for horticultural produce exported to the EU
- Provide timely information on phytosanitary developments and changes in related regulations and standards
- Final dissemination of all project results to a wide group of beneficiaries in the horticultural industry

ePest Surveillance System from Infronics was implemented as part of Early Warning System (EWS) as a part of CABHORT (Capacity Building for Effective Phytosanitary Checks and Systems to Enhance Market Access of Kenya's Horticultural Produce).

II. About KEPHIS

Kenya Plant Health Inspectorate Services (KEPHIS) is a state corporation whose mission is to provide an effective and efficient science based regulatory service for assurance on quality of agricultural inputs and produce thereby promoting sustainable economic growth and development.

CORE VALUES

- Customer focus
- Transparency
- Integrity
- Teamwork
- Social responsibility



Strategic Objectives

- To attain 100% compliance to set quality standards
- To improve and maintain the delivery of high quality service to all stakeholders
- To develop an appropriate regulatory framework
- To strengthen and sustain the financial base of KEPHIS
- To develop and sustain human resource capacity and capability to meet the challenging demands on KEPHIS
- To foster collaboration with all stakeholders
- To promote and popularize the image of KEPHIS

KEPHIS undertakes

1. Regulation of seed production, processing and marketing. KEPHIS
 - a. Vets and registers all seed companies in the country
 - b. Certifies all seed produced and imported by registered seed companies in order to ensure seed available to the farmer is of high quality
 - c. Licenses all agents, sub agents and seed sellers in the seed distribution chain
 - d. Ensures that certified seed offered for sale still maintains the quality, through re-sampling, subsequent re-testing and certification

2. Plant Variety Protection & Plant Variety Release-(Cap 326)

KEPHIS provides for protection of newly bred varieties. This is in order to protect the Intellectual Property Rights of the breeders and encourage innovation in agriculture. Similarly, before new varieties are released for commercialization, they have to be tested by KEPHIS to confirm their value for cultivation.

3. Inspection of Imported Plant Material

Inspection is undertaken to ascertain compliance with import conditions, so as to prevent introduction of alien pests and noxious weeds into the country which might become a Biosecurity Risk to the country's agriculture and/or environment. Illegal imports have in the past led to introduction of pests such as liriomyza spp, larger grain borer, cypress aphid, crown gall and weeds (water hyacinth, etc) bearing devastating effects on food security, environment and economic development. Regulation of importation and exportation of plant material is governed by the Plant protection Act (Cap 324 Laws of Kenya).

4. Inspection of Export Produce

Kenya, as a major exporter, is expected to meet the importing country's regulations and market requirements in accordance with IPPC and WTO SPS agreement. Compliance with international market requirements is key in ensuring that the country maintains its current markets and also enters other markets. KEPHIS undertakes:

- a. Inspections & Certification for compliance to Plant Health (Phytosanitary) Measures
- b. Inspections & Certification for compliance with Quality Standards of Agricultural Produce, Horticultural Produce (Export) Act (CAP 319) and for Conformity Checks Certification in accordance to market standards for selected commodities to the EU markets

5. Analytical Chemistry Laboratory Services

- a. Soil Testing – for fertility evaluation and subsequent fertilizer recommendations
- b. Water Testing – for irrigation suitability and chemical Contamination
- c. Fertilizer Analysis – this ensures conformity of fertilizers to the required standards
- d. Agrochemical Analysis – pesticide formulations are tested for active ingredient concentration to verify conformity to the label, pesticides are also analyzed for Environmental purposes
- e. Testing of Food Commodities for Pesticide Residues – pesticide residues in food are tested for Maximum Residue Levels' (MRL) compliance

III. Use Case

The objectives of Early Warning System (EWS) are:

- To warn growers of possible pest outbreaks by observing the trend and density of key pests of phytosanitary importance in production areas so that appropriate control measures are undertaken
- To inform the government and other stakeholders in devising appropriate measures to eliminate or reduce pest abundance in production areas

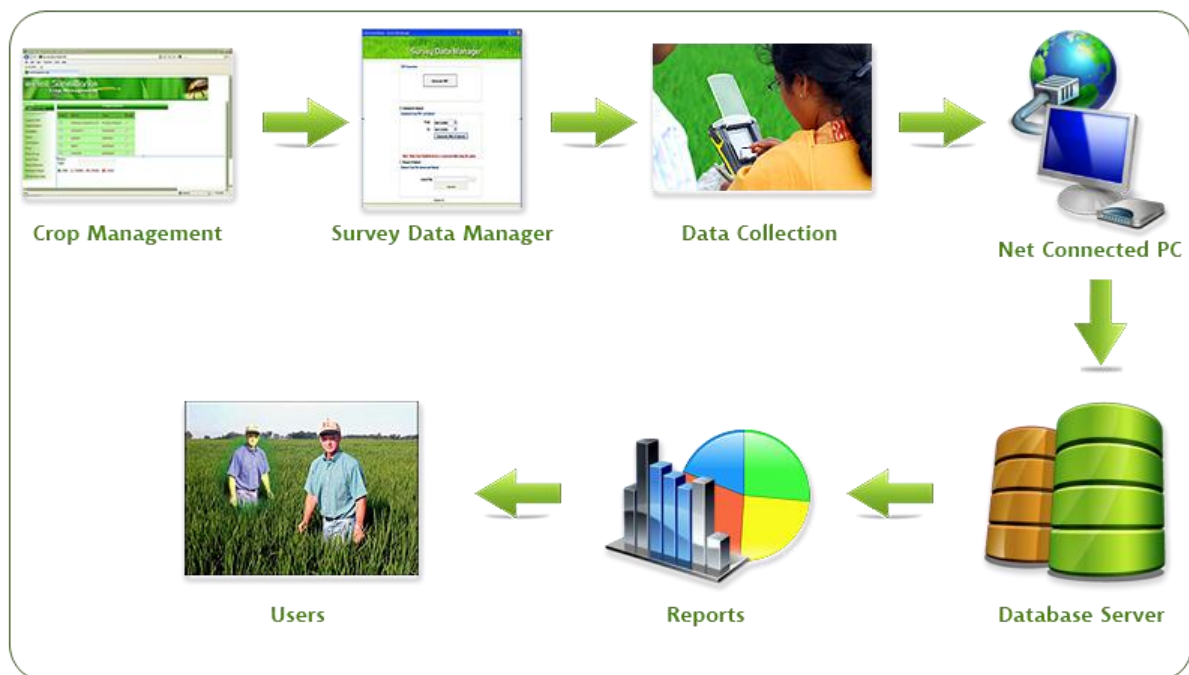
The EWS must at least 'triplicate' the data over three years; widening the number of participating farms/organizations; at least three years of data focus and collaboration before a pest prediction map for the regions is determined.

Under the EWS, data from the participating growers was received and analyzed. There should be a mechanism to continuously standardize data collection in real time (with no delays in uploading survey data to a centralized database server) and such data is utilized to give alerts / reports about the pests in the surveyed region.

IV. Solution

Pest Surveillance today is an important part of Plant protection initiatives by various governments and Private Organizations associated with increasing productivity of Agricultural yields. Over the last few decades a lot has been done in terms of creating processes that will facilitate Plant protection. With the introduction of ICT into Plant Protection, e-Pest Surveillance will play a pivotal role in transforming the way surveillance is being done today by automating and standardizing a lot of the information being captured today. Also allowing quicker analysis and being able to build better and more reliable Expert Systems over a period of time on these huge data captures.

ePest Surveillance system is the perfect solution to the Early Warning System mentioned in uses case section of this white paper and helps a lot in building the Early Warning System. ePest Surveillance system is designed to make up for the weaknesses of the manual data collection. This system provides real-time data; no delays; Standardize collection and data input; Data uses immediate; depends on user needs! The sampling decision taken by management (industry) will ensure data provision and utilization. This System uses the GPS and GIS to increase predictive capabilities for pest detection and management. The e-pest surveillance system used to consolidate the collection of data from the field.



ePest Surveillance Data Flow

Features Overview

1. Managing crops, pests, diseases and surveyors information:

The Crop Management Module maintains information about different crops which are to be surveyed. It also maintains information about pests, diseases and surveyors.

2. Conducting survey with Hand Held Terminal (HHT):

ePest HHT is preloaded with the Survey Application. Using the HHTs, surveyors will survey different regions and crops to monitor growth of pests and disease. The survey information is stored in the HHT database, subsequently the Survey Data Manager Application can be used to download data from the HHT and upload to a central server.

3. Upload surveyed data to a central sever:

After survey is done, the surveyor uploads the data to a central server in following ways:

- Using Survey Data Manager Windows Application to download the data from ePest HHT and upload the downloaded data to a Central Server.
- Using Survey Data Manager Handheld Application to upload data to a central server through the GSM/GPRS module provided in the HHT.

4. Generating and viewing reports using Reports Web Application:

The central server maintains all surveyed data uploaded by the surveyor through Survey Data Manager Application, from where a web server will pick the data pest wise / crop wise / region wise / date and time wise (based on the user selection criteria) and reports are generated accordingly.

V. Benefits

- Data collection made easy, is accurate and quick
- Integrated GPS for accurate location details, geo-referenced data points across country
- Preventing data loss through data back up and automated data transfer
- Timely and comprehensive summary reports
- Quality advisory to farmers through early threat detection
- Uniform surveillance protocols & convergence
- Monitoring pest development & pest forecasting
- Improved understanding of “climate change” impact, development of appropriate responses
- Better advisories leading to effective pest management & farmer’s prosperity

Benefits to Farmers

- Farmers get Pest Advisory Info within shortest possible time, helping in:
 - ✓ Preventing / curing pests
 - ✓ Reduce unnecessary use of pesticides
 - ✓ Use right pesticide in right volume
 - ✓ Reduces farm production cost
- Farmers get forecast of pest / diseases over a period of time, which helps them to plan and manage farm production cost effectively
- Timely and proper advisory help in enhancing production yields
- Farmers can take basic preventive measures proactively

VI. Field Pictures – ePest Surveillance System at KEPHIS



VII. About ePest

Problems in Pest Surveillance:

- Though 80% of farm advisories relate to pests & diseases, surveillance, the basis of issuing advisories, covers limited area
- There is no convergence in data of surveillance by multiple agencies and authenticity/reliability is a major problem
- There is no accurate early warning at district, state or national level

The consequences of the above are:

- Over-consumption of pesticides with impact on environment + livelihoods + market access
- Missed opportunities for early intervention
- Advisories always are curative than preventive
- No data base builds up for forecasting models
- No system to monitor “climate change” induced crop pest-beneficial relationships

The solution to the above is:

- Different agencies need to work together on pest surveillance
- First vital step is to obtain convergent good quality data on actual/emerging pest problems. This requires:
 - ✓ A new pest surveillance partnership for field surveillance
 - ✓ Standardisation of surveillance methods - predictive models based on sound IPM principles and data collection formats
 - ✓ Geo-referenced data capture
- All these will benefit from use of common tools such as an ICT enabled handheld system by surveyors

ePest Surveillance System from Infronics, developed by combining cutting edge technologies (Embedded / GPS / GPRS / Biometrics, etc) for real time data capture and transmission



About Infronics Systems Limited

Infronics is a technology enabled company specializing in providing industry specific and customized solutions, with capabilities in developing business critical messaging systems. Infronics is one of the fastest growing enterprise mobility technology products and services companies in India, with its unique quality in developing industry-specific software & hardware solutions with proven reputation of delivering high quality solutions across broad spectrum of technologies. With a 50+ strong team Mobiprise has developed remarkable software development expertise, particularly in developing business critical eMobility systems. We have expertise in providing quality, cost effective software programming, and outsourcing services to our clients.

In short, Mobiprise helps in making enterprises mobile.

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