

## THE PROJECT IN NUMBERS

Five years, EU funding of EUR 6 million, and 13 partners on 3 continents. A comprehensive set of tools for end users developed via 8 work packages. More than 30 peer-reviewed papers; almost 200 press articles; 20 dissemination events; 88 courses on diagnostics, plant pathogen forensics, transnational multi-sector training on responding to outbreaks, legislation and contained-use licensing, and dual-use consequences of bioresearch; 4 summer schools and 1 winter school; and 8 PhD exchanges/internships among project participants.

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## PLANT AND FOOD BIOSECURITY NETWORK OF EXCELLENCE

A five-year project to develop a virtual research network in order to improve the quality and impact of plant and food biosecurity training and research in Europe.

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## PLANT AND FOOD BIOSECURITY NETWORK OF EXCELLENCE

A FIVE-YEAR PROJECT TO DEVELOP A VIRTUAL RESEARCH NETWORK IN ORDER TO PREVENT, RESPOND TO AND RECOVER FROM BOTH INTENTIONAL AND UNINTENTIONAL BIOSECURITY THREATS TO EU AGRICULTURE, FARMING AND THE AGRO-FOOD INDUSTRY.

Plant and Food Biosecurity (PLANTFOODSEC) is a Network of Excellence funded under the FP7 Security Programme for the period 2011 to 2016. It focuses on biological threats that have the capacity to affect and damage agriculture, infect plants, and ultimately affect food and feed at any stage in the supply chain. The goal of the project is to develop a virtual research network in order to improve the quality and impact of training and research in relation to crop and food biosecurity in Europe, thus enhancing preparedness to prevent, respond to and recover from the *natural or intentional* introduction, establishment and spread of plant pests, pathogens and noxious weeds in the European agro-food system. Agriculture and related sectors both upstream and downstream are essential to the social, economic and political stability of all nations. Since plant systems represent the foundation of agricultural and food systems, plant biosecurity is vital to national security. The PLANTFOODSEC project provides timely scientific inputs to enable a response to the threat posed to European agriculture, farming and the agro-food industry by agro-terrorism; to assist in developing preventive and suppressive crisis management; and to implement specific European policies. The project also aims to improve the level of training available for network partners and to promote the sharing of project results among all partners, thus developing a network with the practical skills to achieve the overall project goal. The end users of the project outcomes are expected to be stakeholders in the agro-food chain, including producers, researchers and the authorities responsible for plant health and food security.

## THE RESULTS

### PROJECT RESULTS: THE PLANTFOODSEC TOOLBOX

The considerable amount of research promoted by the European Union - which has also involved non-EU countries such as the United States, Israel and Turkey - has made possible the development of a comprehensive set of tools for end users, which are presented in this leaflet. Project achievements include the identification and regulatory analysis of biosecurity challenges; experimental and modelling approaches applied in plant disease epidemiology; advanced molecular diagnostics; and, more generally, training, dissemination and networking activities to increase awareness of plant biosecurity and food safety among agronomists and food producers and within the scientific, policy and inspection sectors.



### TARGET CROPS AND TARGET PATHOGENS

A list of 451 target plants and crop products relevant to Europe was drawn up, which includes field crops, vineyards, orchards, vegetable crops, nursery and ornamental horticulture, medicinal and aromatic plants, forest products, beverage crops, straw, tree sap and seeds. In addition, 522 pests were identified, updating the list of "candidate pathogens" established under the EU project "CropBioterror", including harmful organisms likely to threaten crop biosecurity. Criteria for prioritisation were also identified.

### TOOL FOR THE PRIORITISATION OF TARGET HUMAN PATHOGENS ON PLANTS

Repeated outbreaks of human illnesses attributable to the contamination of fresh produce and other plant-derived foods by human pathogens on plants (HPOPs) - that is, human enteric pathogens such as Shiga toxin-producing *Escherichia coli* and *Salmonella* spp. - were analysed in order to provide guidance on the prioritisation of the risks involved in any future HPOP incident.



### ANALYTICAL METHODS FOR THE IDENTIFICATION OF MICROBIAL OR TOXIN CONTAMINATION

Methods available in the EU, the US, Turkey and Israel for the assessment of foodborne contaminants from exemplar food matrices, as well as analytical methods available for the identification of microbial or toxin contamination, were critically reviewed. In addition, food microbiology laboratories in the EU and non-EU project countries that are able to respond in the event of an outbreak of foodborne illness were identified.



### DECISION TOOL TO DETERMINE WHETHER A FOODBORNE ILLNESS WAS INTRODUCED INTENTIONALLY

One of the challenges in food biosecurity is differentiating between accidental and intentional food contamination. Primary factors that make it possible to discriminate between a deliberately initiated outbreak and an accidental outbreak were assessed and used to develop a decision tool for determining the likelihood that an outbreak was criminally induced. The tool has been supplemented with example scenarios for training purposes.



### FORENSICALLY VALID MICROBIAL STRAIN DISCRIMINATION TECHNOLOGY FOR A FOODBORNE PATHOGEN (*E. COLI* STEC)

A forensically valid microbial strain discrimination technology, based on multilocus variable tandem repeat assessment (MLVA), was developed for non-O157:H7 *E. coli*, a foodborne pathogen of increasing EU concern.



### RISK ASSESSMENT TOOL

A tool was developed to enable rapid assessments of agro-terrorism scenarios. The tool is based on pest risk assessment (PRA) schemes, but includes agro-terrorism threats. It has been demonstrated on almost 100 scenarios covering a wide range of potential motivations, biological agents, pathways and receptor systems in order to provide a comparative measure of risk. By re-evaluating the ratings of appropriate criteria to reflect a managed situation, the tool makes it possible to assess the effects of potential prevention and mitigation measures. The results indicate how the threat posed by different scenarios might be reduced and how responses might be improved.

### THE PLANTFOODSEC WEB-BASED VIRTUAL DIAGNOSTIC NETWORK

The virtual diagnostic network allows information to be gathered, searched and reported, and also makes possible information flow between experts and field workers. The primary components are a database of diagnostic laboratories and expertise in the EU28; a community resource detailing plant pathogen news, updates on diagnostic techniques, and training and workshop information; and a structure to allow the uploading of diagnostic records and their interrogation. The network thus provides a unique tool for the community and allows member countries to access summary information on disease outbreaks in Europe.



### MANAGEMENT PROGRAMMES AGAINST VARIOUS OUTBREAK SCENARIOS

The measures to be taken in order to prevent the establishment and spread of harmful crop pathogens have been established by identifying activities and responsibilities following pathogen introduction. In particular, PLANTFOODSEC identified international expertise for setting up contingency plans; listed resistant cultivars and alternative crops for a given pathogen; and developed containment and eradication protocols for selected pathogens.



### THE VIRTUAL CENTRE OF COMPETENCE ON PLANT AND FOOD BIOSECURITY

Whatever the cause of a plant disease outbreak, a comprehensive biosecurity system is essential to protect agriculture, food and citizens. Current EU capabilities to detect and respond to agro-terrorism and bio-criminal acts are very modest. Capacities are spread among many organisations, normally regional or national bodies, and there is a lack of coordination. As biosecurity risks transcend national and regional boundaries, it is essential to monitor, assess and manage them in a coordinated way across the EU. As a first step, PLANTFOODSEC established a *virtual* Centre of Competence on Plant and Food Biosecurity, which is intended as a "backbone" for the EU scientific community in the field of plant and food biosecurity. It comprises a network of research centres, universities and other stakeholders, whose aim is to enhance preparedness, response and recovery capabilities in the event of intentional and unintentional biosecurity threats to EU agriculture, farming and the agro-food industry. The PLANTFOODSEC consortium is working to make the *virtual* European Centre of Competence on Plant and Food Biosecurity *concrete*.