



plantfoodsec.eu

# PLANTFOODSEC NEWS

## European/global news review

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# EDITORIAL



Jane Thomas  
National Institute of Agricultural Botany,  
Cambridge, WP4 leader

As the Plant and Food Biosecurity Network project passes its halfway stage, it is a good time to reflect on the critical theme that underlies our activities. Above all, the project is security based: How can we protect our plants and our food supply from deliberate attack from pathogens and toxins? What might the major threats be? How might the EU pursue legal action in response to suspected criminal acts? What sort of evidence would they need, and who is capable of providing it? How do we determine whether a

pathogen outbreak was the result of deliberate introduction? And, critically, how do we eradicate, contain or control the problem? To answer these questions, and others, requires a combination of specialist plant pathology and food microbiology skills that the consortium brings together in its various work packages. The same skills are, of course, brought into play when dealing with outbreaks of disease that occur naturally, or that are the result of accidental introductions. Our project work thus has major benefits and outcomes that are applicable more widely for crop protection and food safety.

One major method of combating plant pathogens is the deployment of resistant crop genotypes. The project will address this topic in the coming years to the extent of identifying where resistant sources are known to exist for the

high-priority crop and pathogen targets that we have identified. In the event of a major threat, whether deliberate or natural, to a crop species, there would need to be a rapid uptake of resistant material and its incorporation into genetic backgrounds that will perform well commercially. Of course this is still, for the most part, a lengthy process, but in some situations it may be the only realistic option for the sustained control of a problem. The concentration of international efforts to breed for resistance to the Ug99 pathotypes of wheat stem rust is one example, and the mass screening trials recently initiated in the UK to identify ash trees resistant to the ash dieback fungus is another.

The value of resistance breeding and its contribution to controlling diseases may often be overlooked in situations where pesticides are

effective, readily available, economically viable and environmentally acceptable. However, the skills of the plant breeder, using all the molecular genetic tools now available – including the potential of genetic modification in some cases – provide possibly the most effective and only answer to some pathogenic problems, often in shorter timescales than has previously been the case. Although the Plant and Food Biosecurity Network cannot address resistance breeding itself, it will assess and evaluate the possibilities of resistance breeding as a “recovery” mechanism from attack by selected pathogens – an important feature of any response plan.

## UPCOMING EVENTS

Angers (France), June 30 – July 4, 2014



### Fourth PLANTFOODSEC summer school

The summer school in 2014 will be held at the French National Institute for Agricultural Research (INRA), in cooperation with the French Agency for Food, Environmental and Occupational Health and Safety (ANSES). It will provide an opportunity for students and researchers from various academic backgrounds to widen their knowledge of biosecurity.

The programme and application form will be available on the project website [www.plantfoodsec.eu](http://www.plantfoodsec.eu).

Grugliasco (Italy), July 21–25, 2014



### Summer school on seed disinfection strategies

In the framework of the TESTA project, the summer school will focus on seed health and the development of seed treatment methods, evidence for seed transmission, and the assessment of seed health. The TESTA project is funded under the EU FP7 programme. The summer school is organised by AgrolInnova, DISAFA and the University of Turin and offers places for up to 15 PhD and post-doctoral students as well as researchers.

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Turkey, October 2014



### Eighth PLANTFOODSEC consortium meeting

The eighth PLANTFOODSEC consortium meeting is due to be hosted by the in Turkey.

Further details will be made available on the project website [www.plantfoodsec.eu](http://www.plantfoodsec.eu) nearer the date of the meeting.

## EUROPEAN/GLOBAL NEWS REVIEW

## Research dynamics, knowledge systems and diagnostics networks – A sociological comparative analysis of plant biosecurity systems



Vincent Cardon

Science in Society (SenS) research unit of the French National Institute for Agricultural Research (INRA)

Food provision in the modern world relies on large socio-technical systems that produce, collect, assemble, transport, process, package and distribute bio-products or food resources. In the context of globalisation, which implies increased human circulation and exchanges of plants, seeds and biological materials – and therefore of pathogens, too – countries and scientists face new challenges in relation to plant health and the quantities and quality of food. What happens if individuals or organisations want to spread fear through populations via intentional threats against crops or food chains? How can risks that have never become reality be assessed, and by who? How can biosecurity systems anticipate an appropriate reaction to what has never happened before? More generally, how do scientists, countries and international institutions respond to the eventuality of a dual use of knowledge and research? Contemporary biosecurity issues open up new sociological questions and perspectives for analysis.

Ongoing sociological studies by plant epidemiology networks and knowledge infrastructures of phyto-pathology in relation to the development of biosecurity issues (bio-risk assessment, bioforensics, bioterrorism preparedness, dual-use prevention) are attempting to find answers to such challenges. We are striving to understand and describe the main features of the renewal of phytopathology and how capacities have been challenged and enhanced for biosecurity goals. We explore the role of new detection technologies, such as bar coding and models of

species ecology, in the emergence of a new frontline of knowledge in security research on plant protection. We also examine whether there are visible sub-communities and/or invisible colleges involved in the dynamics of knowledge related to security research on plant protection.

The research is twofold. It is based, firstly, on an international comparison between France, Italy and Great Britain, based on interviews with the main actors (scientific, governmental etc.) involved in biosecurity issues at national level. This initial focus on national action systems makes it possible to gather information in order to give a more specific grounding to the social study of the constitution of knowledge systems for biosecurity – the main regulations in force and the organisational framework (administration, agency, public-private), administrative and professional bodies for diagnosis and epidemiological surveillance capabilities, knowledge centres and research capacities etc. Mobilising a common methodological framework will also enable a comparative analysis of biosecurity structures in the area of plant protection, focusing on the organisational patterns and socio-technical networks of research communities, specific national frameworks and organisational changes due to biosecurity national programmes, and the role of international – particularly European – collaboration.

Given that science can be considered as a conjunction of men and women, facilities, institutions, concepts and publications, the second part of the research employs

scientometrics in order to explore how scientific communities dealing with biosecurity are structured. A complex analysis of the scientific literature on the subject reveals how the concepts associated with biosecurity – as well as the authors, institutions and editors involved in the production of those concepts, analyses and recommendations – are linked together and contribute to structuring this field of research. This second area of research relies on the creation and analysis of various corpuses extracted from online scholarly multi-disciplinary research data platforms such as Web of Science or the Commonwealth Agricultural Bureaux (CAB) Abstracts, and on the use of the specific algorithmic tools offered by CorText Manager, a digital platform developed by the French Institute for Research and Innovation in Society (IFRIS).

## WP4 IN FOCUS

## Developing a virtual diagnostic network



Jane Thomas  
National Institute of Agricultural Botany,  
Cambridge, WP 4 leader

There has been considerable discussion over the last two years about the development of a diagnostic network by the consortium. The network is gradually taking shape, and although the content will all be related to plant pathology and potential human pathogens on plants, the main effort in constructing the network is an exercise in information technology and computer coding to provide us with the functionality we require. Pages for identifying laboratories, their locations, skills and facilities have been developed, along with a “look-up” facility to find expert labs on specific pathogenic organisms. The next stages concern sample information and will provide user labs with the opportunity to upload diagnostic records and obtain summary information back from the system about current disease outbreaks in their own country and further afield. Finally, “community” pages will be designed, allowing the network to provide information on diagnostic protocol development, current methods, training and accreditation courses, workshops, news of emerging pathogen problems, and descriptions of spores, colonies etc. A facility to link labs and provide web-enabled microscopy for sample examination is also planned.

The extent to which the network duplicates the efforts of national plant protection organisations has been the subject of much debate. However, it was precisely because significant gaps existed in coordinated diagnostic communication across Europe that this topic was included in the EU proposal. Many state diagnostic labs

have been privatised, and there are many advisory labs across Europe that do not have easy recourse to comprehensive specialist skills. Providing these labs with a central information resource will enhance national capability to identify unusual occurrences, or spot emerging problems, contributing to surveillance mechanisms and potentially accelerating responses. The network will thus essentially be complementary to the work of statutory and regulatory labs, rather than duplicating what they already deliver. By joining the network, diagnostic labs will extend the “eyes and ears” that monitor our crops. Similar networks exist in the US and in Australia, and although Europe presents a very different, and far more difficult, challenge, nevertheless the target of providing a virtual linking network remains realistic.

Other deliverables in Work Package 4 include a review of techniques for mycotoxin analysis, which is now complete and provides a good example of the type of information that could be included in the information area of the diagnostic network. Work on a further deliverable related to physical methods for traceability (such as bar coding) in food product movement will shortly be undertaken. Finally, the *Fusarium proliferatum* onion study, which has been running throughout the project, will be used to create a “manual” of the principles and procedures that could be used in characterising a new pathogen occurrence – and, if necessary, in investigating whether or not there may have been a deliberate introduction. A further

study, recently initiated by NIAB as part of WP4, aims to carry out a much smaller but parallel study on a different organism to test the principles established in the *Fusarium* onion study. The interaction between *Leptosphaeria maculans* and oilseed rape has been selected, and field sampling of leaf spot lesions for molecular genetic analyses began in autumn 2013.

## PROJECT TRAININGS AND MEETINGS

### Mid-term project workshop in China



The mid-term project workshop took place in the scope of the 10th International Congress of Plant Pathology (ICPP 2013) in Beijing, China, between August 25 and 30, 2013. Selected PLANTFOODSEC partners participated and contributed to the session “Plant Food Security: A Network of Excellence on Biosecurity”. Professor Maria Lodovica Gullino gave the presentation “Plant and Food Biosecurity: Need for international cooperation and communication”. The WP7 leader Anita Kocic gave the presentation “Plant and Food

Biosecurity and Communication – Fostering Collaboration from Virtual to ‘Real’ Networks”. Professor James P. Stack spoke about virtual diagnostic networks and the creation of a platform for collaborative diagnostics. Professor Abraham Gamliel highlighted the exclusion of high-consequence pathogens from crop production systems, and Professor John Mumford discussed the quantification and interpretation of risk for security, trade, food and environment. Dr. Jacqueline Fletcher’s presentation focused on the potential for the mis-use of

scientific research, ethical conundrums and global solutions. In addition to the presentations, PLANTFOODSEC was also featured at the daily poster sessions. Two deliverables, a poster and a leaflet, were produced for the mid-term workshop and were disseminated at the event.

### Consortium meeting in Cambridge



The sixth project consortium meeting was held at the National Institute of Agricultural Botany (NIAB) in Cambridge, UK, on October 4 and 5, 2013. The event was preceded by a meeting of the *Fusarium* working group on October 3. The consortium meeting was attended by representatives of Agroinnova (University of Turin); NIAB; the Food and Environment Research Agency

(FERA); Rheinische Friedrich-Wilhelms-Universität Bonn (UNIBONN); the French National Institute for Agricultural Research (INRA); the Regional Environmental Center for Central and Eastern Europe (REC); Imperial College of Science, Technology and Medicine; the Middle East Technical University (METU); SPIN-TO Srl; the United Nations Interregional Crime and

Research Institute (UNICRI); the Agricultural Research Organization of Israel (ARO), Volcani Center; Oklahoma State University (OSU); and Kansas State University. Two members of the project security panel also participated.

### Consortium meeting in Torino



The seventh project consortium meeting was hosted by project partner SPIN-TO in Turin, Italy, on February 6, 7 and 8, 2014. During the intensive three-day meeting, a workshop on Horizon 2020 funding opportunities to ensure network durability was facilitated by Laura Vivani of the consultancy firm Moverim ([www.moverim.eu](http://www.moverim.eu)). Meetings of the work package

technical committees and the Project Steering Committee also took place, and discussions were continued in the framework of the *Fusarium* working group.

## WORK PACKAGE NEWSFEED 1/2



### WP1

#### Plant disease epidemiology applied to crop biosecurity

The main result so far is the establishment of a list of “candidate pathogens”, including 522 harmful organisms, insects, fungi, bacteria, viruses and nematodes, and a list of target plants and crop products, including 451 crops categorised into 11 groups. Criteria for prioritisation have also been identified. The partners have improved epidemiological knowledge of *Fusarium proliferatum* and have worked on epidemiological studies of primary inocula of two of the most damaging European wheat diseases (*Puccinia triticina* and *Mycosphaerella graminicola*). The following tasks have been undertaken:

1. Updating the list of “candidate pathogens” established under the EU project CropBioterror with a new list including pathogens and pests relevant from the previous list as well as new pathogens and those that will be used for research.
2. Updating the list of target plants (crop products) relevant to the project and to the pathogen list by qualitative and quantitative analysis. Generalised templates will be built by developing the broad type-based classification of target crops (three to five groups).
3. Producing comprehensive epidemiological knowledge of *Fusarium proliferatum* (ongoing).
4. Assessing the build-up, persistence and release of primary inocula and the early stages of epidemics of selected pathogens to differentiate between the consequences of natural and deliberate field contamination (ongoing).



### WP2

#### Food biosecurity

During, or following, a significant outbreak of a microbially caused foodborne illness it is important for investigators to assess whether the incident might have been due to intentional contamination. The outcome of such an assessment will help to determine whether a criminal investigation is warranted. The OSU is compiling supporting information for the creation of a predictive tool to assist investigators in making informed decisions related to possible intent.

METU has completed the report “Directory of EU Laboratories Involved in Foodborne Illness Investigation”, which presents an evaluation of capabilities and resources for the forensic investigation of foodborne illness outbreaks within the EU. The outbreak response systems of selected EU partner countries, the US and Turkey were compared and capability gaps and prioritising needs were identified. A strategy was developed to identify a standard protocol for handling outbreaks of foodborne illness.

OSU and UNITO are developing an enhanced strain discrimination assay – multiple locus variable number tandem repeat analysis (MLVA) – for non-O157 Shiga toxin-producing strains of *E. coli*, which are increasingly implicated in disease outbreaks in both the US and the EU.



### WP3

#### Analysis of risks posed by the intentional introduction of new pests and disease agents

Recent collaboration has taken place in the context of WP3 between IC and Bénédicte Moignot (a new post-doctoral researcher at ANSES). Imperial College and ANSES/INRA extended their collaboration on scenarios in WP3 with a three-day workshop held in South West Scotland.

The objective was to identify appropriate scenarios to test a range of risk assessment criteria. The exploration of new scenarios led to the further development of the PLANTFOODSEC risk assessment tool. Over the next three months, ANSES/INRA will conduct risk assessments using the revised tool to test the validity of the proposed criteria and scoring, and to prioritise the scenarios and pest/crop combinations in those cases.



### WP4

#### Diagnostic and detection systems

The first on-line demonstration of the diagnostic network being constructed in WP4 was given at the project consortium meeting held in Cambridge in October 2013. Currently, the content comprises mechanisms for entering laboratory details (location, capacity etc.) and “find an expert” options. Although much work remains to be done in terms of data entry, the network is taking shape. Greater functionality is being built into the system all the time, with the next steps focusing on methods for diagnostic record capture, which could allow laboratories to have an overview of disease events taking place in their own country and elsewhere. The key element in the eventual success of the network, however, remains with the users – without uptake by laboratories, the long-term viability of the network will decline. However, the activities of the European Plant Protection Organisation (EPPO), and the new national diagnostic network being constructed in France, clearly indicate a high level of interest in the principles of virtual diagnostic networks, and the PLANTFOODSEC consortium is in discussion with both organisations to maximise synergy and avoid duplication.

**WORK PACKAGE NEWSFEED 2/2**



**WP5**

**Response systems for eradication and containment**

WP5 first reviewed and compared the regulations applicable in EU member states and other participating countries with regard to accidental or deliberate introductions of non-indigenous harmful organisms. This review was accompanied by a white paper highlighting possible means of cooperation between countries and agencies in order to mitigate threat situations. The project has identified gaps in regulatory measures that might delay the response of certain countries during an event in which pathogens are introduced deliberately. The white paper emphasises that the process of transposing EU legislation into national laws and practice is not yet complete. Another issue of concern is the non-listing and inadequate notification of pests: we suspect that many new pests remain unreported by growers, inspectors and national authorities. No EU country is required at present a contingency plan to combat listed pests, thus there are only a few plans currently in place. WP5 has created a database describing in detail those authorities and institutes charged with responding, under contingency plans, to any crop biosecurity-related issue.

The current focus of WP5 is to provide a system approach strategy for the management of introduced pests by incorporating all practices that have a potential impact on the introduced pest along with a decision-making tool for assessing the application of each component.

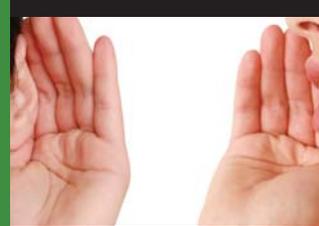


**WP6**

**Training on plant and food biosecurity**

One important activity of the network is to promote post-graduate exchanges between partners in order to create a security-aware professional workforce in Europe. These exchanges contribute to meeting one of the project objectives: that of improving disease surveillance and detection systems through international laboratory cooperation.

The network is also committed to enhancing training opportunities for participants outside the network. A successful summer school was hosted by UNITO in 2012, although the 2013 summer school has been rescheduled (date to be confirmed). The planned 2014 summer school will be hosted by INRA from June 30 to July 4, and will focus on the subject of plant disease epidemiology applied to crop security. The summer school in 2015 will be hosted in Turkey by METU.



**WP7**

**Dissemination, awareness and communication on plant and food biosecurity**

The WP7 team prepared new deliverables – a second project leaflet, a poster and the fourth issue of the newsletter. All deliverables are available in the publications section on the project website. The main WP7 outcomes were presented in Beijing, China, during ICPP 2013, which was an excellent opportunity to work on dissemination activities. The organisation of, and participation in, the second project workshop in China can be seen as another milestone in a series of successful project outcomes. A representative of WP7 gave the presentation “Plant and Food Biosecurity and Communication – Fostering Collaboration from Virtual to ‘Real’ Networks”. Another linked task of PLANTFOODSEC, and of WP7 in particular, is the preparation of the PLANTFOODSEC dissemination strategy and the updating of the database with stakeholder contacts. This task is in progress and partners will be informed about the outcome in due time.



**WP8**

**Management and monitoring**

Networking activities have taken place both within and outside Europe, and at the same time links have been established with other projects and organisations that deal with agriculture, food and biosecurity. Policy makers, including members of the European Parliament, have been contacted. In addition, professional links have been made with other European-funded projects that are dealing with food safety and security.

A PLANTFOODSEC representative joined the Non-Conventional Threats: Food Supply Chain Security forum, held on October 23-24, 2013, in Brussels and organised by IB Consultancy. These links are aimed mainly at enhancing collaboration. Six project meetings have been held since the start of PLANTFOODSEC. The seventh project meeting was hosted by SPIN-TO in Turin, Italy, on February 6-8, 2014.

One important item on the agenda of the Turin meeting was the second intermediate report, covering project implementation from August 2012 to January 2014. It has already been agreed that the eighth project meeting will be hosted by METU in Turkey in October 2014.

Further details and exact dates will be announced in due time.

**THE PROJECT** // Five years, EU funding of EUR 6 million, 13 partners, eight work packages and three continents: these are the numbers that sum up the project “Plant and Food Biosecurity, Network of Excellence” (PLANTFOODSEC), launched in February 2011. The aim is to build a virtual centre of competence in order to increase the quality and impact of plant and food biosecurity training and research in Europe, thus enhancing preparedness and response capabilities to prevent, respond to and recover from biological incidents or deliberate criminal activity threatening the European agri-food system.



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