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EMPHASIS *news*

*Effective Management of Pests
and Harmful Alien Species: Integrated Solutions*

EDITORIAL

Page 2

EVENTS

Page 3–4

GLOBAL REVIEW

Page 5

WP3 IN FOCUS

Page 6

PROJECT TRAININGS AND MEETINGS

Page 6–7

WP NEWSFEED

Page 8–10



EDITORIAL



Ramon Albajes, WP3 leader

PRACTICAL SOLUTIONS FOR PROTECTION, MANAGEMENT AND ERADICATION

Article 14 of Directive 128/2012/EC on establishing a framework for Community action to achieve the sustainable use of pesticides states that “Member States shall take all necessary measures to promote low pesticide-input pest management, giving wherever possible priority to non-chemical methods.” Replacing chemical tools with non-chemical alternatives is a major challenge for European R&D in the field of plant health. It is also the main goal of the EMPHASIS project. Work Package 3 is developing practical solutions for managing native and alien pests in agriculture, horticulture and forestry. The team has selected control methods about which there is sufficient information to ensure their potential efficacy, but where further research is needed to improve their feasibility. In addition, key agricultural systems in the EU, as well as diseases, insect pests and weeds that demand greater control efforts, have been selected for the rapid application of innovative control methods. The WP3 researchers are experienced scientists who have developed tools for analysing agrosystems, identifying their potentially useful relationships for pest suppression, and assessing their efficacy for meeting economic and ecological requirements, as demanded in the directive.

Reducing and optimising the use of pesticides is a major goal of EMPHASIS. The project brings together researchers and stakeholders, providing a framework for cooperation to achieve objectives that cannot be reached by individual actors. Innovations in the field of agrifood technology require mutual exchange between researchers and consumers. Each step involves a different set of stakeholders, whether consumers, farmers, policy makers, input suppliers, consultants, technicians, or the scientific community. Project partnerships and networking beyond the project are aimed at facilitating communication in this multi-stakeholder process. Innovative responses to social and economic demands are based on the activities of, and mutual feedback between, WPs 2, 3 and 4. Work Package 2 focuses on the prevention and early detection of pest problems, while WP3 and WP4 focus

on pest control and containment. These two latter work packages are fed by the results achieved in WP1 and WP2, and vice versa. Methods to control and contain pests developed in WP3 have to be validated in the field through WP4 activities, while pest populations must undergo surveillance and continuous monitoring in order to prevent resurgence due to the failure of WP3 solutions. Good surveillance and monitoring tools are therefore required to maintain the efficacy and sustainability of the methods issued from WP3 and WP4.

EVENTS

1. AGROINNOVA 15TH ANNIVERSARY: INNOVATION THROUGH PASSION 2017

Researchers are often accused of living in "ivory towers", without sharing their work with the public. By contrast, since its foundation in 2002, the Centre of Competence for Innovation in the Agro-environmental Field at the University of Turin (AGROINNOVA) has been communicating its scientific research results in a variety of ways. Events are useful opportunities to engage a range of stakeholders and the public. **For this reason, AGROINNOVA decided to celebrate its 15th anniversary in 2017 through a series of events and communication activities related to plant health and crop biosecurity.**

The first event in the series was the XXXII **Incontri Fitoiatrici**, which was held in Turin on March 22. This is the annual meeting of AGROINNOVA, at which Italian researchers discuss topics relevant to the field of plant protection, and where AGROINNOVA's research findings are showcased in the form of posters. In recent years, meetings have taken place more often than once a year, in the form of special events organised in various Italian cities. **On September 21, the XXXIII Incontri Fitoiatrici** will be held in Sanremo, and the XXXIV will take place in Albenga in November.

On June 5, 2017, Turin's beautiful and impressive theatre, Teatro Carignano, was the setting for a production of the play *Respiro*, which is loosely based on *The Diaries of Adam and Eve* by Mark Twain. The play was directed by Ivana Ferri and co-produced by AGROINNOVA, with the support of Teatro Stabile di Torino, Teatro Nazionale and Tangram Teatro. An audience of **over 450 people attended the play**, which built on the success of the 2016 production "Emphasis for the Environment", which was held in the same theatre and involved a mix of music, acting and debate. Both events were part of the official programme of **European Green Week**. The musical drama *Respiro* aimed to raise audience awareness using key messages on the role of plant, animal and human health for the environment and landscape protection, based on the One Health concept. Theatre is an ideal medium for conveying messages to the public about the importance of plant health for the environment, ensuring the effective and efficient spread of scientific results in an original format to a wider public. A second performance of *Respiro* will be held **on August 12 in Bardonecchia, Turin, during the Theatre and Literature Festival.**

On September 29, AGROINNOVA will take part in the European Researchers' Night in Turin and Cuneo. The centre has participated in this event every year since its launch in 2005 by the European Commission. Throughout the night, young scientists from AGROINNOVA enthusiastically explain to visitors the importance of research in the field of plant pathology. **In December, AGROINNOVA's 15 years of cooperation with China will also be celebrated in Beijing.**



EVENTS

2.
**FIRST EMPHASIS
SUMMER SCHOOL**
*CAMBRIDGE, UK
AUTUMN 2017*

The date of the summer school, which was originally planned for July 10–14, 2017, has been changed to autumn 2017. An announcement of the date will be sent out and disseminated via the EMPHASIS project website. The training, “Integrated control of pests and diseases in arable and horticultural crops”, will cover the latest research results on the integrated control of pests and diseases in arable and horticultural crops.



3.
**SECOND EMPHASIS
SUMMER SCHOOL**
*TURIN, ITALY
JULY 2–6, 2018*

The project’s second summer school, “Emerging pests and diseases in horticultural crops: Innovative solutions for diagnosis and management”, will be organised by AGROINNOVA in July next year. The aim is to inform young researchers about epidemiological issues and innovative management strategies, and to train them to use innovative and effective diagnostic systems, such as loop-mediated isothermal amplification (LAMP). The lecturers will be Michael P. Andreou (Optisense), Neil Boonham and Jenny Tomlinson (Fera Science Ltd.), Rosa Caiazzo (NIAB), Massimo Pugliese (AgriNewTech), Lara Bosco, Chiara Ferracini and Elena Gonella (UNITO-DISAF), and Maria Lodovica Gullino, Davide Spadaro and Giovanna Gilardi (AGROINNOVA).



GLOBAL REVIEW

POTENTIAL EFFECTS OF CLIMATE CHANGE ON TRANSBOUNDARY PLANT PESTS AND DISEASES: RESPONSE AND CONTRIBUTIONS

Climate change, and its impacts on plant pests, could bring about severe reductions in crop production, an increasing number of crop failures, and greater reliance on pesticides, according to the UN Food and Agriculture Organization (FAO). Climate change is expected to affect where crops are cultivated, the distribution of plant pests, the introduction of new pests, the frequency of major pest outbreaks, and the risk of pesticide residues in food.

The primary drivers behind changes in plant pest dynamics are climatic conditions, such as increases in temperature, variability in rainfall intensity and distribution, changes in seasonality, drought, carbon dioxide concentration in the atmosphere, and extreme rainfall events (e.g. hurricanes, storms and floods). Other factors, such as pest characteristics (e.g. lifecycle, optimal growth conditions and host interaction) and intrinsic ecosystem characteristics (e.g. monoculture and biodiversity) will affect these dynamics. This could lead to a greater number of emerging plant pests, which will come into contact with new hosts that do not necessarily have an appropriate level of resistance, or that are introduced in the absence of naturally occurring biological control agents. New, more virulent and aggressive strains of plant pathogens are likely to develop, as has recently been experienced in relation to wheat, coffee and cassava.

Approximately one-third of global crop production is lost every year to plant insects and diseases, including migratory insects and diseases — referred to as transboundary plant pests — which

spread to a number of countries and can reach epidemic proportions, requiring cooperation between countries to ensure control and management.

Although the specific implications of climate change impacts on plant pests and diseases are difficult to predict, it is possible to make projections about future conditions and the future occurrence of such pests and diseases.

One example of diseases likely to be most influenced by climate change are diseases affecting wheat, such as stem and stripe rusts. These are especially serious in the Near East, Central Asia and Eastern and Northern Africa, where severe epidemics cause significant losses in wheat production. The FAO, in partnership with the International Center for Agricultural Research in Dry Areas (ICARDA) and the International Maize and Wheat Improvement Centre (CIMMYT), in the context of the Borlaug Global Rust Initiative, is working closely with countries affected or threatened by wheat rust in order to better manage the pest in the face of climate change.

At global level, the FAO manages transboundary plant pests within the Food Chain Crisis Management Framework – Emergency Prevention System (FCC-EMPRES). This common strategy to address transboundary pests relies mainly on prevention, early warning, early reaction and capacity development.

Further information about the system is available on the FAO website (www.fao.org).



WP3 IN FOCUS

WP3 TEAM, LED BY UDL

The reduction in available plant protection products, and the requirement that EU member states promote low pesticide-input pest management and implement the principles of integrated pest management, as stated in EU legislation, are key drivers of the development of alternative and sustainable pest strategies.

It is vital that non-chemical control methods and products are developed that are more relevant to European agricultural systems. However, the key to ensuring the greater uptake of alternative strategies is to provide products (or methodologies) that are able to perform as well as traditional pesticides, while at the same time

being just as easy to use and equally cost-effective. It must also be possible to integrate such products into the various management practices typically in place for the range of pests, diseases and weeds affecting any given crop.

The work of WP3 follows the standards and activities of the European and Mediterranean Plant Protection Organization (EPPO) (e.g. the safe use of biological control, and the list of biological control agents widely used in the EPPO region) and EPPO pesticide and herbicide efficacy panels. The outputs of the work package are used to propose revisions or to develop new EPPO standards.

The goal of WP3 is to provide practical tools to facilitate the effective

implementation of the principles of integrated protection in line with Directive 2009/128/EC in order to address pest threats (insect pests, pathogens and weeds) in agriculture, forestry and natural ecosystems. The strategies for integrated protection are based on biological control, host plant resistance, cultural control (including sanitation and eradication), optimised chemical control and semiochemicals. Existing pest management methods are being optimised, and new and innovative pest management approaches are being developed.

Examples of WP3 activities and results are given in the WP3 Newsfeed.



PROJECT TRAININGS AND MEETINGS

1.

FOURTH EMPHASIS PROJECT CONSORTIUM MEETING BRNO, CZECH REPUBLIC MAY 17–19, 2017



The EMPHASIS Executive Committee meeting and fourth meeting of the General Assembly were held at Mendel University in Brno. On May 17, the Executive Committee analysed the recommendations of the first review report, the financial status of the project, and planned amendments. In the afternoon, dedicated working groups discussed progress and results from September 2016 and defined a detailed work plan for the second reporting period, which was presented to the General Assembly on May 18 and 19.

PROJECT TRAININGS AND MEETINGS

2.

BUSINESS PLAN DEVELOPMENT WORKSHOP BRNO, CZECH REPUBLIC MAY 16, 2017



The commercialisation of research results is a key outcome of Horizon 2020 projects such as EMPHASIS. On May 16, Dr. Péter Mogyorósi (LC Innoconsult International) delivered a business plan development service for the EMPHASIS project, which included:

- support in fine-tuning the available information and drafting a lean canvas, and the provision of final comments after the workshop.
- an analysis of the current situation (exploitation-related deliverables, reviewers' report);
- a workshop aimed at clarifying ownership issues and exploitation intentions, and at finalising the lean canvas, action plan and exploitation roadmap; and

3.

SOCIO-TECHNICAL LEARNING LAB BRNO, CZECH REPUBLIC MAY 17, 2017



In parallel with the Executive Committee meeting during the fourth EMPHASIS project meeting, and as a follow-up to a similar event held in Budapest in 2016, a socio-technical learning lab (SLL) took place on May 17, hosted by Mendel University.

Researchers, scientists, farmers and foresters shared practices, observations and knowledge acquired in their daily battle against pathogens and invasive species such as hogweed (*Heracleum mantegazzianum*), ash dieback (*Hymenoscyphus fraxineus*) and root/heart rot (*Heterobasidion annosum*, *parviporum* and *abietinum*).

Inge Gaile, from Integrētās Audzēšanas Skola, Latvia, presented the integrated pest management methodology, a combination of biological, chemical and mechanical methods for bringing hogweed under control in two to three years, which has been used successfully in both Latvia and the Czech Republic.

Roman Krejcir of the farm supply company L.E.S. CR, Czech Republic, highlighted examples of the effect of different herbicides on the spread of hogweed, and the respective conclusions, in the Czech Republic.

The prevention of ash dieback was a central topic in the presentation given by Jiri Rozsypalek of Mendel University, which described the complex evaluation carried out in Czech ash forests, focusing on the pathogen *Hymenoscyphus fraxineus*; while Jelle A. Hiemstra from the agricultural research institute Wageningen Research, the Netherlands, introduced a new technology that is currently being tested to cultivate ash trees resistant to ash dieback in Denmark and Germany.

Luana Giordano of UNITO, Italy, presented available techniques applied to combat *Heterobasidion*, emphasising that integrated disease management refers to a combination of different management approaches. Petr Sedlak of Mendel University followed up with a demonstration of multifaceted experiments for effective *Heterobasidion* control, carried out in the Czech Republic.

The SLL provided an exclusive forum for a lively exchange among a wide range of experts from several European countries, who discussed numerous findings and techniques aimed at the protection of native species in forests, woods and urban areas.

WP NEWSFEED

WORK PACKAGE 1



The EMPHASIS project is developing diverse technologies for the detection and control of pests. An analytical framework tool has been designed by WP1 to coordinate information on the attributes of these new measures.

The elicitation uses performance indicator scores in four different categories — Cost and Management Efficiency; Coherence and Relevance; Efficacy for Control or Detection; and Environment and Sustainability — in order to present the innovative use of the new technologies to consumers. Each score is given an uncertainty rating to reflect the extent of knowledge or natural variability that could affect the score. The uncertainty rating is used to convert the score into a

visualised distribution, so that the user can decide if it matches their perceptions of a measure's performance for each indicator. The WP1 team is working on an attractive visual design for reaching the project's target groups.

The assessments form an accessible database of control and detection measures that are updated in order to bring the innovative tools closer to market. Field validation data will be compared with design expectations, and relevant use indicators will be identified for each technology.

WORK PACKAGE 2



Work Package 2 has been working on loop-mediated isothermal amplification (LAMP), a fast and robust DNA amplification technique that is well suited to diagnostics. It can be seen as a faster and simpler version of the polymerase chain reaction (PCR) approach.

In terms of surveillance, WP2 is continuing to explore traditional biological approaches, as well as some

post-genomic technologies. The work on biological surveillance is being led by the UK National Institute of Agricultural Botany (NIAB), which has successfully set up a network of sentinel plots with other EMPHASIS partners. The technology being used in EMPHASIS traps airborne cereal diseases ahead of them becoming established in crops more widely. The results will be disseminated soon.

WORK PACKAGE 3



Results achieved by WP3 are detailed below in the form of three case studies.

Cabbage stem flea beetle: Facing the loss of neonicotinoid seed treatment

The cabbage stem flea beetle has emerged as a major pest in winter-sown oilseed rape throughout northern Europe, following the loss of neonicotinoid seed treatments. New approaches to controlling the pest are urgently needed. In the UK, NIAB is investigating companion crops that are planted together with rape to see if they can either repel the pest from the crop, or attract it, so that the companion species is preferentially attacked. So far, it appears that white mustard (*Sinapis alba*) offers some degree of protection to oilseed rape. Less "shot-holing" is seen in young rape plants that are sown with *Sinapis*, than in rape that is grown alone. Companion crops will

compete for nutrients and resources with the crop plant, so it is important that they are controlled after their beneficial function has been achieved. In cold winters, frosts should be sufficient to kill a companion crop such as *Sinapis*. However, other methods need to be available in mild winters. Further investigations with herbicides are planned so as to develop ways to manage the companion crop.



WP NEWSFEED

Compost for the integrated management of soil-borne diseases

Soil-borne diseases are one of the main problems in many modern plant production systems. Compost is a good source of organic matter and microorganisms. It provides different soil functions and can be one strategy to reduce the impact of soil-borne diseases in agriculture. Composts can be used to improve crop production, soil health, nutrient levels, organic matter and plant growth, but they can also be used to suppress diseases caused by soil-borne plant pathogens. Disease suppression may vary according to compost quality, and can be guaranteed when composts are colonised by specific antagonists during composting. The agriculture-related European Innovation

Partnership (EIP-AGRI) of the European Commission has included the use of compost as an IPM practice for soil-borne disease suppression (<https://ec.europa.eu/eip/agriculture/en/content/ipm-practices-soil-borne-diseases-suppression-vegetables-and-arable-crops>).



Foliar fertilisers for the control of downy mildew in basil

Downy mildew can cause the complete loss of high-value crops such as basil. The pathogen *Peronospora belbahrii* has emerged relatively recently as a threat, but provides examples of how high-value crops that are critical to horticultural economies, despite being grown on a small area, can be devastated. Relatively low incidence of disease can also reduce quality at the point of sale, resulting in crops being rejected by retailers.

Foliar fertilisers containing humic acids, amino acids, plant hormone-like substances, plant elicitors and rapidly available sources of meso- and micronutrients have been developed by

the biotechnology research company AgriNewTech and tested in trials during the first two years of the project. Preliminary results indicate that the products are effective in the control of downy mildew on basil, and further tests will evaluate the possibility to integrate them to reduce the use of chemical fungicides, and consequently pesticide residues in food.



WORK PACKAGE 4



Several field trials have been set up and implemented by WP4 to fine-tune practical solutions at farm level. Agrobio, for example, carried out a semi-field greenhouse experiment in Spain with the predatory bug *Dicyphus tamaninii* to control white flies (*Bemisia tabaci*). White flies are difficult to control because of resistance to many insecticides, and the flies are vectors for plant viruses. The predatory bugs that are currently used can damage the plants and fruit, and they also have problems establishing themselves in the crop. The experiment, in which *Dicyphus* is compared

to the currently used predator, is ongoing. To date, both predators have proved to be very efficient in controlling white flies. The next stage will be to see if the predators can handle increased pest pressure.

The mating disruption product of Semios to control codling moths in fruits and nuts in the Netherlands has been approved for growers to start using. This is a good example of implementing practical solutions within the EMPHASIS project on the part of growers and Wageningen University and Research Centre (WUR).

WP NEWSFEED

WORK PACKAGE 5



The current activities of WP5 for the dissemination of project achievements and training opportunities are contributing to overall policy-making processes.

The WP5 project partners are using multiple communication channels, including social media, to disseminate the project's research findings and to stimulate current and new networks.

Training activities are an important forum for communication, dissemination and the identification of new research opportunities. In particular, the exchange programme between partners, mainly

universities, provides a good basis for the replication of pilot activities at national and international level.

Other tasks of WP5 include the regular management and updating of the database; the dissemination and publications table; stakeholder mapping; and the training plan.

Key outcomes foreseen for this period are the fourth project newsletter and the software outline for the HabiThreats toolkit, based on cooperation with the WP1 learning platform.

WORK PACKAGE 6



The conclusions of the first review (covering the first 18 months of project implementation), carried out by external experts selected by the Research Executive Agency (REA) in October 2016, highlight that EMPHASIS has achieved the objectives and milestones for the given period.

The external reviewers considered the project to be highly ambitious: they were apprehensive about the consortium being able to deliver as planned. However, after a thorough Q&A session following the presentation of progress, they were happy to say that the project is progressing favourably.

Although most of the innovative outputs will be delivered later in the project lifetime,

considerable progress has been made and an admirable amount of work has already been carried out, while deliverables planned for the period have been delivered.

The reviewers particularly appreciated WP1, which is fully dedicated to developing a framework that will allow for the smooth integration of various multidisciplinary approaches, ensuring cohesive implementation, including input from stakeholders to ensure relevance, and linking the final deliverables and milestones.

The momentum generated at this stage will have to be maintained. The EMPHASIS consortium is fully committed to ensuring that all planned results are achieved on schedule.

We hope you have found this newsletter interesting and informative. We welcome your views on any of the issues covered: please email agroinnova@unito.it
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