Scientific Colloquium Series

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EFSA Scientific Colloquium XVI

Identification of emerging plant health risks: future challenges and approaches

Parma, Italy, 9-10 June 2011

BRIEFING NOTES FOR DISCUSSION GROUPS

These briefing notes are provided to participants, along with selected references for further background, so as to be prepared for an interactive exchange of views and expertise during the Colloquium.

BACKGROUND

The European Food Safety Authority (EFSA) is broadening its monitoring procedures for identifying emerging risks to all the fields within its mission, including plant health. An emerging risk to human, animal and/or plant health is defined as a risk resulting from a newly identified hazard to which a significant exposure may occur or from an unexpected new or increased significant exposure and/or susceptibility to a known hazard. In the field of plant health, an emerging risk can result from:

- a newly identified plant pest[1] for which a significant probability of introduction and/or spread may occur, or
- an unexpected new or increased significant probability of introduction and/or spread of an already known plant pest (e.g. a new or a modified trade pathway of introduction, a change in agriculture or forestry practice, a change in pest/disease management or the cultivation of a new crop), or
- a new or an increased susceptibility of the host plants to a known plant pest.

The plant health sector worldwide is facing an increasing number of outbreaks by both new pests and by pests that were not previously considered to be important. There is a need for a rapid, efficient and robust system to identify emerging plant health risks as early as possible, to assess the risks, and to communicate the risk assessments to risk managers without delay. The key challenges for such a system include the identification and/or prediction of a new pest at an early stage, the production of pest risk assessments under time and data constraints, as well as the need for prioritizing criteria for the new plant health risks. Finally, it will be important to provide sufficient scientific support to the risk managers to put in place effective risk mitigation strategies.

[1] A pest is defined in these briefing notes as any species, strain or biotype of plant, animal or pathogenic agent injurious to plants or plant products (FAO/IPPC, 2010. ISPM No. 5 Glossary of phytosanitary terms. Available at https://www.ippc.int/file_uploaded/1273490046_ISPM_05_2010_E.pdf). This definition includes plant pathogens as micro-organisms causing diseases.

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OBJECTIVES

International experts will be gathering for an open scientific debate on key issues related to the identification of emerging risks in plant health. The results of this discussion will provide inputs for the development of EFSA's methodological framework for emerging risks identification in plant health, including systems and methodologies for data monitoring, data filtering and risk assessment of emerging plant health risks.

The colloquium will be organised through four discussion groups dealing with the emergence of plant health risks at different scales: changes in pests, vectors and/or plants and their interactions as drivers[2] of emerging plant health risks; changes in agriculture and forestry practices as drivers of emerging plant health risks; changes in trade, food consumption and land use as drivers of emerging plant health risks; climate change as driver of emerging plant health risks.

Focus should be on challenges and methodologies to identify emerging plant health issues and, in particular, to anticipate new emerging plant pests or new pathways of introduction/drivers of change of plant pests. Finally, the issue of how the risk assessment of emerging plant pests and pathogens may support risk managers in decision making will be discussed.

GENERAL SELECTED READINGS

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[2] The following definition of a 'driver' is used in these briefing notes. Drivers have been defined as issues shaping the development of a society, organisation, industry, research area, technology, etc. Drivers can be classified in categories such as STEEP (i.e. Social, Technological, Economic, Environmental, Political). One important characteristic of drivers is that they may act as modifiers of effect on the onset of emerging risks, namely they can either amplify or attenuate the magnitude or frequency of risks arising from various sources. A large body of literature is available on drivers in different fields, including economy, social sciences, technology, health and environmental sciences.

DISCUSSION GROUP 1 – Changes in pests, vectors and/or plants and their interactions as drivers of emerging plant health risks

INTRODUCTION

Plant pests may become significantly more damaging when they invade new areas due to changes in virulence, aggressiveness, host range, population density and fitness (e.g. through resistance-breaking strains and strains resistant to agrochemicals). Consequently more invasive biotypes or populations may emerge and replace existing ones complicating pest control but also, in the case of vector populations, leading to a significant increase in vector-borne diseases (e.g. the worldwide emergence of *Bemisia tabaci* biotypes and the spread of the tomato yellow leaf curl disease). Plant health problems may emerge from pests that were previously unknown (e.g. *Phytophthora ramorum*, Torradoviruses, etc), from pests that are not known to be important in their current area of distribution (e.g. the palm borer, *Paysandisia archon*) or from well known plant pests which, once introduced, may attack new hosts (e.g. the recent outbreaks of *P. ramorum* on a new host, Japanese larch, in the UK) or change their behaviour and cause more severe damage than in their area of origin (e.g. *Pepino mosaic virus* on tomato,). Also newly introduced pests may act as new components in trophic webs lacking of natural control agents (e.g. *Metcalfa pruinosa*). Ancient diseases may sometimes reemerge or become more difficult to control for example through the emergence of resistance-breaking strains (e.g. the Ug99 races of the wheat stem rust fungus) or though the spread of new vectors (e.g. the re-emergence of *tomato spotted wilt tospovirus* following the spread of the new more efficient vector *Frankliniella occidentalis).*

Changes in plant pest species, biotypes, strains or pathovars and in their populations, as well as changes in host susceptibility, may therefore act as a driver of emerging plant health risks. The discussion group should focus on these changes, the methods to identify, detect and/or anticipate them and their consequences.

DISCUSSION POINTS

1. How do we recognise if changes in plant pests and/or vectors (changes in species, biotypes, strains or pathovars) and in their populations, as well as changes in the host plant susceptibility, become a driver of emerging plant health risks? (identifying type of information, data sources, monitoring, screening)
2. How can we anticipate these changes? Is prediction possible?
3. What are the implications of these changes for managing risk? (e.g. needs for ranking and/or prioritising criteria of emerging issues, rapid risk assessment etc.)
4. Can we learn from the past? Are there any case studies for retrospective analysis?

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DISCUSSION GROUP 2 – Changes in agriculture and forestry practices as drivers of emerging plant health risks

INTRODUCTION

Changes in agriculture and forestry practices have often lead to the emergence/re-emergence of plant health problems. Examples of such changes in agriculture practices are: shortening of crop rotation, application of crop sequences, intercropping and/or soil cultivation techniques (ploughing versus no tillage or minimum tillage) which may favour the survival of pests and pathogens in the soil (e.g. the influence of crop rotation and soil cultivation on *Fusarium* wheat diseases and mycotoxin contamination); the expansion of protected cultivation and the spread of tropical and subtropical plant pests in greenhouse crops of temperate zones (e.g. *Tuta absoluta*); the increase in areas devoted to fresh-cut vegetables (e.g. lettuce, lamb lettuce, rocket, wild rocket) and the spread of seed borne diseases; the increase of monoculture in perennial fruit crops and the *Armillaria* root rot build up; the application of soilless cultivation technique and the raise of new plant pathogens; the adoption of grafting on tomato, pepper, eggplant and cucurbits and the raise of already known diseases on rootstocks (e.g. *Colletotrichum coccodes, Macrophomina phaseolina, Phytophthora* spp.) as well as the increased risk of spread of seed borne diseases (e.g. *Acidovorax avenae* subsp. *citrulli*, *Clavibacter michiganensis* subsp. *michiganensis*, *M. phaseolina*); the cultivation of susceptible plant varieties and the re-emergence of old pests (e.g. tobamoviruses in crops of the "typical" old tomato cultivar Coeur-de-Boeuf /Cuor di bue), as well as the selection of virulent pest populations after repeated cultivation of the same plant variety (e.g. the selection of virulent populations of *Meloidogyne javanica* after repeated cultivation of Mi resistance gene tomato rootstocks under field conditions); changes in the availability of plant protection products, including soil fumigants, and their consequences on the pest and disease management strategies.
Also changes in forestry and arboriculture practices may lead to the emergence/re-emergence of tree pathogens and pests. The choice of the plants size/age for new plantations may trigger potential plant health problems as, for example, scions of *Acer* sp. with diameter exceeding 5 mm are more likely to allow egg survival and embryo development of *Anoplophora chinensis*. Also a reduced intensity of forest management practices, such as the lengthening of the rotation age leading to ageing of forest plantations or the lack of forest thinning, may lead to an increase of forest phytosanitary problems.

DISCUSSION POINTS

1. How do we recognise if changes in agriculture and forestry/arboriculture practices become a driver of emerging plant health risks? (identifying type of information, data sources, monitoring, screening)

2. How can we anticipate these changes? Is prediction possible?
3. What are the implications of these changes for managing risk? (e.g. needs for ranking and/or prioritising criteria of emerging issues, rapid risk assessment etc.)
4. Can we learn from the past? Are there any case studies for retrospective analysis?

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DISCUSSION GROUP 3 – Changes in trade, food consumption and land use as drivers of emerging plant health risks

INTRODUCTION

Changes in trade of plants and plant products, particularly of living plants for planting and ornamentals, have led in the past decades to a considerable increase in the emergence of new plant pest problems. The ornamental trade has been considered to be the main cause of the worldwide spread in the 1990's of the thrips *F. occidentalis* in the horticulture industry. Similarly, the trade in plants for planting is a key pathway for the introduction of many other emerging plant pests, such as the citrus longhorn beetle *A. chinensis*, the red palm weevil *Rhynchophorus ferrugineus*, *Phytophthora ramorum*, *Potato spindle tuber viroid* and other pospiviroids; vegetable trade has been an important pathway for spread of *Tuta absoluta* and *Pepino mosaic virus* in protected tomatoes; new imports of cherries from Eastern Asia may well have led to the introduction of *Drosophila suzukii* to North America and Europe; wood packaging materials, even after the implementation of the ISPM N° 15[3], are still found important for the introduction of many plant pests (e.g. the pine wood nematode, *Bursaphelenchus xylophilus*, and the Asian longhorned beetle *Anoplophora glabripennis*).

Changes in food consumption, such as the trends for novel foods or new exotic plant products or organic food, might also raise new plant health problems through the related trade or changes in agriculture practices (e.g. organic versus conventional agriculture),. Changes in land use may also trigger emerging plant health risks. For example, the increase in abandoned or unmanaged rural marginal areas, or in the design and management of the farm landscape to meet conservation and ecological requirements of the sustainable agriculture, may create reservoirs for plant pests and or disease vectors.

[3] FAO/IPPC (2009). ISPM No. 15: Regulation of wood packaging material in international trades. Available at https://www.ippc.int/file_uploaded/1285321495_ISPM_15_Revised_2009_E.pdf.

DISCUSSION POINTS

1. How do we recognise if changes in trade of plants and plant products, food consumption and land use become a driver of emerging plant health risks? (identifying type of information, data sources, monitoring, screening)
2. How can we anticipate these changes? Is prediction possible?
3. What are the implications of these changes for managing risk? (e.g. needs for ranking and/or prioritising criteria of emerging issues, rapid risk assessment etc.)
4. Can we learn from the past? Are there any case studies for retrospective analysis?

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DISCUSSION GROUP 4 – Climate change as driver of emerging plant health risks

INTRODUCTION

There is a scientific consensus that, mainly due to anthropogenic emissions of greenhouse gases into the atmosphere, global surface temperatures have increased in recent decades. The increase in the average temperature of Earth's near-surface air and oceans since the mid-20th century and its projected continuation is generally defined as global warming. According to model projections, global and regional climate change in this century will be characterised by higher temperatures, altered precipitation regimes and increases in the frequency of extreme events with serious consequences to many human activities, including agriculture.

Considering that climate is one of the key factors in determining the establishment and spread of plant pests in new areas, climate change may therefore act as driver of emerging plant health risks. For instance, earlier springs or modified growing seasons may result in the shifting of pest and host distributions, establishment potential of pests, the phenological “timetables” of plants and the synchronisation between pest and plant life cycles.

The natural spread of warmth-loving plant pests and their vectors may accelerate northwards, as former climate barriers may no longer be effective. This may result in more severe outbreaks of both pests and their vectors, an

extension of the period of disease infection and vector survival further into the growing season and also the introduction and establishment of new pest/vector species. More vectors may survive from one vegetation period to the following one, leading to earlier and faster development of the transmitted disease. For fungal plant pathogens, the predicted warming may be favourable for those species for which winter survival due to low temperatures is a limiting factor, while for others the favourable effect of warming may be counterbalanced by the negative effect of a decrease in summer rainfall. It has also been suggested that the shift in host range and the altered phenology of wood-decay fungi may be linked to climate change. Latitudinal and altitudinal expansion of the geographic range of the pine processionary moth in Europe has been reported and linked to increased winter temperatures. Warming trends have also coincided with changes in population dynamics and outbreaks cycle, e.g. of larch budmoth across the European Alps. The expression of symptoms and impacts of plant pests may also be linked to higher temperatures or to higher water stress in summer with strong implications for impact assessment and risk mitigation measures. Outbreaks with increased attack levels of the spruce web-spinning sawfly have been linked in Italy to water stress. Experiments in the U.S. suggested that atmospheric CO_2 may enable the invasive vine kudzu (*Pueraria lobata*) to spread further westwards and northwards. An 3°C increase of winter temperatures may enable the species to spread northwards by several hundred kilometres, whereas the decrease in summer precipitation may minimize westward spread.

Climate change may therefore act as a driver of emerging plant health risks enhancing the possibility for exotic pests and diseases to colonize new areas. The discussion group should focus on these changes, the way to recognize and/or anticipate them and their consequences. . Changes in the plant host and in pest behaviour due to climate change should be considered taking into account the balance between host, pest, and the environment as well as current weather change/global warming and future climate change scenarios..

DISCUSSION POINTS

1. How do we recognise if changes in the plant host and in the plant pest behaviours due to climate changes become a driver of emerging plant health risks? (identifying type of information, data sources, monitoring, screening)
2. How can we anticipate these changes? Is prediction possible?
3. What are the implications of these changes for managing risk? (e.g. needs for ranking and/or prioritising criteria of emerging issues, rapid risk assessment etc.)
4. Can we learn from the past? Are there any case studies for retrospective analysis?

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