

Monitoring and early warning systems for invasive alien species in the Plant Health sector in Europe

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ABSTRACT

The European and Mediterranean Plant Protection Organization (EPPO) and the European Union are providing the technical and regulatory framework in the field of Plant Health in Europe. Both are running databases and information exchange systems in order to achieve early warning of the responsible official bodies of the member countries on the occurrence and/or spread of invasive, plant damaging organisms. Several ways of proceeding are applied to monitor the occurrence of those organisms on the respective national territories. The realization of the surveillance is under the responsibility of the national plant protection organizations. An overview is given on the main elements of 'general monitoring', 'import/export monitoring' and 'specific area-wide monitoring'. Within the EU, specific area-wide monitoring programs directed on the detection of particular harmful organisms are carried out in the framework of either a Control Directive, the surveillance of Protected Zones or Commission Decisions on emergency measures. The performance and the results of such a Community-wide monitoring is demonstrated on the example of the pinewood nematode (*Bursaphelenchus xylophilus*).

INTRODUCTION

Surveillance of the occurrence of harmful organisms which may be invasive alien species is an important element of plant health regulations. Knowledge on the occurrence of invasive species in a country or a certain area and on possible pathways of introduction of those organisms is essential for early warning of the responsible official bodies and for enabling precautionary action against the introduction and spread of harmful organisms. In this respect the European and Mediterranean Plant Protection Organization (EPPO) and the European Commission are running databases to gather relevant information. Surveillance in the field of plant health can be distinguished into four different ways: a) general monitoring, b) import monitoring, c) export monitoring and d) area-wide monitoring. This paper provides information on the objectives, the legal background and on the practical realization of the different procedures.

EARLY WARNING SYSTEMS

The effectiveness of phytosanitary regulations highly depends on the continuous exclusion of harmful organisms or if an introduction already had occurred on the period between the introduction and the first notice of the presence of the organism. Therefore it is very

important for the work of the Plant Protection Services (PPS) to get information on potential risks of introduction of harmful organisms as early and as quick as possible. To achieve this objective EPPO is providing information on new threats or emerging problems with harmful organisms via the 'EPPO Reporting Service' and by compiling an 'Alert List'. The 'Reporting Service' presents a collection of new information on pests listed in the A1 and A2 lists or on other pests of potential phytosanitary concern. The information is taken from the scientific literature or from official notifications of the national plant protection organizations (NPPO) of the EPPO member countries. In contrast, the 'Alert List' compiles comprehensive data (incl. references to the relevant literature) on selected pests which could be candidates for the A1 or A2 lists but have not yet been subjected to pest risk analysis. The purpose of the 'Alert List' is to draw the attention of the official bodies to these organisms which already may be present in some areas in Europe or where there is an ongoing risk of introduction.

All interceptions of consignments imported into the EU irrespective of the reason for the interception (e.g. presence of harmful organisms, documentary problems) are notified by the Member States to the European Commission, are included into the EUROPHYT database and via this system are distributed to the other Member States. Thus, inspectors in the different Member States can get current notice on problems with consignments from certain origins which have been encountered at any point of entry all over the Community. This alert system enables the responsible bodies to adjust their control procedures immediately to potential new risks of introducing harmful organisms with traded goods.

GENERAL MONITORING

The general monitoring contributes to the overall surveillance of invasive species harmful to plants. As it gives early alert on the occurrence of those organisms it constitutes an important basis for taking measures against their introduction and/or spread. The information gathered in the framework of the general monitoring is an integral part of coping with the requirements set out under the International Plant Protection Convention (IPPC) and the related International Standards for Phytosanitary Measures (ISPM) in respect of pest reporting (ISPM 17) and determination of the status of a certain pest in an area (ISPM 8). In this context it also provides information which is essential for export certification.

Usually, the main objective of general monitoring is not to discover a certain harmful organism in an area but it is largely unspecific to cover the whole range of potential plant pests. In fact, the main focus is on the occurrence of harmful organisms on cultivated crops but it also allows for natural habitats as well as for public and private green. A broad range of different sources of information is used including data which are directly available at the PPS and those which can be obtained from scientific publications, the internet, communities of interest or from personnel contacts.

According to the German Plant Protection Law the surveillance of organisms harmful to plants is clearly attributed to the PPS of the Federal States. The Federal Biological Research Centre for Agriculture and Forestry (BBA) can assist the PPS in this respect.

IMPORT MONITORING

General import monitoring

According to Council Directive 2000/29/EC all imported consignments of plants and plant products requiring a Phytosanitary Certificate (PC) have to be inspected by the PPS in order to prevent the introduction of harmful organisms with the imported commodities. At the point of entry into the EU or at the place of destination each individual consignment will be subjected to a documentary check (PC), an identity control and a physical inspection for the presence of harmful organisms. To promote a harmonized execution of the controls in the Member States (especially of the physical controls) an inspection guideline (EC-Vademecum) has been established which contains both a description of the general procedure of import inspections (incl. sample size) and special information for different kinds of commodities (plants for planting, plants of *Solanaceae*, fruits, forestry products).

Consignments which do not meet the import requirements, especially in case of presence of harmful organisms are intercepted and appropriate measures are imposed (rejection, destruction, treatment). Each interception is notified via the EUROPHYT system to the other Member States in order to give alert on possible problems with consignments of a certain origin.

Specific import monitoring

In situations where a particular risk of introduction of harmful organisms is associated with certain types of commodities or with certain countries of origin, it may be appropriate to carry out a specific import monitoring focussed on these risk commodities. Usually this is done in connection with an Emergency Decision of the Commission. Such a targeted import monitoring has been carried out in the EU since 1999 in the context of two Decisions concerning the import of packaging material made from hardwood or coniferous wood (Decisions 1999/516/EC and 2001/219/EC) and which is actually 'in use'. These Decisions have been revoked in the meantime since with effect of 1st March 2005 new provisions on packaging wood have been incorporated into Directive 2000/29/EC implementing ISPM 15 ('Guidelines for regulating wood packaging material in international trade').

In the course of globalization and the growing worldwide trade the use of wood for packaging purposes (e.g. pallets, crates, boxes, drums) or in the form of dunnage increases continuously. It can be assumed that there is some packaging wood in nearly every container and it is also evident that for economical reasons low-grade and untreated wood is frequently used. Since about 97% of organisms harmful to trees which are of plant health concern like wood-inhabiting insects (e.g. *Anoplophora glabripennis*), wood nematodes (e.g. *Bursaphelenchus xylophilus*) or pathogenic fungi (e.g. *Ophiostoma novo-ulmi*) are associated with packaging wood the risk for the introduction of those pests is obvious.

Until recently packaging wood actually in use for packing and supporting commodities was practically not subjected to phytosanitary controls as there neither was an obligation for a PC nor for a declaration in the import documents. After an increasing number of findings of Asian Longhorned Beetle and pinewood nematodes in packaging material made from hard and soft wood, respectively, the Commission enacted two Emergency Decisions against the

introduction of *A. glabripennis* from China (Decision 1999/516/EC) and *B. xylophilus* from Canada, China, Japan and the USA (Decision 2001/219/EC). The compliance of the packaging wood with the requirements of the Decisions had to be checked by the responsible bodies of the Member States and a report on the monitoring results had to be submitted to the Commission. According to Decision 2001/219/EC a specific monitoring plan was asked from the Member States. During the planning and practical realization of the controls the PPS were faced with considerable difficulties:

- a trigger for phytosanitary controls of packaging wood is lacking (no PC and no declaration in the customs documents),
- container controls in ports are almost impossible for reason of time and costs,
- controls at the place of destination are complicated by the manifold ways of further shipment,
- after customs clearance of the commodity the legal power of the PPS to carry out controls is largely restricted.

In Germany the monitoring plan comprised different possibilities to achieve a reasonable number of controls. The most effective way is to realize the controls at the points of entry, usually a port or an airport. A broad variety of commodities of different origins can be examined e.g. in customs warehouses, in the free port or in the course of regular customs controls when containers are unpacked. Another possibility, particularly suitable for containerized commodities, are controls at the place of destination where the containers were moved to according to the relevant customs transit procedure. Since the control of the whole range of commodities from all countries is not feasible the monitoring has to be focused on high risk material which usually is made from low-grade wood (e.g. stone products from China). In both customs related kinds of monitoring mentioned above an intensive cooperation between the relevant customs and plant health authorities is essential. Packaging wood associated to commodities which are already cleared by customs can be inspected at the place of destination in the context of special arrangements between the PPS and the consignee. This procedure is mainly used with big import companies.

The import monitoring on packaging wood on the one hand showed that the requirements for treatment and marking of the wood were more and more complied with by the Third Countries concerned. On the other hand also in recent times there were many findings of living pinewood nematodes and of larvae and adults of *Anoplophora* sp. in packaging material of coniferous and hard wood, respectively. Thus, the intensified monitoring activities unequivocally underlined the risk for introductions of dangerous invasive species associated with packaging wood. It can be expected that this situation will be continuously improved in the future when the relevant International Standard (ISPM 15) will be implemented in more and more countries.

EXPORT MONITORING

Imports from Third Countries into the EU require a PC. This applies for plants and plant products to be exported into Third Countries, too. The issue of a PC by the responsible PPS is based on phytosanitary inspections which have been carried out on the consignment prior to export. With the issue of a PC it is certified that the consignment a) has been inspected in an appropriate way, b) has been found free from quarantine organisms and practically free

from other harmful organisms, and c) therefore meets the phytosanitary requirements of the importing country. Apart from the formal aspects of export certification valuable information on the possible occurrence of invasive species in the own country can be obtained from the respective inspections.

AREA-WIDE MONITORING

In the EU Community-wide monitoring programs are carried out either in a permanent, annually repeated way or on a temporary basis in the framework of emergency measures. In each case the objective is to elucidate the dissemination of certain harmful organisms within the Community and as far as possible to gain information suitable for risk assessment. The monitoring results are an important element to assess existing plant health regulations and those which are to be newly enacted. Usually the realization of the monitoring is under the responsibility of the Member States. In certain cases guidelines may be elaborated by the Commission in cooperation with experts from the Member States. The results of the area-wide monitorings have to be reported to the Commission at fixed dates.

Permanent area-wide monitoring

In the framework of the Control Directives 93/85/EC (*Clavibacter michiganensis* ssp. *sepedonicus*) and 98/57/EC (*Ralstonia solanacearum*) all Member States are obliged to carry out a targeted monitoring on the occurrence of both bacteria in the national potato production every year. To meet these requirements about 17 000 samples per year are taken in Germany from the seed and ware potato production and are subjected to laboratory testing for each of the bacteria. For reporting of the monitoring results a largely formalized procedure is established and the results are evaluated in the Standing Committee on Plant Health.

The whole territory of some Member States or only parts of it are recognized as a 'Protected Zone' for certain harmful organisms which do not occur in these areas. As the ongoing pest freedom has to be substantiated these countries are obliged to monitor the respective areas continuously and report to the Commission on an annual basis.

Specific area-wide monitoring related to emergency measures

Specific monitoring programs, in most cases on a temporary basis, are carried out in the context of emergency measures which are directed against the introduction and/or further spread of certain already regulated or newly introduced, not yet regulated harmful organisms. Especially in the latter case these Community-wide surveys are an essential element for the risk assessment. Currently Community-wide monitoring programs are conducted on the following harmful organisms:

- *B. xylophilus* (Decision 2000/58/EC and subsequent Decisions); sampling of coniferous stands in the Member States
- *Pepino mosaic virus* (Decision 2000/325/EC and subsequent Decisions); inspection and sampling of tomato seed, tomato young plants and tomato crops for fruit production
- *Phytophthora ramorum* (Decision 2002/757/EC); inspection and sampling of *Rhododendron*, *Viburnum* and other susceptible plants in nurseries, public green, private gardens and forests

- *Diabrotica virgifera virgifera* (Decision 2003/766/EC); trapping in maize fields.

In the following *B. xylophilus* will be taken as an example to describe some details on the realization and the results of such an area-wide monitoring.

Since the first detection of the pinewood nematode in summer 1999 in Portugal south of Lisbon in an area of about 258 000 ha the Portuguese authorities are running an eradication program. Additional measures to prevent further spread of *B. xylophilus* within Portugal and to other areas of the Community have been adopted with Commission Decision 2000/58/EC. This and the subsequent Decisions include an obligation for all Member States to carry out a survey in coniferous stands on their national territory with the aim to clarify whether there might be other infested areas within the EU. The Commission, together with experts from some Member States prepared a guideline (EC Survey Protocol) in order to achieve as much as possible of harmonization of this monitoring in the various countries. 2004 was the fifth year of monitoring.

In Germany the BBA, Department on Plant Health, is coordinating the monitoring, compiling the annual report to the Commission and doing reference testing, if necessary. Sampling of the trees which is usually done in close cooperation with the forestry services, and laboratory testing are the task of the PPS. Especially in the first years the surveys have been intensively prepared during various technical meetings with representatives from BBA and the plant protection and forestry authorities of the Federal States.

During the five years of Community-wide monitoring (2000 to 2004) nearly 22 000 samples from conifers have been taken by the Member States and were analyzed for the presence of the pinewood nematode (2000 = 6373 samples; 2001 = 4918 samples; 2002 = 3086 samples; 2003 = 3171 samples; 2004 = 4418 samples). To date there were no findings of pinewood nematode outside the infested area in Portugal. Nevertheless, a considerable number of other *Bursaphelenchus* species has been identified. This underlines the usefulness of such area-wide monitoring programs to provide supplementary information on the occurrence of other harmful organisms which the actual monitoring is not aimed at.

CONCLUDING REMARKS

On the background of the expanding worldwide trade and also because of the growing tourism, the introduction of invasive alien species harmful to plants and plant products is becoming an increasing serious problem. To meet these challenges the regulatory framework of the Plant Health sector in Europe provides for a comprehensive surveillance system for invasive species which is carried out at different levels and clearly attributed to the responsible PPS of the respective countries. As a consequence of newly identified phytosanitary risks and the recent introduction of a variety of harmful organisms into the EU there is an increasing need to carry out Community-wide monitoring programs in order to check the compliance with new provisions and/or to investigate the actual distribution of certain invasive species. This leads to further considerable charges for the responsible official bodies which at the same time are subjected to more and more restrictions in their personal and financial capacities.