Activities of the International Plant Protection Convention in regard to invasive alien species

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ABSTRACT

The International Plant Protection Convention (IPPC) is a multilateral treaty, with the aim to prevent the introduction and spread of plant pests. National plant protection services and the governing body of the IPPC, the Interim Commission on Phytosanitary Measures (ICPM), recognized that one of the aims of the Convention on Biological Diversity (CBD), to prevent the introduction of alien species, corresponds in large measure to the objective of the IPPC. In order to clarify its role with regard to invasive alien species, the ICPM has actively pursued a work programme for invasive alien species that are plant pests. In 2001, it determined that such species should be considered quarantine pests, and should be subjected to measures according to IPPC provisions. The ICPM also decided that IPPC standards should be reviewed, to ensure that they adequately address environmental risks of plant pests. The ICPM adopted supplements to two of the international standards for phytosanitary measures (namely 'Glossary of phytosanitary terms' and 'Pest risk analysis for quarantine pests'). These supplements elaborated on environmental considerations. To avoid conflicting developments within the IPPC and the CBD, regarding invasive alien species and plant pests, the secretariats of the two conventions have signed a Memorandum of Cooperation. Further contacts to strengthen the cooperation between the governing bodies of the IPPC and the CBD are currently undertaken. There is a need for closer cooperation between environmental and phytosanitary authorities on a national and international level as well as the need for technical assistance to developing and least developed countries in regard to invasive alien species.

INTRODUCTION

The Convention on Biological Diversity (CBD) is an international convention which aims at conserving biological diversity, world-wide. It contains provisions in article 8(h), which requires contracting parties to prevent the introduction, control or eradication of those alien species which threaten ecosystems, habitats or species. Since its adoption in 1992, the governing body of the CBD, the Conference of Parties, has continued to elaborate on advice on article 8(h), and adopted guiding principles for the prevention, introduction and mitigation of impacts of alien species (CBD, 2002), which aim to assist all governments and organizations in developing effective strategies to minimize the spread and impact of invasive alien species.

The IPPC is a multilateral treaty, that was deposited with the Food and Agriculture Organization of the United Nations (FAO) in 1951, and was subsequently amended in 1979 and 1997 (FAO, 1997). The purpose of the IPPC is to promote international cooperation in controlling pests of plants and plant products and in preventing their international spread and their introduction into endangered areas. The IPPC is recognized under the 'Agreement on the Application of Sanitary and Phytosanitary Measures' (SPS) of the World Trade Organiztion (WTO) as a standard setting organization, which means that its international standards on phytosanitary measures (ISPM) are regarded as a benchmark in the multilateral trade system established by the WTO (WTO, 1994).

This paper addresses the activities of the IPPC in regard to invasive alien species and the cooperation between the IPPC and the CBD. It also discusses how the CBD, the IPPC and national governments may proceed in furthering the implementation of both conventions.

RELEVANCE OF THE IPPC FOR INVASIVE ALIEN SPECIES

The relevance of the IPPC in regard to alien invasive species derives from a comparison of the definitions used for 'invasive alien species' in the CBD and that of 'quarantine pests' in the IPPC. The CBD definition of an invasive alien species and the IPPC definition of a quarantine pest are comparable, and cover to a large extent the same threats. Both definitions cover any organism that is injurious to plants and that has an environmental impact (threatens biological diversity). Both definitions prescribe in different words that the environmental impact results from the organism's introduction and/or spread. It can be argued that most quarantine pests are invasive alien species and that those invasive alien species which are directly or indirectly injurious to plants are quarantine pests.

Considering that the protection of ecosystems, habitats or species by preventing the introduction of invasive alien species is related to the aim of the IPPC, to prevent the international spread and introduction of plant pests into endangered areas, one must conclude that in relation to invasive alien species the CBD and the IPPC have overlapping mandates. This draws also other international organizations into the picture (see Figure 1).

Perhaps the most important is the SPS Agreement, which lays down trade-related rules concerning sanitary and phytosanitary measures. This leads to the situation where trade-related rules for those plant pests which are also invasive alien species have to comply also with the SPS Agreement. In such instances, countries that establish phytosanitary import requirements would have to comply not only with IPPC and CBD provisions but also with the basic rules of the SPS Agreement. Additionally, regional plant protection organizations (RPPOs) functioning under Article IX of the IPPC may also be drawn into the international framework dealing with invasive alien species that are plant pests. Consequently, RPPOs may be active in relation to invasive alien species. For example, the European and Mediterranean Plant Protection Organization (EPPO) has initiated an extensive work programme in this area (see www.eppo.org).

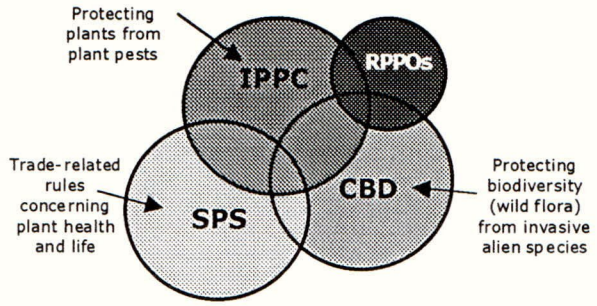

Figure 1. Overlapping mandates of international organizations (Lopian, 2005). (See text for definitions of CBD, IPPC, RPPOs and SPS.)

THE ACTIVITIES OF THE IPPC IN RELATION TO INVASIVE ALIEN SPECIES

At its second meeting in 1999 (ICPM 2), the ICPM concluded that the concept of invasive alien species had considerable implications for the IPPC, and that coordination between government authorities at a national and international level was necessary to avoid conflicting views in different fora (FAO, 1999). An informal open-ended working group was established to consider issues regarding GMOs, biosafety and invasive alien species. This group met in 2000 and, based on its recommendations, ICPM 3 decided in 2001 that:

- Species that may be invasive and that directly or indirectly affect plants or plant products should be assessed, monitored and managed, if necessary, according to IPPC provisions.
- Invasive alien species that are plant pests and that are absent from an area (or if present, are of limited distribution and under official control) should be considered quarantine pests and should be subjected to measures according to IPPC provisions.
- Implementation of the IPPC is directly relevant to implementation of Article 8(h) of the CBD.
- Many provisions and standards of the IPPC are directly relevant to, or overlap with, the (then interim) guiding principles of the CBD.
- Standards should be reviewed to ensure that they adequately address environmental risks of plant pests.
- A supplement to ISPM 11: 'Pest risk analysis for quarantine pests' should be developed to address in detail the environmental risks of plant pests (FAO, 2001).

The work on the development of a supplement to ISPM No.11 ('Pest risk analysis for quarantine pests') commenced almost immediately and, in 2003, ICPM 5 adopted this supplement (FAO, 2003). This supplement to ISPM No.11 is a technical standard intended to provide details regarding the analysis of risks of plant pests to the environment and biological diversity, including those risks affecting uncultivated/unmanaged plants, wild flora, habitats and ecosystems contained in the pest risk analysis (PRA) area.

In 2003, ICPM 5 also adopted a supplement to ISPM No.5: 'Glossary of phytosanitary terms'. Supplement no. 2: 'Guidelines on the understanding of potential economic importance and related terms including reference to environmental considerations' (FAO, 2003). The IPPC has been, at times, misinterpreted as referring to the protection only of cultivated plants. This misinterpretation may have arisen partly because the definition of a quarantine pest provides that only those pests which potentially cause economic damage may qualify as quarantine pests. The adopted guideline on the understanding of the term 'potential economic importance' clarifies that the IPPC can account for environmental concerns in economic terms using monetary or non-monetary values and that market impacts are not the sole indicator of pest consequences. The clarification offered by the 2003 supplement to ISPM 5 assures that the scope of the IPPC covers the protection of cultivated plants in agriculture (including horticulture or forestry), uncultivated and unmanaged plants, wild flora, habitats and ecosystems.

Work on another ISPM commenced at a slower pace. The revision of ISPM No.3 ('Code of conduct for the import and release of exotic biological control agents') was necessary, in order to bring the standard up-to-date but also to include clarification and emphasis as regards invasive species and other impacts on the environment. ISPM No.3 describes responsibilities of authorities of governments, importers and exporters for the import and release of biological control agents. It provides guidance on the application of phytosanitary measures for regulating the export, shipment, import and release of organisms used as biological control agents for plants and plant pests. It lists the responsibilities of governments, and the responsibilities of the exporters and importers of biological control agents. ISPM No.3 is particularly relevant to the guiding principle 10 ('Intentional Introduction') of the CBD (Lopian, 2005). It is expected that the revised ISPM No.3 will be adopted at ICPM 7 in April 2005.

Besides the technical work of the IPPC to account in standards for special and detailed environmental concerns the cooperation between the IPPC and the CBD was intensified. Based on a decision by ICPM 3 (FAO, 2001), the IPPC Secretariat sought observer status for the IPPC with the CBD, attended relevant meetings of the CBD and invited the CBD to attend relevant IPPC meetings. In addition, a Memorandum of Cooperation was signed between FAO and the Secretariat of the CBD on cooperation between the secretariats of the IPPC and the CBD, which aims to promote synergy, to avoid overlaps and unnecessary duplication as well as to ensure effective cooperation in joint activities. Furthermore, ICPM 6 decided (FAO, 2004) that the cooperation between the governing bodies of the CBD and the IPPC may be intensified, and invited the ICPM Bureau to explore possibilities for such closer cooperation. This activity is ongoing.

DISCUSSION

Cooperation between national and international bodies

For almost 100 years, phytosanitary authorities world-wide have carried out the important task of preventing the introduction of quarantine pests. An efficient infrastructure (such as border controls, national surveillance programmes, technical and scientific institutions, as well as export-oriented certification programmes) has been established, to achieve the tasks

of phytosanitary authorities. The long experience of phytosanitary authorities in the assessment and management of biological risks related to the introduction of organisms provides these authorities with the knowledge of how to deal with risks posed by plant pests and invasive alien species that are plant pests.

On a national level, this existing infrastructure and know-how should be utilized by environmental authorities in their efforts to implement the guiding principles of the CBD. Such utilization would have considerable advantages for governments since existing structures and know-how would be used without significant new investments and a duplication of activities would be prevented.

The argument for close national cooperation between environmental and phytosanitary authorities also holds true on an international level. To avoid duplication of activities, contradictory approaches and a confusion of competences, the IPPC and the CBD should work closely together in relation to invasive alien species. Such a close cooperation need not be limited to the secretarial levels of both conventions, but may also include joint activities of the relevant governing bodies. This could be achieved either through a declaration by the CBD that the IPPC is the competent organization for the development of technical standards on invasive alien species that are plants or pests of plants or through the establishment of a formal inter-organizational working group developing recommendations for invasive alien species.

Closer cooperation between international organizations depends on the efforts of national governments, because it is ultimately their responsibility to determine the policy of the international organizations to which they belong. CBD matters are administered in many countries by environmental authorities and IPPC-related activities by agricultural authorities. Hence, communication between these authorities in relation to invasive alien species is important. If governments are to address matters related to invasive alien species and plant pests in the CBD and the IPPC in a consistent way, it would be advisable for national coordination strategies to be developed.

The need for assistance

The success of the CBD and the IPPC in protecting plants and the environment is very much dependent on the implementation of their provisions by national governments. The prevention of the spread of invasive alien species and plant pests is primarily an international approach, in which countries must cooperate to prevent the natural or man-facilitated spread of such organisms. For many developing countries, and especially for least-developed countries, however, the protection of the environment may not be located high on their list of national priorities. These countries may need to use their scarce resources to establish basic economic conditions taken for granted in the developed world. Thus, the provision of technical assistance for developing countries should be seen as one of the priorities for the CBD and the IPPC to further the implementation of their provisions. A close cooperation between the CBD and the IPPC on technical assistance activities in relation to invasive alien species and plant pests would maximize the use of resources provided for this purpose and utilize FAO's experience in providing technical assistance.

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Soil and biowaste as potential pathways for invasive alien species, and regulatory approaches to minimize the risks

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ABSTRACT

Soil, growing medium and biowaste of plant origin may be a pathway for the introduction and spread of harmful organisms of plants like nematodes, soil-borne pathogens and invasive alien plants. In the European Union (EU) biowaste of plant origin is more and more collected separately from other waste and after a biological treatment (composting and anaerobic digestion) used as organic fertilizer in agriculture and horticulture.

An analysis of the EU Plant Health Directive 2000/29/EC revealed that import prohibitions and specified import requirements for soil and growing medium with their origins in Third Countries (non-EU countries) seem to be effective tools against invasive alien species as well as quarantine pests. In contrast, the spread of harmful species already established in parts of the EU is not prevented on the basis of the present rules. However, in so far as invasive alien species harmful to plants are concerned, the EU plant health regulations provide the basis for future action.

An appropriate measure for minimizing the risks of biowaste would be a sanitization treatment. Harmonized legislation does not exist. Since national regulations on waste as far as they exist differ between the countries a harmonized approach is recommended.

INTRODUCTION

In the early 1960s the New Zealand flatworm (*Arthurdendyus triangulatus*), an earthworm predator, was introduced to the British Isles, where it is now widespread. The flatworm and its eggs can be found on the soil surface under loose clumps of soil and also inside plant pots of container-grown plants. There are many other species, e.g. nematodes, soil-inhabiting microorganisms and also plants hidden in the soil in form of reproductive parts such as rhizomes, bulbs, tubers or seeds that may be spread around the world with soil as the vector.

In Northern Germany in 1997 (Kowarik, 2003) establishments of alien knotweeds (*Fallopia* spp.) (*F. japonica*, *F. sachalinensis* and *F.* × *bohemica*) were in 17%, and giant hogweed (*Heracleum mantegazzianum*) were in 13%, of 106 cases due to the disposal of garden waste in natural or semi-natural environments. Biowaste bears similar risks as soil and it must be recognized that the volume of biowaste is growing in the European Union (EU). Because of environmental concerns the EU Member States are requested to reduce the disposal of biodegradable municipal waste in landfill sites between 1995 and 2016 stepwise down to

35% (by weight) (Landfill Directive, 1999). As a consequence, 17 million tonnes of biowaste are currently collected separated from other waste in the EU-Member States per year (Germany 7 million tonnes). It is estimated that this is only 35% of the total recoverable potential of 49 million tonnes of separately collected biowaste (Barth, 2005). The biowaste is decomposed by composting and anaerobic digestion. Owing to its nutritional nature the decomposed biowaste is used as soil improvement or organic fertilizer. From 1999 to 2001, 25% of German compost production was marketed to landscaping/landfill and restoration companies, 43% to farmers and growers of special cultures and 5% to horticulture (Barth, 2005).

Biowaste can originate from households, the industry, wholesale markets, nurseries, parks and gardens and other sources and the raw material can be from local production as well as imports from Europe and other continents. It can be assumed that a certain amount of this organic waste is infested with plant pests, able to re-infest a host crop or contains invasive alien species that endanger the biological diversity in natural environments.

Countries should consider the potential pathways and establish regulations to ensure that invasive alien species are not introduced and spread. In the following the existing regulations in the EU for soil and biowaste are analysed and evaluated in respect of their effectiveness to prevent the introduction into and the movement of alien invasive species within the European Community (EC).

PHYTOSANITARY MEASURES OF THE EU REGARDING SOIL AND GROWING MEDIUM

The Plant Health Directive 2000/29/EC (Plant Health Directive, 2000) is the harmonised basis for phytosanitary measures in the EU. Based on the International Plant Protection Convention it may also provide measures against invasive alien species in so far as the biological diversity of plants, their habitats or ecosystem is endangered. In respect of soil the Directive 2000/29/EC refers to "soil and growing medium as such", to "soil and growing medium attached to or associated with plants" and to soil particles attached to agricultural machinery. Growing medium is defined as: consisting in whole or in part of soil or solid organic substances such as parts of plants, humus including peat or bark, other than that composed entirely of peat.

Apart from few exceptions ,soil and growing medium as such originating in Third Countries (non-EU countries) is prohibited for import into and movement within the EU. Only a few countries are allowed to import these commodities with a phytosanitary certificate. The import of plants in growing medium is possible for all countries in the world if specified requirements are met that ensure freedom from harmful organisms (Tables 1 and 2).

Within the EU there are no special conditions for the movement of soil and growing medium as such, and only few for specified plants in growing medium but the horizontal requirements of Annex I A II of Directive 2000/29/EC have to be respected. Annex I A II specifies harmful organisms that are known to occur in the Community. The spread of these organisms is prohibited irrespective whether they are found on plants or contaminated soil or growing medium.

Table 1. Requirements of Directive 2000/29/EC on the import and movement of soil and growing medium originating in Third Countries.

Soil and growing medium as such	
Import prohibited from:	Import with phytosanitary certificate from:
▪ Third Countries not belonging to continental Europe, other than Egypt, Israel, Libya, Morocco, Tunisia	▪ Third Countries in continental Europe, other than Turkey, Belarus, Georgia, Moldova, Russia, Ukraine
▪ Turkey, Belarus, Georgia, Moldova, Russia, Ukraine	▪ Egypt, Israel, Libya, Morocco, Tunisia
Soil and growing medium, attached to or associated with plants	
Import with phytosanitary certificate if specified requirements are met from:	No special requirements for import from:
▪ Non-European countries other than Egypt, Israel, Libya, Morocco, Tunisia	▪ European countries other than Turkey, Belarus, Georgia, Moldova, Russia, Ukraine
▪ and Turkey, Belarus, Georgia, Moldova, Russia, Ukraine	▪ Egypt, Israel, Libya, Morocco, Tunisia

Table 2. Additional requirements of Directive 2000/29/EC on the import and movement of specified plants in respect of attached or associated growing medium originating in Third Countries.

Type of plants concerned	Phytosanitary measures against
▪ Citrus, Fortunella, Poncirus and their hybrids, Araceae, Musaceae, Persea spp. and Strelitziaceae	Radopholus citrophilus, Radopholus similis (Nematodes)
▪ Bonsai originating in non-European countries	soil inhabiting pests and others

Pests can also be spread by soil attached to agricultural machinery. Therefore, it is stated that import or movement of used agricultural machinery to specified Protected Zones in the EU require cleaning of the machinery from soil and plant debris in order to prevent the introduction of beet necrotic yellow vein virus (Rhizomania of sugar beet).

PHYTOSANITARY MEASURES IN THE EU REGARDING BIOWASTE

Most of the requirements of the Directive 2000/29/EC were established on the assumption that mainly plants for planting can close infection cycles. It was not considered that improperly treated cut flower, potato, fruit, pot plant and other vegetable waste from diverse

origin might close infection cycles when utilized as compost or fermentation residues in landscaping, agriculture, horticulture or forestry.

The Directive 2000/29/EC provides only in the case of sugar beet (*Beta vulgaris*) requirements for the movement of non-sterilized waste to Protected Zones in respect of beet necrotic yellow vein virus. Regulations on the treatment of potato waste, ensuring freedom from bacterial diseases, are expected for the future.

SANITIZATION STANDARDS FOR BIOWASTE

The EU has recently established harmonized legislation on the treatment of waste from animals that guarantees effective sanitization. This legislation may cover also plant debris if it is mixed with waste of animal origin (for example biowaste from households), but detailed harmonized measures have not yet been approved. For pure waste of plant origin there are no harmonized EU regulations up to now, and it is still unclear if the Commission intends to require sanitization for it. In preparatory documents regarding a future EU Directive on the Treatment of Biodegradable Waste, the Commission raised the question whether such regulations for waste of plant origin would be necessary.

Some European countries have established national statutory standards for biowaste, including sanitization requirements (Austria, Belgium, Denmark, Germany, Italy, Luxemburg and the Netherlands) others such as Finland, France, Greece, Ireland, Portugal, Spain, Sweden and the UK have none or quality standards on a low level with insufficient sanitization requirements or only voluntary standards (Hogg *et al.*, 2002).

Existing standards require composting, anaerobic digestion and pre- or post heating under specified conditions and they may be effective against many pests but it was shown that some 'pests' (such as *Macrophomina phaseolina*, *Fusarium oxysporum* f. sp. *lycopersici* and *Plasmodiophora brassicae*) are considerably resistant (Noble & Roberts, 2004). Therefore, a high level of effectiveness and reliability of the sanitization treatments is necessary to reach a sufficient inactivation.

In Germany, the Ordinance on Biowaste (1998) is the statutory standard (Table 3). The regulations for composting require that the test organisms are reduced considerably during the direct process validation to a defined contamination threshold. Until now it has not been determined if the level of reduction would also be sufficient for resistant quarantine organisms such as potato wart (*Synchytrium endobioticum*).

In the case of anaerobic digestion it was found that tobacco mosaic virus can not be inactivated sufficiently by the rules in Table 3 (Marciniszyn *et al.*, 2004) and the Biowaste Ordinance has to be amended. This shows that the knowledge about the behaviour of harmful organisms in anaerobic fermentation facilities is poor and needs further investigation.

Furthermore, it must be stated that the German Ordinance on Biowaste provides exemptions from sanitization for park and garden waste, although 'pests' such as *Phytophthora ramorum* could easily be spread by untreated waste. This regulatory gap can be explained by the fact

that phytosanitary aspects were not sufficiently taken into account in contrast to other environmental needs.

Table 3. Requirements on the Treatment of Biowaste by composting and anaerobic digestion regarding plant health aspects according to the German Ordinance on Biowaste.

Requirements	Composting	Anaerobic digestion
Requirements to process management	2 weeks 55°C or 1 week 65°C or 1 week 60°C (indoor) and - pH-value c. 7 - at least 40%water content - high level of biological activity - optimum air conduction	24 h, 55°C and a hydraulic dwell time of 20 days or pre -treatment 70°C, 1 h or post-treatment 70°C, 1h or composting of the fermentation residues
Direct process validation	Evaluation of the reduction of samples of - tobacco mosaic virus - *Plasmodiophora brassicae* - tomato seeds during composting (anaerobic digestion)	
Monitoring of the treatment process	Records of - temperature - re-stacking times (composting) - feeding intervals (anaerobic treatment)	
Product analysis	Not more than 2 viable seeds or reproductive parts of plants in 1 litre of test substrate	

On an international level, EPPO started in 2002 to work on a phytosanitary procedure 'Standard on the management of plant health risks associated with the use of biowaste of plant origin'. The draft standard was established by the EPPO *ad hoc* Panel on Phytosanitary Risks of Composted Organic Waste, on the basis of the German Ordinance on Biowaste. However, in contrast with the German Regulations, a complete inactivation of the test organisms is required and there are no exemptions for any kind of plant material.

When the draft standard will be approved it should be the basis for the establishment of sanitization regulations in countries presently lacking such regulations, and it could also provide guidance for the expected EU Directive on the Treatment of Biodegradable Waste in respect of the minimum conditions regarding plant health.

CONCLUSIONS

The above-mentioned examples support the expectation that soil, biowaste and growing medium bear a probable risk of introduction and spread of invasive alien species. The identified risk must be managed with appropriate measures.
The harmonized EU regulations in Directive 2000/29/EC already provide appropriate protection in respect of soil and growing medium originating in Third Countries, but the

spread of species already established in parts of the EC is not prevented on the basis of the present rules. In so far as invasive alien species harmful to plants are concerned the directive could be amended according to the needs. Annex I A II would provide a broad basis for future action in cases where a general treatment of soil and growing medium is not required.

The appropriate measure for biowaste intended for utilization in landscaping, agriculture, horticulture and forestry is a sanitization treatment. Regarding the effectiveness of currently used treatments, more scientific work is necessary to identify reliable conditions ensuring a sufficient reduction of invasive alien species, including quarantine pests.

The legislation should be harmonized, to ensure the same level of protection in the whole EU. This is important because there are no restrictions for the movement of biowaste and compost in the EC and national standards currently result in different sanitization levels. Therefore, it is recommended to cover also pure waste of plant origin in a future EC Directive on Biodegradable Waste and to provide harmonized sanitization conditions in order to manage the risks regarding invasive alien species and other pests associated with biowaste.

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EPPO work on invasive alien species

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INTRODUCTION

The European and Mediterranean Plant Protection Organization (EPPO) is an intergovernmental organization responsible for cooperation in plant protection in the European and Mediterranean regions. Under the International Plant Protection Convention (IPPC), EPPO is the regional plant protection organization (RPPO) for Europe. It was created in 1951 and has now 46 member countries, including all the member states of the European Union and other future probable EU members, Russia and some other countries of the Commonwealth of Independent States, as well as certain other Mediterranean countries (in North Africa and Near East). Since its creation, EPPO has worked on preventing the introduction of dangerous pests from other parts of the world, and limiting their spread within Europe if they were introduced. These invasive alien species are listed in two lists of pests recommended for regulation as quarantine pests. EPPO members are encouraged to manage them nationally while supporting a harmonized regional approach.

EPPO works with the national plant protection organizations of its members, i.e. the authorities responsible for all regulatory aspects of plant protection, and particularly for plant quarantine (whether applied to import at national borders or as official control within the country). The EPPO Secretariat in Paris manages a programme of international work, which produces regional standards recommended to the members. These standards are drafted by panels of experts from the member countries, and coordinated by the Working Party on Phytosanitary Regulations. Over 400 standards for phytosanitary measures have been developed so far, that include general background measures against alien pests as well as specific measures for individual pests. They form part of different sets such as pest-specific phytosanitary measures, phytosanitary procedures, certification schemes, PRA schemes and diagnostic protocols. An important EPPO standard is PM 1/2 A1 and A2 lists of pest recommended for regulation as quarantine pests. 'A1 pests' are those that are recognized not to be present in any part of the EPPO region, but which present a risk to most or all parts of the region, whereas 'A2 pests' are those with a limited distribution in the EPPO region, but which present a risk of further spread.

Traditionally, EPPO has given priority to pests of cultivated plants, i.e. insects, nematodes, fungi, bacteria, viruses, but has also been concerned with weeds, which harm crops by their competition. In 2002, the EPPO Council resolved that invasive alien species affecting plants are quarantine pests. Quarantine pests may include pests of agriculture, of forests and of wild flora, indirect pests of plants, and plants themselves. Wild plants are also threatened by the introduction and spread of pests, and notably by 'invasive alien plants' which can seriously disturb and destroy natural plant communities.

CURRENT WORK PROGRAMME ON INVASIVE ALIEN SPECIES

The EPPO Panel on Pest Risk Analyses is currently revising and extending the Pest Risk Assessment Scheme and Pest Risk Management Scheme (respectively, EPPO Standards PM 5/3 and PM 5/4) to ensure that they are applicable to invasive alien plants. The EPPO Secretariat has started to publish news, monthly, about invasive alien plants in the Reporting Service.

The *ad hoc* EPPO Panel on Invasive Alien Species was created in 2002 with the following terms of reference:

- terminology and definitions;
- collection of data on invasive alien species in the EPPO region, particularly invasive alien plants;
- collection of information on official control measures existing in the EPPO region for invasive alien plants;
- pilot studies on pest risk assessment and pest risk management of specific invasive alien species;
- pilot studies on possible recommendations to EPPO members on the suppression and containment of invasive alien plants;
- development of a common approach to weeds as quarantine pests or regulated non-quarantine pests, in relation to invasive alien plants as appropriate;
- EPPO information services on invasive alien species.

The Panel meets twice a year and its members come from 10 European countries: Belarus, Denmark, Germany, Hungary, Latvia, Lithuania, Netherlands, Norway, Switzerland, UK. The Panel and the EPPO Secretariat cooperates with other bodies such as the Secretariat of the Bern Convention, the IPPC Secretariat, CAB International, national environmental agencies, etc.

So far, the Panel has identified and partly documented over 1,000 alien plant species of concern as a result of a Europe-wide consultation. Of these, 45 have been selected for further study (including 15 aquatic weeds) because they have obvious importance for many European countries. The selected species are being fully documented, with the help of expertise from the member countries. Those presenting a particular immediate danger have been placed on the EPPO Alert List (see the EPPO website: www.eppo.org). The Panel is developing the EPPO List of invasive alien plants. This list aims to make member countries aware of the threat to biodiversity or other economic or social impacts that are linked to some plant species. For these plants, EPPO will recommend a set of general measures to prevent their further introduction and spread (for example: publicity, restriction on sale and planting, control). The list will be available through the website and will be regularly updated. The Panel will work further on some important individual cases and perform risk analyses in order to define specific management options against these particular species. Measures are being evaluated in two contexts: prevention of introduction from other continents and management of species already introduced. Work is concentrating on alien plants which are intentionally introduced as ornamentals, since they present great problems if they prove to be invasive.

The EU phytosanitary system and invasive alien species

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ABSTRACT

The phytosanitary provisions and systems of the European Union (EU) and its member states have been fully harmonized since 1993. They are in place to minimize the introduction of alien organisms that are harmful to plants and plant products and to limit their spread within the community. Their scope equates the scope of the International Plant Protection Convention. The measures applied to imports and the internal movement of plants and plant products are based on directive 2000/29/EC of the Council of the European Union. Provisions include the prohibition or restriction of the import or internal movement of certain harmful organisms (quarantine pests) or of plants, plant products or other articles that may be pathways for these organisms. The systems include the National Plant Protection Organizations of the member states, which are the main part of the official services of each state responsible for the implementation of the provisions. The provisions and required procedures for their implementation are developed and decided in different working groups and committees at the EU level. Furthermore, this framework includes an EU-wide early warning and pest reporting system and some specific obligations to limit the spread or to eradicate certain organisms that are not yet widespread in the community and harmful to plants and plant products. Thus the EU phytosanitary system provides an excellent framework for the implementation of measures against invasive alien species that are harmful to plants, plant communities and plants in any ecosystem. Such protection is already established in this framework in regard to direct plant pests like pathogenic fungi or harmful insects. The Guiding Principles on measures against invasive alien species (mitigation of impacts, eradication, containment and control) of the Convention on Biological Diversity are widely covered regarding the plant sector. However, the systems, including monitoring and research, need some adaptation concerning indirect plant pests in particular invasive plants and impacts on the uncultivated environment.

INTRODUCTION

The phytosanitary provisions and systems of the member states of the European Union (EU) can be seen as the co-ordinated implementation of the International Plant Protection Convention's provisions (IPPC, 1997) for risks associated with imports and also - in an transposed way- for the risks from in particular spread of harmful organisms within the community. They have been fully harmonized since 1993. Most of the measures have to be applied in the same way in all member states. They are decided in different groups of the Council of the EU and the European Commission, in particular by the Plant Health Standing Committee of the Commission, which is empowered to decide on the specific phytosanitary

measures and implementing provisions that are applicable in all member states. In phytosanitary terminology, quarantine pests are organisms harmful to plants or plant products that are either absent from an area (alien) or if present not widespread and under official control. According to the IPPC's Interim Commission on Phytosanitary Measures, they are considered as invasive alien species if they have an impact on biodiversity in the plant sector (FAO, 2001; see also Schrader, 2005). As quarantine pests are the core element of plant health regulations, the EU phytosanitary system can provide an excellent framework for the implementation of the measures against invasive alien species in this sector. This paper gives an overview of the main elements of the EU provisions and systems relevant for invasive alien species. Particular attention is paid in the 'Guiding principles on invasive alien species' (see: www.biodiv.org), as established under the Convention on Biological Diversity (CBD). Gaps and areas where intensified activity is required to ensure full implementation in this sector are identified and discussed at the end of each section.

BORDER CONTROL OF IMPORTS AND OTHER PATHWAYS FROM NON-EU COUNTRIES

All EU member states are obliged to prohibit the import and internal movement of specified quarantine organisms, which are listed in annexes I and II of Council Directive 2000/29/EC (Council of the European Union, 2000), and of other alien organisms potentially harmful to plants. Traditionally, the organisms targeted by these regulations are plant pests directly harmful to plants or plant products, such as pathogenic bacteria or harmful insects. As there is no commercial interest to their import, their unintentional introduction or spread is the main problem rather than their intentional introduction. Thus, the EU plant health provisions reflect primarily the scope of preventing and controlling unintentional introductions.

Measures against unintentional introduction

All main pathways for alien harmful organisms affecting plants are regulated and controlled by the EU phytosanitary system in order to minimize the probability of introduction of these organisms. These pathways are mainly plants (and plant parts), plant products (including wood), wooden packaging and soil. Imports of such items may be prohibited or they have to fulfill specific requirements and, at least, are subjected to inspection at the EU borders on entry. All plants intended for planting or further cultivation as well as certain specified products such as cut flowers, vegetables and fruits have to be accompanied by a plant health certificate that complies with the model of the IPPC. This certificate has to be issued by the National Plant Protection Organization (NPPO) of the exporting country in accordance with the EU import regulations and triggers the inspection procedure at import. An optional clause in this plant health certificate requiring the substantial freedom from all kind of pests provides a general safeguard against risks not yet identified. For many of the regulated articles in annex IV of this directive particular conditions are laid down to ensure that the articles are not contaminated by specific pests. Such conditions may be the requirement that the area of production be free from the quarantine organism or that the product be subjected to a specific treatment before export. Such requirements must be fulfilled on the exporting side under the control of the appropriate NPPO to ensure that the material is not infested and that no organisms are hitchhiking on the product or packaging into the importing country. Also, the regulations of annex IV include general safeguard requirements for trees, shrubs,

Gramineae (= Poaceae), annual and biennial plants other than Gramineae and, if not prohibited, for soil of certain origin. Various import prohibitions laid down in annex III of directive 2000/29/EC (e.g. those relating to soil and certain forest plants) offer a general safeguard in addition to addressing the specific risks for which they are designed. A special case are import regulations for wooden packaging, that are based on IPPC standard ISPM 15 (Guidelines for regulating wood packaging material in international trade). Under this regime, the import requirement (in particular, heat treatment) has to be applied to all kinds of wooden packaging that may be a pathway for pests. Thus they provide also a general safeguard against all kinds of invasive alien species that may be spread by this important pathway. The requirements include the need to mark the wooden packaging according to the IPPC standard, which allows the identification of the responsible official service and producers in the exporting country if needed, e.g. for clarification of cases of non-compliance. Although the NPPOs are finally responsible for the reliable application of these requirements, the private sector is much more involved than in normal phytosanitary certification.

Up to now, all consignments with regulated plants and plant products have not only to be checked on the documentary side but also to be inspected physically by the service of the NPPO. A so-called EU 'Vademecum' prepared by the European Commission provides detailed guidance on the inspection procedures for the most important categories of products. In cases of repeated non-compliance of imports of any kind of product of phytosanitary concern to the EU, the Plant Health Standing Committee may decide to take emergency measures. These may be in the form of a prohibition, a particular restriction or additional requirements for the products from the relevant origin.

The phytosanitary system of the EU is very similar to the import regulatory system of many other IPPC contracting parties. It implements elements of the CBD's guiding principles 7 and 11, which call for border controls and measures to minimize unintentional introductions. The competent authorities and institutions with appropriate responsibilities called for by these principles are clearly identified in Article 2 of directive 2000/29/EC. Within the scope of "protection of plants", the provisions and systems against unintentional introduction are very well developed. However, if more attention is to be paid to indirect effects and impacts on biodiversity the existing responsible official bodies need to be strengthened and the training of staff developed accordingly, as is mentioned in CBD guiding principle 7. In addition, the efficacy of the general protective requirements needs to be assessed and options for their improvement should be developed, in particular with regard to aeroplanes, tourism, containers and feedstuffs.

Measures relating to intentional introduction

The phytosanitary control of intentional import of species is much less developed than the measures against unintentional introduction. Though there is no commercial interest in the import or trade of organisms directly harmful to plants, it may nevertheless be useful and necessary to import them for scientific or breeding purposes. If such organisms are listed in the annexes of directive 2000/29/EC and thus their importation or movement within the EU is prohibited, specific exemptions on a case by case basis may be granted by the NPPOs of the member states. A detailed procedure of specific risk analysis and/or application of specific requirements and exchange of information between the responsible services is laid

down in Commission Directive 95/44/EC. Similarly, member states are authorized to grant exemptions on a case by case basis for plants or plant products that are prohibited because they present a high-risk pathway for the unintentional introduction of other organisms. In both cases, exemptions may be made only for scientific or breeding purposes and not for regular trade.

Council Directive 2002/89/EC of 28 November 2002 amended directive 2000/29/EC. Article 3(7) of the revised directive now authorizes member states and the European Commission to apply the provisions of the directive's framework of protective measures to those organisms "which are suspected of being harmful to plants or plant products but are not listed in Annexes I and II". Thus Article 3(7) provides the legal basis to regulate on the EU level (and within EU member states) the intentional introduction of invasive alien species within the scope of the IPPC . This includes at least weeds and invasive alien plants. It is expected that measures will be taken on intentional imports of invasive alien species after the procedures and methods for risk analysis are implemented for this purpose.

The CBD's guiding principles 7 and 10 call for the establishment of authorization procedures for the intentional introduction of alien species. The procedures should identify whether these species may be invasive and, if so, may require specific restrictions or prohibit introduction. The competent authorities for such procedures should be determined. Though the current EU system partially fulfils these requirements and the competent authorities are established, official procedures need to incorporate at least weeds and potentially invasive plants. This would require a substantial development of the system. The legal basis is already established in Article 3(7) of directive 2000/29/EC but the details of the regulatory framework need to be developed and the procedures (e.g. risk analysis) need to be adapted in the NPPOs. Additional communication lines with agencies responsible for nature conservation may be useful. At all levels these activities will require additional resources within the established framework, as guiding principle 7 indicates.

MEASURES BETWEEN AND WITHIN EU MEMBER STATES

This section outlines the provisions of directive 2000/29/EC relating to movement of plant pests in trade and spread, eradication and suppression of harmful organisms.

Measures against the movement of plant pests in trade

Inspections at the borders between the EU member states were abolished in 1993 and replaced by a system of official control at the places of production and of the trade between and within the member states. To allow tracing the source of consignments infested with regulated harmful organisms or any non-compliance with the regulations, plants or plant products moving through the EU must be accompanied by a plant passport. This plant passport has to be placed on the relevant plants or their packaging or on the commercial documents in combinations with labels on the products. In addition, importers of plants for planting and of many plant products have to be registered and subjected to an annual inspection by the state's plant protection service in the same way as the producers inside the EU. The import control system is closely linked with the internal control. Imported plants or plant products that fulfil the phytosanitary import requirements are either finally released

after the phytosanitary inspection or, if the relevant product is also regulated inside the EU, the relevant information is transferred after the inspection onto a plant passport. The required code on the plant passports allows the identification of the official plant protection services responsible for the control of the producers and traders in the region. In addition it contains a unique registration number of these producers or traders and indicates the country of origin if the plants have been imported from third countries. All producers and traders of regulated plants and plant products have to be registered by the responsible official service and have to be visited and inspected annually. Inspection includes checking the relevant records for the identification of movements of regulated plants. There are some exemptions in place for local marketing and for the sale to the end users of these plants.

Measures relating to spread, eradication and suppression of harmful organisms

If quarantine organisms listed in Council Directive 2000/29/EC are identified in an area in the EU where they have not been found before, the member state concerned has to take effective action against the outbreak with the aim to stop its spread and, if possible, to eradicate or suppress the population of the organism in the infested area (Article 16.1). If outbreaks are identified for new harmful organisms, for instance those which have not been found in the EU before, the member state concerned is obliged to take preliminary measures that at least limit the spread of the organism to other member states (Article 16.2). The measures have to be notified to the European Commission and the other member states. If risk analysis at community level reveals that further measures against the organism are necessary, the Commission and all member states may adopt a binding EU decision specifying all relevant actions (including monitoring) that are required to limit the spread and eradicate or suppress the invasive alien species. Such a decision was made after the outbreak of *Bursaphelenchus xylophilus* in1999 in Portugal. This pinewood nematode has caused the death of millions of pine trees in Japan and China every year since its introduction from North America some decades ago. The EU decision was developed within a few months after the outbreak. It requires that in Portugal the infested zone is delimited and a buffer zone created. In the infested zone, specified eradication measures have to be taken; measures in the buffer zone should stop any spread from the infested zone into new areas. The EU is funding with more than one million Euros annually (about 50 per cent of the costs of these measures), based on the so-called 'solidarity provision' laid down in Article 21 of directive 2000/29/EC. Although different in many aspects, also the EU-decision against *Phytophtora ramorum* follows the same approach.

The CBD guiding principles 12, 13, 14 and 15 provide for the mitigation of impacts of invasive alien species, their eradication or, if this is not possible, their control. The relevant EU provisions are in principle a powerful tool ensuring that all member states take the required action individually or, if necessary, community wide. Once the IPPC approach on invasive alien species is fully adopted by the EU, the system may address more invasive alien species, than it is already the case. Further work on the relevant articles in directive 2000/29/EC could improve the system by placing a stronger emphasis on eradication in early stages of outbreaks.

INFORMATION EXCHANGE, MONITORING AND RESEARCH

Monitoring and early warning are crucial elements of any system aiming at the identification of risks. The EU phytosanitary system does provide such system at different levels, that is suitable for invasive alien species in the plant sector (see contribution Pfeilstetter). Research on quarantine pests and other potential invasive alien species that may pose a risk to plants in the EU is done either individually in the countries most concerned or in the EU research funding framework in cooperation with scientists of several member states. The latter is of particular importance for organisms of EU-wide concern and often such projects prepare the basis for an EU pest risk analysis. The community measures against *B. xylophilus* are based mainly on the results of such projects. More recently, the potential consequences, including those for the environment, of a further establishment of *P. ramorum* in Europe are being studied.

The CBD guiding principles 5 and 6 on research and monitoring are implemented in the phytosanitary field already to a large extent. Monitoring systems have to be focused more clearly also on harmful organisms of relevance for biodiversity. Research should continue to work also on these aspects of alien organisms. In particular, intensified research work is required for risk analysis of indirect pests such as invasive alien plants.

CONCLUDING REMARKS

With the accession of the EU to the revised IPPC it is expected that the EU follows the IPPC approach on invasive alien species. The chief officers of plant health services in the EU have acknowledged already in December 2002 that most of the CBD guiding principles are already covered in the EC plant health regulatory framework. With that, it is also necessary to identify more concretely the responsibilities within the EU plant health system and the required action. The Commission is in the process of developing a strategy how the EU regulatory framework and its services will contribute to the management of invasive alien species in future. The phytosanitary sector is already considering the inclusion of new invasive alien species in its regulatory framework and will specifically address invasive alien species issues in its further work.

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