SCIENTIFIC OPINION

Scientific Opinion on the pest categorisation of *Atropellis* spp.[1]

EFSA Panel on Plant Health (PLH)[2,3]

European Food Safety Authority (EFSA), Parma, Italy

ABSTRACT

The European Commission requested the EFSA Panel on Plant Health to perform a pest categorisation of *Atropellis* spp., the fungal pathogens responsible for causing cankers in several *Pinus* species. The pathogens are listed in Annex IIAI of Directive 2000/29/EC. The pathogens have been identified as *A. apiculata*, *A. pinicola*, *A. piniphila* and *A. tingens*. Detection, identification and differentiation of *Atropellis* species is based on their morphological and cultural characteristics. *A. apiculata* is present in North Carolina and Virginia (USA), and *A. pinicola*, *A. piniphila* and *A. tingens* are present in Canada and the USA. *Atropellis* spp. are not known to occur in the EU Member States so far. Several *Pinus* species have been reported to be hosts of *Atropellis* spp., with some of them being present in the EU Member States. However, the susceptibility to infection with these pathogens of pine species native to Europe and Eurasia, such as *Pinus brutia*, *P. cembra*, *P. mugo*, *P. peuce*, *P. pinaster* and *P. sibirica* is not yet known. There are no obvious eco-climatic factors limiting the potential establishment and spread of the pathogens in the risk assessment area. The pathogens can spread over short distances by ascospores that are dispersed primarily by wind and secondarily by rain. Spread of *Atropellis* spp. over long distances may occur by means of movement of infected host plants for planting (especially asymptomatic), cut branches, and wood or isolated bark. Control methods used against *Atropellis* spp. include cultural practices and sanitary measures. No chemical control measures, resistant host genotypes or biological control measures exist. Potential consequences of the damage caused by *Atropellis* spp. include malformation of the trees resulting in lower wood quality or tree marketability.

KEY WORDS

biology, *Pinus*, distribution, European Union, impacts, quarantine pest

[1] On request from the European Commission, Question No EFSA-Q-2014-00260, adopted on 27 November 2014.

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BACKGROUND AS PROVIDED BY THE EUROPEAN COMMISSION

The current European Union plant health regime is established by Council Directive 2000/29/EC on protective measures against the introduction into the Community of organisms harmful to plants or plant products and against their spread within the Community (OJ L 169, 10.7.2000, p. 1).

The Directive lays down, amongst others, the technical phytosanitary provisions to be met by plants and plant products and the control checks to be carried out at the place of origin on plants and plant products destined for the Union or to be moved within the Union, the list of harmful organisms whose introduction into or spread within the Union is prohibited and the control measures to be carried out at the outer border of the Union on arrival of plants and plant products.

The Commission is currently carrying out a revision of the regulatory status of organisms listed in the Annexes of Directive 2000/29/EC. This revision targets mainly organisms which are already locally present in the EU territory and that in many cases are regulated in the EU since a long time. Therefore it is considered to be appropriate to evaluate whether these organisms still deserve to remain regulated under Council Directive 2000/29/EC, or whether, if appropriate, they should be regulated in the context of the marketing of plant propagation material, or be deregulated. The revision of the regulatory status of these organisms is also in line with the outcome of the recent evaluation of the EU Plant Health Regime, which called for a modernisation of the system through more focus on prevention and better risk targeting (prioritisation).

In order to carry out this evaluation, a recent pest risk analysis is needed which takes into account the latest scientific and technical knowledge on these organisms, including data on their agronomic and environmental impact, as well as their present distribution in the EU territory. In this context, EFSA has already been asked to prepare risk assessments for some organisms listed in Annex IIAII. The current request concerns 23 additional organisms listed in Annex II, Part A, Section II as well as five organisms listed in Annex I, Part A, Section I, one listed in Annex I, Part A, Section II and nine organisms listed in Annex II, Part A, Section I of Council Directive 2000/29/EC. The organisms in question are the following:

Organisms listed in Annex II, Part A, Section II:

- *Ditylenchus destructor* Thorne
- *Circulifer haematoceps*
- *Circulifer tenellus*
- *Helicoverpa armigera* (Hübner)
- *Radopholus similis* (Cobb) Thorne (could be addressed together with the IIAI organism *Radopholus citrophilus* Huettel Dickson and Kaplan)
- *Paysandisia archon* (Burmeister)
- *Clavibacter michiganensis* spp. *insidiosus* (McCulloch) Davis *et al.*
- *Erwinia amylovora* (Burr.) Winsl. *et al.* (also listed in Annex IIB)
- *Pseudomonas syringae* pv. *persicae* (Prunier *et al.*) Young *et al.*
- *Xanthomonas campestris* pv. *phaseoli* (Smith) Dye
- *Xanthomonas campestris* pv. *pruni* (Smith) Dye
- *Xylophilus ampelinus* (Panagopoulos) Willems *et al.*
- *Ceratocystis fimbriata* f. sp. *platani* Walter (also listed in Annex IIB)
- *Cryphonectria parasitica* (Murrill) Barr (also listed in Annex IIB)
- *Phoma tracheiphila* (Petri) Kanchaveli and Gikashvili
- *Verticillium albo-atrum* Reinke and Berthold
- *Verticillium dahliae* Klebahn
- Beet leaf curl virus
- Citrus tristeza virus (European isolates) (also listed in Annex IIB)
- Grapevine flavescence dorée MLO (also listed in Annex IIB)

- Potato stolbur mycoplasma
- *Spiroplasma citri* Saglio *et al.*
- Tomato yellow leaf curl virus

Organisms listed in Annex I, Part A, Section I:

- *Rhagoletis cingulata* (Loew)
- *Rhagoletis ribicola* Doane
- Strawberry vein banding virus
- Strawberry latent C virus
- Elm phloem necrosis mycoplasm

Organisms listed in Annex I, Part A, Section II:

- *Spodoptera littoralis* (Boisd.)

Organisms listed in Annex II, Part A, Section I:

- *Aculops fuchsiae* Keifer
- *Aonidiella citrina* Coquillet
- Prunus necrotic ringspot virus
- Cherry leafroll virus
- *Radopholus citrophilus* Huettel Dickson and Kaplan (could be addressed together with IIAII organism *Radopholus similis* (Cobb) Thorne
- *Scirtothrips dorsalis* Hendel
- *Atropellis* spp.
- *Eotetranychus lewisi* McGregor
- *Diaporthe vaccinii* Shaer.

TERMS OF REFERENCE AS PROVIDED BY THE EUROPEAN COMMISSION

EFSA is requested, pursuant to Article 29(1) and Article 22(5) of Regulation (EC) No 178/2002, to provide a pest risk assessment of *Ditylenchus destructor* Thorne, *Circulifer haematoceps, Circulifer tenellus, Helicoverpa armigera* (Hübner), *Radopholus similis* (Cobb) Thorne, *Paysandisia archon* (Burmeister), *Clavibacter michiganensis* spp. *insidiosus* (McCulloch) Davis *et al, Erwinia amylovora* (Burr.) Winsl. *et al, Pseudomonas syringae pv. persicae* (Prunier *et al)* Young *et al. Xanthomonas campestris* pv. *phaseoli* (Smith) Dye, *Xanthomonas campestris* pv. *pruni* (Smith) Dye, *Xyîophilus ampelinus* (Panagopoulos) Willems *et al, Ceratocystis fimbriata* f. sp. *platani* Walter, *Cryphonectria parasitica* (Murrill) Barr, *Phoma tracheiphila* (Petri) Kanchaveli and Gikashvili, *Verticillium albo-atrum* Reinke and Berthold, *Verticillium dahliae* Klebahn, Beet leaf curl virus, Citrus tristeza virus (European isolates), Grapevine flavescence dorée MLO, Potato stolbur mycoplasma, *Spiroplasma citri* Saglio *et al*, Tomato yellow leaf curl virus, *Rhagoletis cingulata* (Loew), *Rhagoletis ribicola* Doane, Strawberry vein banding virus, Strawberry latent C virus, Elm phloem necrosis mycoplasma, *Spodoptera littoralis* (Boisd.), *Aculops fuchsiae* Keifer, *Aonidiella citrina* Coquillet, Prunus necrotic ringspot virus, Cherry leafroll virus, *Radopholus citrophilus* Huettel Dickson and Kaplan (to address with the IIAII *Radopholus similis* (Cobb) Thorne), *Scirtothrips dorsalis* Hendel, *Atropellis* spp., *Eotetranychus lewisi* McGregor and *Diaporthe vaccinii* Shaer., for the EU territory.

In line with the experience gained with the previous two batches of pest risk assessments of organisms listed in Annex II, Part A, Section II, requested to EFSA, and in order to further streamline the preparation of risk assessments for regulated pests, the work should be split in two stages, each with a specific output. EFSA is requested to prepare and deliver first a pest categorisation for each of these 38 regulated pests (step 1). Upon receipt and analysis of this output, the Commission will inform EFSA for which organisms it is necessary to complete the pest risk assessment, to identify risk

reduction options and to provide an assessment of the effectiveness of current EU phytosanitary requirements (step 2). *Clavibacter michiganensis* spp. *michiganensis* (Smith) Davis *et al.* and *Xanthomonas campestris* pv. *vesicatoria* (Doidge) Dye, from the second batch of risk assessment requests for Annex IIAII organisms requested to EFSA (ARES(2012)880155), could be used as pilot cases for this approach, given that the working group for the preparation of their pest risk assessments has been constituted and it is currently dealing with the step 1 "pest categorisation". This proposed modification of previous request would allow a rapid delivery by EFSA by May 2014 of the first two outputs for step 1 "pest categorisation", that could be used as pilot case for this request and obtain a prompt feedback on its fitness for purpose from the risk manager's point of view.

As indicated in previous requests of risk assessments for regulated pests, in order to target its level of detail to the needs of the risk manager, and thereby to rationalise the resources used for their preparation and to speed up their delivery, for the preparation of the pest categorisations EFSA is requested, in order to define the potential for establishment, spread and impact in the risk assessment area, to concentrate in particular on the analysis of the present distribution of the organism in comparison with the distribution of the main hosts and on the analysis of the observed impacts of the organism in the risk assessment area.

ASSESSMENT

1. Introduction

1.1. Purpose

This document presents a pest categorisation prepared by the EFSA Scientific Panel on Plant Health (hereinafter referred to as the Panel) for *Atropellis* spp. in response to a request from the European Commission.

1.2. Scope

This pest categorisation is for *Atropellis* spp. The risk assessment area is the territory of the European Union (hereinafter referred to as the EU) with 28 Member States (hereinafter referred to as MSs), restricted to the area of application of Council Directive 2000/29/EC.

2. Methodology and data

2.1. Methodology

The Panel performed the pest categorisation for *Atropellis* spp. following guiding principles and steps presented in the EFSA Guidance on a harmonised framework for pest risk assessment (EFSA PLH Panel, 2010) and as defined in the International Standards for Phytosanitary Measures (ISPM) No 11 (FAO, 2013) and No 21 (FAO, 2004).

In accordance with the Guidance on a harmonised framework for pest risk assessment in the EU (EFSA PLH Panel, 2010), this work is initiated as result of the review or revision of phytosanitary policies and priorities. As explained in the background of the European Commission request, the objective of this mandate is to provide updated scientific advice to the European risk managers for their evaluation of whether thoese organisms listed in the Annexes of the Directive 2000/29/EC still deserve to remain regulated under Council Directive 2000/29/EC, or whether they should be regulated in the context of the marketing of plant propagation material, or be deregulated. Therefore, to facilitate the decision making process, in the conclusions of the pest categorisation, the Panel addresses explicitly each criterion for quarantine pest according to ISPM 11 (FAO, 2013), but also for regulated non-quarantine pest according to ISPM 21 (FAO, 2004), and includes additional information required as per the specific terms of reference received by the European Commission. In addition, for each conclusion the Panel provides a short description of its associated uncertainty.

Table 1 presents the ISPM 11 (FAO, 2013) and ISPM 21 (FAO, 2004) pest categorisation criteria against which the Panel provides its conclusions. It should be noted that the Panel's conclusions are formulated respecting its remit, and particularly with regards to the principle of separation between risk assessment and risk management (EFSA founding regulation[4]), therefore, instead of determining whether the pest is likely to have an unacceptable impact, the Panel will present a summary of the observed pest impacts. Economic impacts are expressed in terms of yield and quality losses and not in monetary terms, in agreement with the Guidance on a harmonised framework for pest risk assessment (EFSA PLH Panel, 2010).

Table 1: International Standards for Phytosanitary Measures (ISPM) 11 (FAO, 2013) and ISPM 21 (FAO, 2004) pest categorisation criteria under evaluation.

Pest categorisation criteria	ISPM 11 for being a potential quarantine pest	ISPM 21 for being a potential regulated non-quarantine pest
Identity of the pest	The identity of the pest should be clearly defined to ensure that the assessment is being performed on a distinct organism and that biological and other information used in the assessment is relevant to the organism in question. If this is not possible because the causal agent of particular symptoms has not yet been fully identified, then it should have been shown to produce consistent symptoms and to be transmissible.	The identity of the pest is clearly defined.
Presence or absence in the PRA area	The pest should be **absent from all or a defined part of the PRA area.**	The pest is **present** in the PRA area
Regulatory status	If the pest is present but not widely distributed in the PRA area, it should be under official control or expected to be under official control in the near future.	The pest is under official control (or being considered for official control) in the PRA area with respect to the specified plants for planting.
Potential for establishment and spread in PRA area	The PRA area should have ecological/climatic conditions including those in protected conditions suitable for the establishment and spread of the pest and, where relevant, host species (or near relatives), alternate hosts and vectors should be present in the PRA area.	–
Association of the pest with the plants for planting and the effect on their intended use	–	Plants for planting are a pathway for introduction and spread of this pest.
Potential for consequences (including environmental consequences) in the PRA area	There should be clear indications that the pest is likely to have an unacceptable economic impact (including environmental impact) in the PRA area.	–

[4] Regulation (EC) No 178/2002 of the European Parliament and of the Council of 28 January 2002 laying down the general principles and requirements of food law, establishing the European Food Safety Authority and laying down procedures in matters of food safety. Official Journal of the European Communities L 31/1, 1.2.2002, p. 1–24.

Pest categorisation criteria	ISPM 11 for being a potential quarantine pest	ISPM 21 for being a potential regulated non-quarantine pest
Indication of impact(s) of the pest on the intended use of the plants for planting	–	The pest may cause unacceptable economic impact on the intended use of the plants for planting.
Conclusion	If it has been determined that the pest has the potential to be a quarantine pest, the PRA process should continue. If a pest does not fulfil all of the criteria for a quarantine pest, the PRA process for that pest may stop. In the absence of sufficient information, the uncertainties should be identified and the PRA process should continue.	If a pest does not fulfil all the criteria for a regulated non-quarantine pest, the PRA process may stop.

In addition, in order to reply to the specific questions listed in the terms of reference, three issues are specifically discussed only for pests already present in the EU: the analysis of the present EU distribution of the organism in comparison with the EU distribution of the main hosts; the analysis of the observed impact of the organism in the EU; and the pest control and cultural measures currently implemented in the EU.

The Panel will not indicate in its conclusions of the pest categorisation whether to continue the risk assessment process as it is clearly stated in the terms of reference that at the end the pest categorisation the European Commission will indicate if further risk assessment work is required following their analysis of the Panel's scientific opinion.

2.2. Data

2.2.1. Literature search

An extensive literature search on *Atropellis* spp. was conducted at the beginning of the mandate. Further references and information were obtained from experts and from citations within the references.

2.2.2. Data collection

To complement the information concerning the current situation of the pest provided by the literature and online databases on pest distribution, damage and management, the PLH Panel sent a short questionnaire on the current situation at country level, based on the information available in the European and Mediterranean Plant Protection Organization (EPPO) Plant Quarantine Retrieval (PQR) system, to the National Plant Protection Organisation (NPPO) contacts of the 28 EU Member States, and of Iceland and Norway. Iceland and Norway are part of the European Free Trade Association (EFTA) and are contributing to EFSA data collection activities, as part of the agreements EFSA has with these two countries. A summary of the pest status based on EPPO PQR and NPPO replies is presented in Table 2. Information on distribution of the main host plants were obtained from the EUROSTAT database JRC forestry host maps, and EUFORGEN host maps.

3. Pest categorisation

3.1. Identity and biology of *Atropellis* spp.

3.1.1. Taxonomy

Taxonomy displayed is according Kirk et al. (2008) and MycoBank (Crous et al. 2004).

Names:

- *Atropellis apiculata* M.L. Lohman, E.K. Cash & R.W. Davidson (1942)
- *Atropellis pinicola* Zeller & Goodd. (1930)
- *Atropellis piniphila* (Weir) M.L. Lohman & E.K. Cash (1940) [anamorph *Cenangium piniphilum* Weir (1921)]
- *Atropellis tingens* M.L. Lohman & E.K. Cash (1940)

Synonyms:

- *Atropellis arizonica* M.L. Lohman & E.K. Cash, J. *Wash. Acad. Sci*. 30(6): 261 (1940) (= *Atropellis piniphila*)
- *Atropellis piniphila* var. *arizonica* (M.L. Lohman & E.K. Cash) M. Morelet, *Ann. Soc. Sci. Nat. Arch. Toulon et du Var* 21: 104 (1969) (= *Atropellis piniphila*)
- *Atropellis piniphila* var. *piniphila* (Weir) M.L. Lohman & E.K. Cash (1940) (= *Atropellis piniphila*)
- *Cenangium piniphilum* Weir, *Phytopathology* 11(7): 295 (1921) (= *Atropellis piniphila*)
- *Godronia zelleri* Seaver, *Phytopathology* 20: 555–567 (= *Atropellis pinicola*)

The species formerly known as *Atropellis treleasei* (Sacc.) Zeller & Goodd. (1930), (= *Scleroderris treleasei* Sacc. 1904; = *Godronia treleasei* (Sacc.) Seaver 1945), has been reclassified as *Discocainia treleasei* (Sacc.) J. Reid & A. Funk, *Mycologia* 58(3): 432 (1966) (Fungi; Ascomycota; Leotiomycetes; Leotiomycetidae; Rhytismatales; Rhytismataceae). Furthermore, whereas the hosts of *Atropellis* species are all *Pinus* spp., *D. treleasei* infects *Picea* spp. At the time the legislation was enacted, *A. treleasei* had already been reclassified as *D. treleasei*; thus, this species is not considered in the current pest categorisation.

Taxonomic position:

Domain: Eukaryota; kingdom: Fungi; phylum: Ascomycota; class: Leotiomycetes; sub-class: Leotiomycetidae; order: Helotiales; family: Dermateaceae; genus: *Atropellis*

Common names:

Krebs: kiefer (German) (*A. pinicola*, *A. piniphila*, *A. tingens*); rindenkrebs: kiefer (German) (*A. pinicola*, *A. piniphila*); canker of pine (English) (*A. tingens*); branch canker of pine (EN) (*A. pinicola*, *A. piniphila*, *A. tingens*); trunk canker of pine (English) (*A. pinicola*, *Atropellis piniphila*); twig blight of pine (English) (*A. apiculata*, *A. pinicola*, *A. piniphila*), chancre atropellien (French) (*A. piniphila*).

Atropellis spp. are four native North American species, causing cankers in several *Pinus* species.

A. apiculata causes cankers mainly on twigs and small branches, but also on main stems of seedlings. Apothecia emerge from the bark over the cankered areas, scattered or in small groups. Apothecia are sessile, 1.5–2 mm in diameter. Ascospores are hyaline, fusoid to sub-sigmoid, with sharply or apiculate ends, one- or, rarely, two-septate, 20–24 × 4.8–6.5 µm in dimension.

A. pinicola causes cankers that are smooth, elongated, flattened depressions covered with bark, in which appear very small black apothecia. Apothecia are erumpent, sessile or with a very short central stalk, 2–4 mm in diameter. Asci are clavate, interspersed with hair-like paraphyses. Ascospores are

long, narrow, one- to six-celled and hyaline (30–65 × 1.5–4 µm). Conidia are narrowly ellipsoid to bacillar, one-celled and hyaline (8–11 × 1.7–3 µm).

A. piniphila attacks 5- to 25-year-old trees, causing deformation of main stem and branches. Infection is at branch whorls; cankers are elongated, flattened depressions covered with bark and copious resin. There is a characteristic blue-black staining of the wood beneath cankers and a red or brown discoloration is usually present in xylem at the edge of the blue-black zone. Apothecia are erumpent, brownish black, irregularly disc-shaped with a short central stalk, 2–5 mm in diameter. Ascospores are hyaline, elliptical-fusoid, aseptate or uniseptate (16–28 × 4.7 µm). Conidia are very thin-walled, hyaline, aseptate, cylindrical, rounded at the ends and possess a mucilaginous coat (3.5–8.3 × 0.7–1.7 µm).

A. tingens attacks mainly young trees, which are the most susceptible. Cankers persist for many years, but extension stops after about 10 years. Cankers are small, elliptical, blue-black, about 2 cm long underneath the bark of twigs and branches, and originate at needle bases. Small resin droplets are formed on the bark surface around the margins of cankers. Multiple cankers girdle small branches or twigs, while perennial target cankers are formed on larger branches and main stems. Needles on these girdled twigs/branches begin to discolour and the twig/branch eventually dies. These flagging branches are most noticeable in spring and early summer. Apothecia are black, cup-shaped, 2–4 mm long, and are produced in clusters on the dead bark of two- to three-year-old cankers. Cutting into cankered areas reveals darkly stained sapwood (Thomas and Pickel, 2010; Horst, 2013).

3.1.2. Biology

The life cycle of all *Atropellis* species is similar (Lightle and Thompson, 1973). Inoculum is produced on the surface of the bark over the cankers, in the central sunken canker zone, as stromata containing conidia and apothecia that produce ascospores (in the case of *A. apiculata* only apothecia have been reported) (Hopkins and Callan, 1991). *In planta*, the formation of conidia precedes the formation of apothecia. Conidia are produced in stromata and released as a creamy, sticky mass when the fructifications are wet (Hopkins, 1963). The role of conidia in the infection cycle has not been determined, but it is believed that they serve as spermatia and have a role in sexual reproduction (Callan, 1997; Lightle and Thompson, 1973). Inoculum capable of establishing new infections consists of ascospores. Ascospores are wind dispersed in summer or early autumn, but rain may also play a secondary role in dispersal. They germinate under appropriate conditions of moisture and temperature, and the mycelium penetrates undamaged bark or leaf scars (*A. tingens* penetrates the base of the needle) of susceptible hosts (Lightle and Thompson, 1973; Thomas and Pickel, 2010). Ecological requirements were studied for *A. piniphila*: temperatures for growth were in the range between 4 and 24°C, with optimum temperature at 18°C. The optimum pH for growth was 3.0–4.0. In tests with different media, the best growth was obtained in those containing 4 % dextrose and 0.4 % ammonium succinate. Conidia were produced abundantly in culture with relative humidity (RH) ≥ 50 %, while attempts to produce apothecia in culture failed (Hopkins, 1961).

Ascospores are formed after widely varying intervals. Infection can be asymptomatic for quite a long time, and apothecia with ascospores on the symptomatic plant tissue can also occur after a long time. A period of two to five years usually elapses between infection and the onset of inoculum formation on small branches and stems of small, suppressed trees (Lockman, 2005; Sinclair and Lyon, 2005). In the case of large, vigorous trees, it can often take 20 or more years for stem infections to manifest. Inoculum production, once it has begun, continues each year until a few years after death of the host. Inoculum formation on cankers left after clear-cutting usually ceases within a year, although it can continue for as long as three or three years on logs in heavy shade within a stand (Hopkins, 1969).

Incipient cankers show no external sign of the underlying infection. Dark-brown, necrotic spots, 5 mm in diameter, occur within the bark, possibly enclosed by a single layer of wound tissue. The first external symptom is a drop of resin on the bark surface. Copious amounts of fresh resin are found during the summer at the margin of cankers throughout their life (Lockman, 2005).

Cankers normally expand each year, modifying the infected wood in resin-soaked and stained blue-black. Blue-black streaks develop in the direction of the long axis of the wood fibres. The fungus penetrates sapwood rapidly, but penetrates heartwood more slowly. At canker tips a reddish-brown stain often develops in the sapwood between the bark and the nearest invaded (blue-black) sapwood. Furrowing develops longitudinally on the stem and is deepest on the most vigorous trees. Bark is often cracked at the margins of cankers. The mean annual rate of canker development has been estimated at 45 mm longitudinally and 6 mm tangentially. Dead branches are not invaded externally to the stem, but their base may be attacked. Needles on attacked trees may become chlorotic in summer. The rate of growth around the stem is approximately 0.6 cm per year, while the longitudinal advance is nearly 5 cm per year, resulting in long narrow cankers (Hopkins and Callan, 1991; Callan, 1997).

Cankers are found more frequently on pines in wet habitats, since several consecutive days of continuously moist summer weather favour development of new infections. Multiple stem cankers may be present on the same individual. Large stem cankers 40 to 50 years old have been observed occasionally in vigorous trees. Infections are most numerous on the northern sides of stems, and very few cankers develop on the southern sides of stems (Hopkins, 1969; Stanek et al., 1986; Hopkins and Callan, 1991).

The disease is frequently associated with causative agent of stem rust, *Cronartium coleosporioides* (stalactiform blister rust), in the north-western USA (EPPO Datasheet, 2014).

Host resistance to *Atropellis* species is poorly understood. The only available information on host resistance is for *A. piniphila*. Resistance of lodgepole pine to *A. piniphila* is known to take three forms:

(i) All trees are resistant until the age of about 15 years (Hopkins, 1969).

(ii) Resistance is dependent on the age of the tissues infected: most infections begin in tissues that are 10 to 14 years of age, many infections occur in tissues that are 15 to 19 years old and very few infections occur in tissues 5 to 9 years old, or in tissues older than 29 years. As a result, the upper crowns remain healthy and infections in the mid-crown tend to be small (Hopkins and Callan, 1991).

(iii) Existing cankers may be overgrown; this happens only in some vigorous trees (Hopkins, 1969).

3.1.3. Intraspecific diversity

No intraspecific taxa are currently recognised for *Atropellis* spp.

3.1.4. Detection and identification

The characteristics of the canker are the first approach to disease identification: heavy resin flow results from stem cankers; the bark is usually tight over dead cambium; dark blue or black staining in sapwood under a canker is observed by cutting into the wood; minute black fruiting bodies are cup-shaped on short stems (apothecia) emerging from bark at canker margins; cankers are usually many times longer than wide; the cankers may cause vertical seams which give stems a fluted appearance; flagged (dead and brown) branches occur throughout an infected tree.

Atropellis spp. can be distinguished from certain other twig fungi by a colorimetric response of apothecia to KOH; in the case of *Atropellis pinicola*, *A. piniphila* and *A. tingens* a fragment of apothecial tissue turns 5 % aqueous KOH a bluish green colour, whereas apothecia of *A. apiculata* will turn the solution chocolate brown (Diller, 1962; Callan, 1997). As a consequence, apothecia would have to be present on the live planting material for the pathogens to be detected.

Atropellis species can be differentiated from one another by the shape, size and number of cells of their hyaline ascospores. Ascospores of *A. tingens* are cylindrical and tapered towards one or both

ends, one- to four-celled, 24–40 × 3.5–3.5 µm. Ascospores of *A. piniphila* are fusiform, one- or two-celled, 16–28 × 4–7 µm. Ascospores of *A. pinicola* are filiform, one- to six-celled, 32–63 × 1.5–3 µm. Ascospores of *A. apiculata* are fusiform with sharply tapered ends, 20–24 × 5–6.5 µm (Sinclair and Lyon, 2005). If apothecia with mature ascospores are present, a confident identification of the species of *Atropellis* can be made. If immature apothecia are present, it may not be possible to identify the species unequivocally.

A. pinicola, *A. piniphila* and *A. tingens* also can be distinguished from each other by their different inhibition temperatures on malt agar cultures, and *A. piniphila* from the other two by the presence of conidia in droplets formed on mycelial mats (Diller, 1962). No information is available in the literature for *A. apiculata* with respect to the above-mentioned characteristics.

There are no nucleotide sequences for any *Atropellis* species accessioned in GenBank (http://www.ncbi.nlm.nih.gov/nuccore/: accessed 29 October 2014). Currently, differentiation of *Atropellis* species is based on the morphological and culture characteristics listed above.

3.1.4.1. Similarities to other diseases

Atropellis cankers are similar to those caused by certain rust fungi (stalactiform rust on *Pinus contorta* and white pine blister rust on *P. monticola*), but *Atropellis* cankers are easily distinguishable by the presence of 'blue-stained' wood beneath the affected bark, the absence of bark rupture by aecial blisters and the presence of diagnostic apothecia. Apothecia take years to form, making diagnosis difficult, especially on planting material. If infections of *A. piniphila* are near ground level, early canker and stain symptoms may be confused with black-stain root disease, caused by *Leptographium wagneri* (Hopkins and Callan, 1991).

3.2. Current distribution of *Atropellis* spp.

3.2.1. Global distribution

According to the EPPO PQR database (EPPO PQR, 2014), USDA-ARS fungus–host database (Farr and Rossman, 2014, accessed 28 October 2014) and Environment Canada (Pacific Forestry Centre, Forest Pathology Herbarium: http://www.nrcan.gc.ca/forests/research-centres/pfc/13493, accessed 28 October 2014), *Atropellis pinicola*, *A. piniphila* and *A. tingens* are known to occur in Canada and USA, as shown in Table 2; *A. apiculata* is known only from North Carolina and Virginia in the USA (Sinclair and Lyon, 2005).

Table 2. Distribution of *Atropellis* spp. in North America (EPPO PQR 2014, version 5.3.1, accessed 16 September 2014; CABI distribution maps (CABI, 1981a, b, c); USDA-ARS fungus–host database (Farr and Rossman, n.d., accessed 28 October 2014); Environment Canada, Pacific Forestry Centre, Forest Pathology Herbarium: http://www.nrcan.gc.ca/forests/research-centres/pfc/13493, accessed 28 October 2014)

	A. pinicola	***A. piniphila***	***A. apiculata***	***A. tingens***
Canada				
Alberta		Present, widespread		
British Columbia	Present, widespread	Present, widespread		Present, uncommon
Northwest Territories		Present, no details		
Nova Scotia				Present, no details
Saskatchewan		Present, no details		
USA				
Alabama		Present, no details		Present, no details
Arizona		Present, no details		
Arkansas				Present, no details
California	Present, no details			

	A. pinicola	*A. piniphila*	*A. apiculata*	*A. tingens*
Connecticut				Present, no details
Delaware				Present, no details
Florida				Present, no details
Georgia				Present, no details
Idaho	Present, no details	Present, no details		
Louisiana				Present, no details
Maine				Present, no details
Maryland				Present, no details
Massachusetts				Present, no details
Minnesota				Present, no details
Missouri				Present, no details
Montana	Present, no details	Present, no details		
New Hampshire				Present, no details
New Jersey				Present, no details
New Mexico		Present, no details		
New York				Present, no details
North Carolina		Present, no details	Present, no details	Present, no details
Ohio				Present, no details
Oklahoma				Present, no details
Oregon	Present, no details	Present, no details		
Pennsylvania				Present, no details
Rhode Island				Present, no details
South Carolina				Present, no details
South Dakota		Present, no details		
Tennessee		Present, no details		Present, no details
Texas				Present, no details
Vermont				Present, no details
Virginia			Present, no details	Present, no details
Washington state	Present, no details	Present, no details		
West Virginia				Present, no details

A. pinicola is present only in western North America (Fig. 1) while *A. piniphila* has a wider geographical distribution in North America (Fig. 2). *A. apiculata* is known only from the states of North Carolina and Virginia in the eastern USA (Table 2). There are no maps available for the distribution of *A. tingens*, which is found throughout eastern North America (Nova Scotia to Florida) as well as in Colorado and British Columbia (Sinclair and Lyon, 2005) (Table 2).

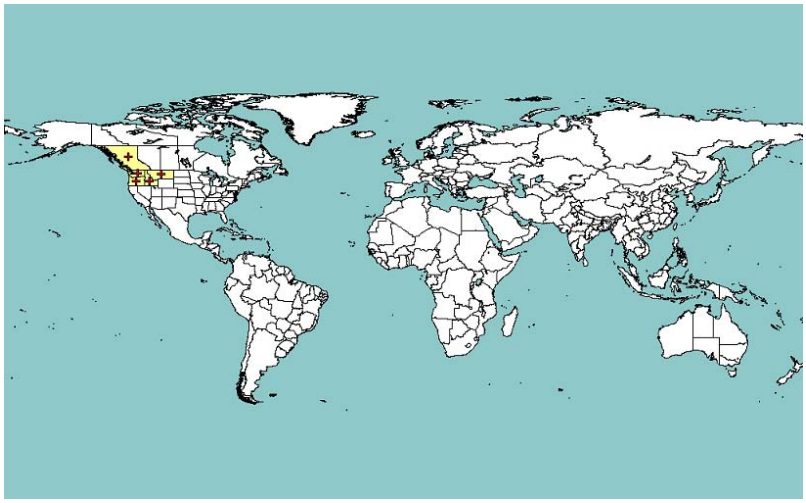

Figure 1: Global distribution map of *A. pinicola*. Red crosses represent national and sub-national pest records (extracted from EPPO PQR 2014, version 5.3.1, accessed 16 September 2014)

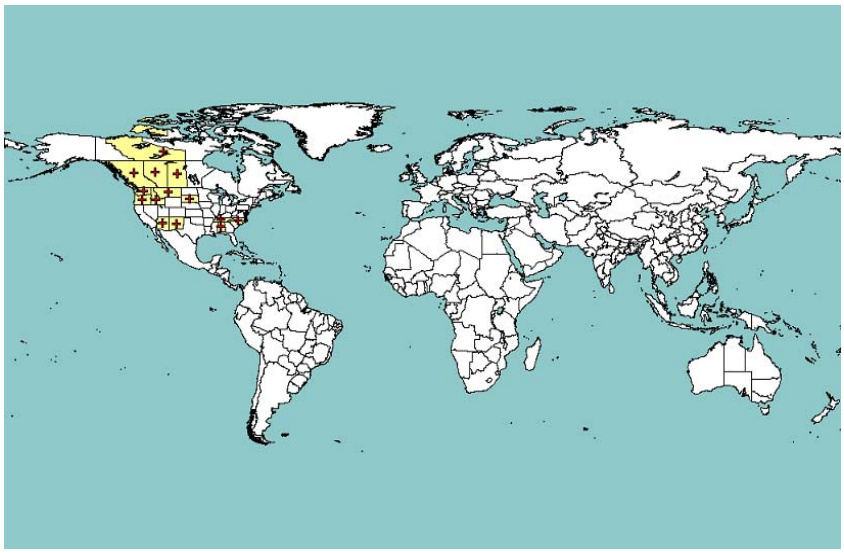

Figure 2: Global distribution map of *A. piniphila*. Red crosses represent national and sub-national pest records, respectively (extracted from EPPO PQR 2014, version 5.3.1, accessed 16 September 2014)

3.2.2. Distribution in the EU

No information was found in the EPPO PQR database (EPPO PQR, 2014) concerning the presence of *Atropellis* spp. in the risk assessment area. Based on the NPPO answers to the EFSA questionnaire, *Atropellis* spp. are not known to occur in the EU so far (Table 3); seven NPPOs, namely those of Cyprus, Greece, Romania, Norway, Latvia, Lithuania and Luxembourg, did not respond to the EFSA questionnaire. No additional information was retrieved in the literature concerning the presence of *Atropellis* spp. in the risk assessment area.

Table 3: Current distribution of *Atropellis* spp. in the 28 EU MSs, Iceland and Norway, based on the answers received via email from the NPPOs or, in absence of a reply (–), on information from EPPO PQR (and other sources if relevant).

Country	NPPO answer	NPPO comments
Austria	Absent, no pest records	
Belgium	Absent, no pest records	
Bulgaria	Absent	
Croatia	Absent: no pest records	
Cyprus	–	
Czech Republic	Absent, no record	
Denmark	Not known to occur	
Estonia	Absent, no pest records	
Finland	Absent, no pest records	
France	Absent	
Germany	Absent, no pest records	
Greece	–	
Hungary	Absent, no pest records	
Iceland	–	
Ireland	Absent, no pest records	
Italy	Never reported in Italy	
Latvia	–	
Lithuania	–	
Luxembourg	–	

Country	NPPO answer	NPPO comments
Malta	Absent, no pest records	
Norway	–	
Poland	Absent	In years 2009–2013, in total, 1423 visual inspections were carried out on *Pinus* plants
Portugal	No records	
Romania	–	
Slovak Republic	Absent, no pest record	
Slovenia	Absent: no pest records	
Spain	Absent	
Sweden	Absent, not known to occur	
Netherlands	Absent: no pest records	
United Kingdom	Absent	

3.3. Regulatory status

3.3.1. Council Directive 2000/29/EC

3.3.1.1. Harmful organism: *Atropellis* spp.

These species are regulated as harmful organisms in the EU and are listed as *Atropellis* spp. in Council Directive 2000/29/EC in Annex II, section I, as follows (Table 4)

Table 4: *Atropellis* spp. in Annex II of Council Directive 2000/29/EC

Annex II, Part A—Harmful organisms whose introduction into, and spread within, all Member States shall be banned if they are present on certain plants or plant products	
Section I—Harmful organisms not known to occur in the Community and relevant for the entire Community	
(c) Fungi	
Species	**Subject of contamination**
3. *Atropellis* spp.	Plants of *Pinus* L., other than fruit and seeds, isolated bark and wood of *Pinus* L.

3.3.1.2. Regulated hosts of *Atropellis* spp.:

The requirements of Annexes III, IV and V of Council Directive 2000/29/EC are presented below for the host plants of *Atropellis* spp. (Table 5).

Table 5: *Atropellis* spp. host plants in Annexes III, IV and V of Council Directive 2000/29/EC

Annex III, Part A—Plants, plant products and other objects the introduction of which shall be prohibited in all Member States	
Description	**Country of origin**
1. Plants of [...] *Pinus* L., [...] other than fruit seeds	Non-European countries
Annex IV, Part A—Special requirements which must be laid down by all Member States for the introduction and movement of plants, plant products and other objects into and within all Member States	
Section I—Plants, plant products and other objects originating outside the Community	
Plants, plant products and other objects	**Special requirements**
1.1. Whether or not listed among the CN codes in Annex V, Part B, wood of conifers (Coniferales), except that of *Thuja* L. and *Taxus* L., other than in the form of: — chips, particles, sawdust, shavings,	Official statement that the wood has undergone an appropriate: (a) heat treatment to achieve a minimum temperature of 56 °C for a minimum duration of 30 continuous minutes throughout the entire profile of the wood (including at its

wood waste and scrap obtained in whole or part from these conifers, — wood packaging material, in the form of packing cases, boxes, crates, drums and similar packings, pallets, box pallets and other load boards, pallet collars, dunnage, whether or not actually in use in the transport of objects of all kinds, except dunnage supporting consignments of wood, which is constructed from wood of the same type and quality as the wood in the consignment and which meets the same Union phytosanitary requirements as the wood in the consignment, — wood of *Libocedrus decurrens* Torr. where there is evidence that the wood has been processed or manufactured for pencils using heat treatment to achieve a minimum temperature of 82 °C for a seven- to eight-day period, but including that which has not kept its natural round surface, originating in Canada, China, Japan, the Republic of Korea, Mexico, Taiwan and the USA, where *Bursaphelenchus xylophilus* (Steiner et Bührer) Nickle et al. is known to occur.	core). There shall be evidence thereof by a mark 'HT' put on the wood or on any wrapping in accordance with current usage, and on the certificates referred to in Article 13.1.(ii), Or (b) fumigation to a specification approved in accordance with the procedure laid down in Article 18.2. There shall be evidence thereof by indicating on the certificates referred to in Article 13.1.(ii), the active ingredient, the minimum wood temperature, the rate (g/m^3) and the exposure time (h), Or (c) chemical pressure impregnation with a product approved in accordance with the procedure laid down in Article 18.2. There shall be evidence thereof by indicating on the certificates referred to in Article 13.1.(ii), the active ingredient, the pressure (psi or kPa) and the concentration (%), And Official statement that subsequent to its treatment the wood was transported until leaving the country issuing that statement outside of the flight season of the vector *Monochamus*, taking into account a safety margin of four additional weeks at the beginning and at the end of the expected flight season, or, except in the case of wood free from any bark, with a protective covering ensuring that infestation with *Bursaphelenchus xylophilus* (Steiner et Bührer) Nickle et al. or its vector cannot occur.
1.2. Whether or not listed among the CN codes in Annex V, Part B, wood of conifers (Coniferales) in the form of: — chips, particles, sawdust, shavings, wood waste and scrap obtained in whole or part from these conifers, originating in Canada, China, Japan, the Republic of Korea, Mexico, Taiwan and the USA, where *Bursaphelenchus xylophilus* (Steiner et Bührer) Nickle et al. is known to occur.	Official statement that the wood has undergone an appropriate: (a) heat treatment to achieve a minimum temperature of 56 °C for a minimum duration of 30 continuous minutes throughout the entire profile of the wood (including at its core), the latter to be indicated on the certificates referred to in Article 13.1.(ii), Or (b) fumigation to a specification approved in accordance with the procedure laid down in Article 18.2. There shall be evidence thereof by indicating on the certificates referred to in Article 13.1.(ii), the active ingredient, the minimum wood temperature, the rate (g/m^3) and the exposure time (h), And Official statement that subsequent to its treatment the wood was transported until leaving the country issuing that statement outside of the flight season of the vector *Monochamus*, taking into account a safety margin of four additional weeks at the beginning and at the end of the expected flight season, or, except in the case of wood free from any bark, with a protective covering ensuring that infestation with *Bursaphelenchus xylophilus* (Steiner et Bührer) Nickle et al. or its vector cannot occur.

1.6. Whether or not listed among the CN codes in Annex V, Part B, wood of conifers (Coniferales), other than in the form of: — chips, particles, sawdust, shavings, wood waste and scrap obtained in whole or part from these conifers, — wood packaging material, in the form of packing cases, boxes, crates, drums and similar packings, pallets, box pallets and other load boards, pallet collars, dunnage, whether actually in use or not in the transport of objects of all kinds, except dunnage supporting consignments of wood, which is constructed from wood of the same type and quality as the wood in the consignment and which meets the same Union phytosanitary requirements as the wood in the consignment, but including that which has not kept its natural round surface, originating in third countries, other than: — Russia, Kazakhstan and Turkey, — European countries, — Canada, China, Japan, the Republic of Korea, Mexico, Taiwan and the USA, where *Bursaphelenchus xylophilus* (Steiner et Bührer) Nickle et al. is known to occur.	Official statement that the wood: (a) is bark-free and free from grub holes, caused by the genus *Monochamus* spp. (non-European), defined for this purpose as those which are larger than 3 mm across, Or (b) has undergone kiln-drying to below 20 % moisture content, expressed as a percentage of dry matter, achieved through an appropriate time/temperature schedule. There shall be evidence thereof by a mark 'kiln-dried' or 'K.D' or another internationally recognised mark, put on the wood or on any wrapping in accordance with current usage, Or (c) has undergone an appropriate fumigation to a specification approved in accordance with the procedure laid down in Article 18.2. There shall be evidence thereof by indicating on the certificates referred to in Article 13.1.(ii), the active ingredient, the minimum wood temperature, the rate (g/m^3) and the exposure time (h), Or (d) has undergone an appropriate chemical pressure impregnation with a product approved in accordance with the procedure laid down in Article 18.2. There shall be evidence thereof by indicating on the certificates referred to in Article 13.1.(ii), the active ingredient, the pressure (psi or kPa) and the concentration (%), Or (e) has undergone an appropriate heat treatment to achieve a minimum temperature of 56 °C for a minimum duration of 30 continuous minutes throughout the entire profile of the wood (including at its core). There shall be evidence thereof by a mark 'HT' put on the wood or on any wrapping in accordance with current usage, and on the certificates referred to in Article 13.1.(ii).
7.3. Isolated bark of conifers (Coniferales), originating in non-European countries	Official statement that the isolated bark: (a) has been subjected to an appropriate fumigation with a fumigant approved in accordance with the procedure laid down in Article 18.2. There shall be evidence thereof by indicating on the certificates referred to in Article 13.1.(ii), the active ingredient, the minimum bark temperature, the rate (g/m^3) and the exposure time (h), Or (b) has undergone an appropriate heat treatment to achieve a minimum temperature of 56 °C for a minimum duration of 30 continuous minutes throughout the entire profile of the bark (including at its core), the latter to be indicated on the certificates referred to in Article 13.1.(ii), And

	official statement that subsequent to its treatment the bark was transported until leaving the country issuing that statement outside of the flight season of the vector *Monochamus*, taking into account a safety margin of four additional weeks at the beginning and at the end of the expected flight season, or with a protective covering ensuring that infestation with *Bursaphelenchus xylophilus* (Steiner et Bührer) Nickle *et al.* or its vector cannot occur.
39. Trees and shrubs, intended for planting, other than seeds and plants in tissue culture, originating in third countries other than European and Mediterranean countries	Without prejudice to the provisions applicable to the plants listed in Annex III(a)(1), (2), (3), (9), (13), (15), (16), (17), (18), Annex III(B)(1) and Annex IV(A)(I)(8.1), (8.2), (9), (10), (11.1), (11.2), (12), (13.1), (13.2), (14), (15), (17), (18), (19.1), (19.2), (20), (22.1), (22.2), (23.1), (23.2), (24), (25.5), (25.6), (26), (27.1), (27.2), (28), (29), (32.1), (32.2), (33), (34), (36.1), (36.2), (37), (38.1) and (38.2), where appropriate, official statement that the plants: — are clean (i.e. free from plant debris) and free from flowers and fruits, — have been grown in nurseries, — have been inspected at appropriate times and prior to export and found free from symptoms of harmful bacteria, viruses and virus-like organisms, and either found free from signs or symptoms of harmful nematodes, insects, mites and fungi, or have been subjected to appropriate treatment to eliminate such organisms.
43. Naturally or artificially dwarfed plants intended for planting other than seeds, originating in non-European countries	Without prejudice to the provisions applicable to the plants listed in Annex III(A)(1), (2), (3), (9), (13), (15), (16), (17), (18), Annex III(B)(1), and Annex IV(A)(I)(8.1), (9), (10), (11.1), (11.2), (12), (13.1), (13.2), (14), (15), (17), (18), (19.1), (19.2), (20), (22.1), (22.2), (23.1), (23.2), (24), (25.5), (25.6), (26), (27.1), (27.2), (28), (32.1), (32.2), (33), (34), (36.1), (36.2), (37), (38.1), (38.2), (39), (40) and (42), where appropriate, official statement that: (a) the plants, including those collected directly from natural habitats, shall have been grown, held and trained for at least two consecutive years prior to dispatch in officially registered nurseries, which are subject to an officially supervised control regime, (b) the plants on the nurseries referred to in (a) shall: (aa) at least during the period referred to in (a): — be potted, in pots which are placed on shelves at least 50 cm above ground, — have been subjected to appropriate treatments to ensure freedom from non-European rusts: the active ingredient, concentration and date of application of these treatments shall be mentioned on the phytosanitary certificate provided for in Article 7 of this Directive under the rubric ‘disinfestation and/or disinfection treatment’. —have been officially inspected at least six times a year at appropriate intervals for the presence of harmful organisms of concern, which are those in the Annexes to the Directive. These inspections, which shall also be carried out on plants in the immediate vicinity of the nurseries referred to in (a), shall be carried out at least by visual examination of each row in the field or

	nursery and by visual examination of all parts of the plant above the growing medium, using a random sample of at least 300 plants from a given genus where the number of plants of that genus is not more than 3 000 plants, or 10 % of the plants if there are more than 3 000 plants from that genus, — have been found free, in these inspections, from the relevant harmful organisms of concern as specified in the previous indent. Infested plants shall be removed. The remaining plants, where appropriate, shall be effectively treated, and in addition shall be held for an appropriate period and inspected to ensure freedom from such harmful organisms of concern, — have been planted in either an unused artificial growing medium or in a natural growing medium, which has been treated by fumigation or by appropriate heat treatment and has been of any harmful organisms, — have been kept under conditions which ensure that the growing medium has been maintained free from harmful organisms and within two weeks prior to dispatch, have been: — shaken and washed with clean water to remove the original growing medium and kept bare rooted, or — shaken and washed with clean water to remove the original growing medium and replanted in growing medium which meets the conditions laid down in (aa) fifth indent, or — subjected to appropriate treatments to ensure that the growing medium is free from harmful organisms, the active ingredient, concentration and date of application of these treatments shall be mentioned on the phytosanitary certificate provided for in Article 7 of this Directive under the rubric 'disinfestation and/or disinfection treatment'. (bb) be packed in closed containers which have been officially sealed and bear the registration number of the registered nursery; this number shall also be indicated under the rubric *additional declaration* on the phytosanitary certificate provided for in Article 7 of this Directive, enabling the consignments to be identified.
Annex V—Plants, plant products and other objects which must be subject to a plant health inspection (at the place of production if originating in the Community, before being moved within the Community—in the country of origin or the consignor country, if originating outside the Community) before being permitted to enter the Community	
Part A—Plants, plant products and other objects originating in the Community	
Section I—Plants, plant products and other objects which are potential carriers of harmful organisms of relevance for the entire Community and which must be accompanied by a plant passport	
1. Plants, plant products and other objects produced by producers whose production and sale is authorised to persons professionally engaged in plant production, other than those plants, plant products and other objects which are prepared and ready for sale to the final consumer, and for which it is ensured by the responsible official bodies of the Member States, that the production thereof is clearly separate from that of other products.	
2.1. Plants intended for planting other than seeds of the genera [...], *Pinus* L., [...].	
Section II —Plants, plant products and other objects which are potential carriers of harmful organisms of relevance for certain protected zones, and which must be accompanied by a plant passport valid for the appropriate zone when introduced into or moved within that zone Without prejudice to the plants, plant products and other objects listed in Part I.	
1. Plants, plant products and other objects**.**	
1.1. Plants of *Albies* Mill., *Larix* Mill., *Picea* A. Dietr., ***Pinus*** L. and *Pseudotsuga* Carr.	

1.10. Wood within the meaning of the first subparagraph of Article 2(2), where it (a) has been obtained in whole or part from conifers (*Coniferales*), excluding wood which is bark-free, And (b) meets one of the following descriptions laid down in Annex I, Part two to Council Regulation (EEC) No 2658/87: […].
1.11. Isolated bark of *Castanea* Mill, and conifers (Coniferales).
Annex V—Plants, plant products and other objects which must be subject to a plant health inspection (at the place of production if originating in the Community, before being moved within the Community—in the country of origin or the consignor country, if originating outside the Community) before being permitted to enter the Community
Part B—Plants, plant products and other objects originating in **territories, other than those territories referred to in part A**
Section I—Plants, plant products and other objects which are potential carriers of harmful organisms of relevance for the entire Community
1. Plants, intended for planting, […].
Parts of plants, other than fruits and seeds, of: […], — conifers (*Coniferales*), […].
5. Isolated bark of: — conifers (Coniferales), originating in non-European countries, […].
6. Wood within the meaning of the first subparagraph of Article 2(2), where it: (a) has been obtained in whole or part from one of the order, genera or species as described hereafter, except wood packaging material defined in Annex IV, Part A, Section I, Point 2: […] — Conifers (Coniferales), including wood which has not kept its natural round surface, originating in non-European countries, Kazakhstan, Russia and Turkey, […] (b) meets one of the following descriptions laid down in Annex I, Part 2 to Council Regulation (EEC) No 2658/87: […]
Section II —Plants, plant products and other objects which are potential carriers of harmful organisms of relevance for certain protected zones, Without prejudice to the plants, plant products and other objects listed in Part I.
7. Wood within the meaning of the first subparagraph of Article 2(2), where it: (a) has been obtained in whole or part from conifers (Coniferales), excluding wood which is bark-free originating in European third countries, […] and (b) meets one of the following descriptions laid down in Annex I, Part 2 to Council Regulation (EEC) No 2658/87: […]
9. Isolated bark of conifers (Coniferales) originating in European third countries.

3.3.2. Marketing directives

Host plants of *Atropellis* spp. that are regulated in Annex IIAII of Council Directive 2000/29/EC are explicitly mentioned in the following marketing directives:

- Council Directive 1999/105/EC.[5]

[5] Council Directive 1999/105/EC of 22 December 1999 on the marketing of forest reproductive material. OJ L 11, 15 January 2000, p. 28–39.

- Council Directive 98/56/EC.[6]

3.4. Elements to assess the potential for establishment and spread in the EU

3.4.1. Host range

Plants belonging to the genus *Pinus* are hosts for *Atropellis* spp. The major host in western North America is *Pinus contorta* (lodgepole pine). Other common hosts in North America are *P. monticola* and *P. ponderosa* (EPPO PQR, 2014; Shakhramanov, 2000; Horst, 2013; Lightle and Thompson, 1973; USDA-ARS; Natural Resources Canada; Table 6).

Table 6: Host range of *Atropellis pinicola*, *A. piniphila*, *A. apiculata* and *A. tingens* in both natural and naturalised stands

Host	*A. pinicola*	*A. piniphila*	*A. apiculata*	*A. tingens*
Pinus albicaulis (whitebark pine)	Host	Host		
Pinus banksiana (jack pine)		Incidental host		Host
Pinus caribbea (Caribbean pine)			Minor host	Host
Pinus contorta (lodgepole pine)	Major host	Major host		
Pinus densiflora (Japanese red pine)		Incidental host		Incidental host
Pinus echinata (shortleaf pine)		Minor host	Host	Host
Pinus elliottii (slash pine)			Host	Host
Pinus jeffreyi (Jeffrey pine)		Incidental host		
Pinus lambertiana (sugar pine)	Minor host			
Pinus monticola (western white pine)	Host	Host		Host
Pinus nigra (black pine)	Incidental host			Minor host
Pinus palustris (longleaf pine)			Host	
Pinus ponderosa (ponderosa pine)		Host		
Pinus pungens (Table mountain pine)				Host
Pinus resinosa (red pine)				Host
Pinus rigida (pitch pine)				Host
Pinus strobus (eastern white pine)	Incidental host			Host
Pinus sylvestris (Scots pine)	Incidental host			Host
Pinus taeda (loblolly pine)		Incidental host	Host	Host
Pinus virginiana (Virginia pine)		Incidental host	Host	Host

The susceptibility to infection with *Atropellis* spp. of pine species native to Europe and Eurasia, such as *Pinus brutia*, *P. cembra*, *P. mugo*, *P. peuce*, *P. pinaster* and *P. sibirica*, is not known.

3.4.2. EU distribution of main host plants

The distribution of the five most widely known *Pinus* species, i.e. *P. nigra*, *P. sylvestris*, *P. contorta*, *P. strobus* and *P. banksiana*, is shown below (Figures 3 and 4). The five species are found throughout the entire risk assessment area except for Malta (Figures 3 and 4). The distribution map for *P. nigra* shows that this species occurs in France, Spain, Italy, Austria, Slovenia, Croatia, Bulgaria, Greece and Romania (Figure 3). *P. sylvestris* occurs in almost all EU MSs with the exception of Malta (Figure 3).

[6] Council Directive 98/56/EC of 20 July 1998 on the marketing of propagating material of ornamental plants. OJ L 226/16, 13.8.98, p. 17–40.

P. contorta occurs mainly in northern Europe including Ireland, the UK, Denmark, Norway, Sweden, and Finland. *P. strobus* occurs in many EU MSs but not in Ireland, the UK, Denmark, Norway, Sweden, Finland, Estonia, Latvia, Lithuania, Greece, Macedonia, Malta, Spain, Portugal or Poland. *P. banksiana* occurs in only two European countries (Figure 4).

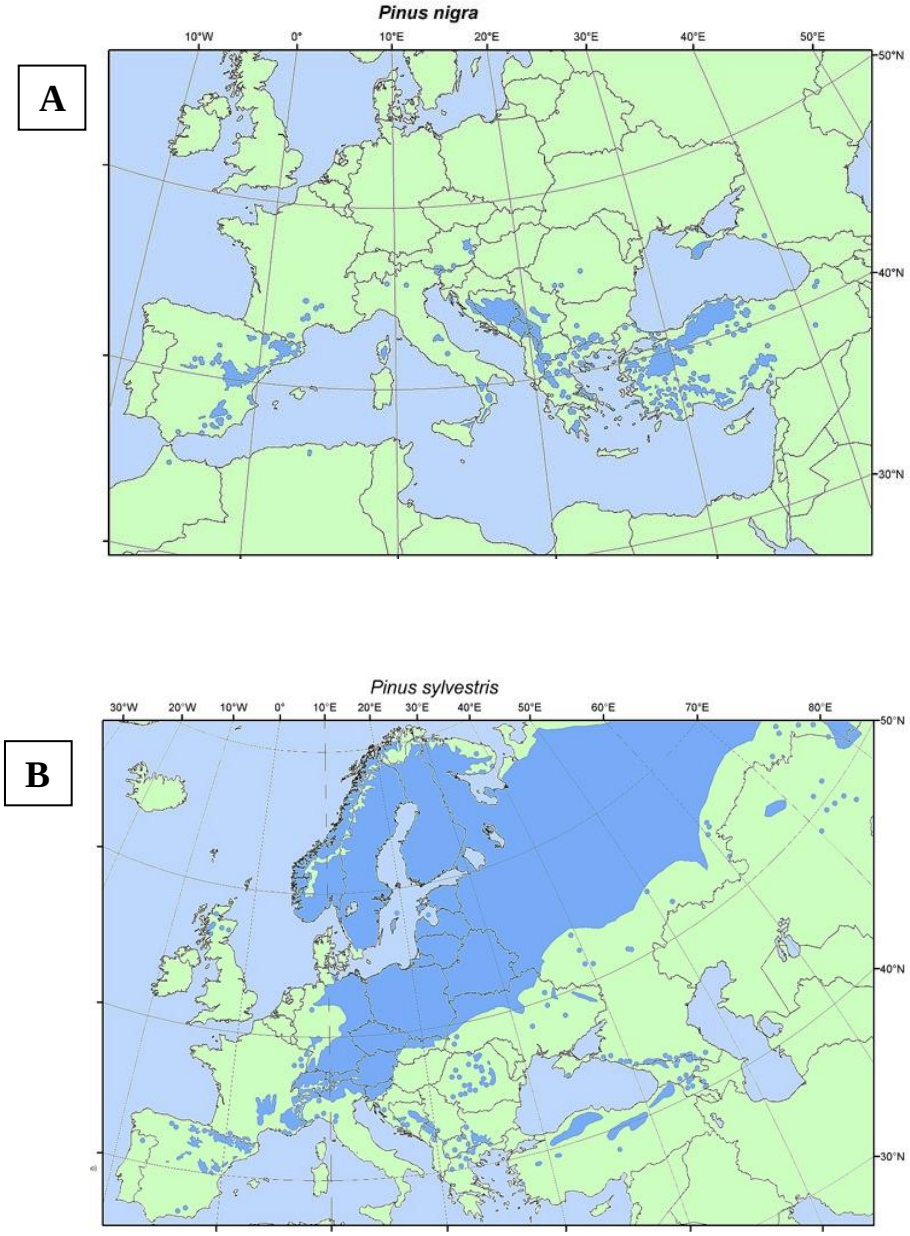

Figure 3: Distribution maps of *Pinus nigra* (A) and *P. sylvestris* (B) in Europe (prepared by EUFORGEN, 2009). These maps refer to the occurrence of *P. nigra* and *P. sylvestris* in both natural and naturalised forests

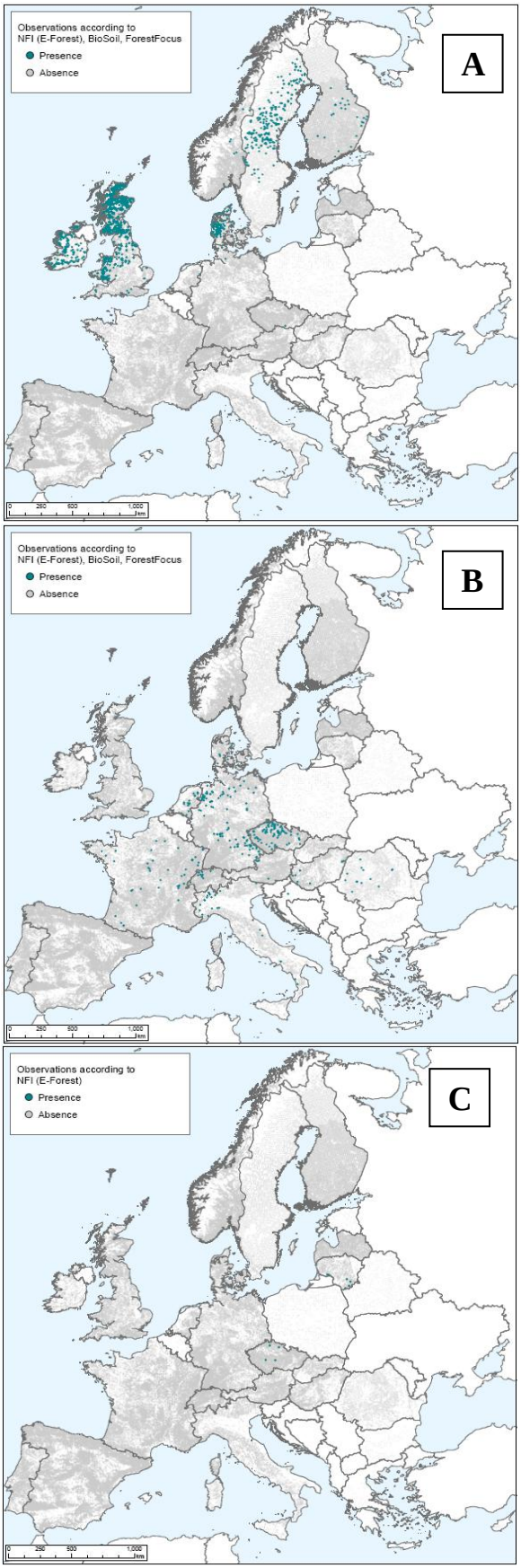

Figure 4: Presence of *Pinus contorta*, (A) *P. strobus* (B) and *P. banksiana* (C) in Europe and Eurasia (JRC, accessed 6 October 2014)

3.4.3. Analysis of the potential pest distribution in the EU

Atropellis spp. are currently known to occur in North America but not in the risk assessment area (see section 3.2).

In North America, the pest is present in areas with Dfc (cold, cold summer without dry season) and Dfb (cold, warm summer without dry season) climate types in Canada (Figure 5). It is also present in Cfa (temperate, hot summer without dry season) climates in the south-eastern areas of the USA, and in a range of climates in the western areas of the USA (Figure 5) which include Bsk (arid, steppe, cold), Csa (temperate, dry and hot summer), Csb (temperate, dry and warm summer) and Cfb (temperate, warm summer without dry season) climates.

In the risk assessment area, the Dfb climate type is prevalent in the eastern MSs, and Dfc in the Scandinavian peninsula and in the Alps (Figure 6). Bsk, Csb and Csa climate types are present in the Iberian peninsula, in the Mediterranean coast of France and in Italy; the Cfb climate is present in the central part of Europe and in the UK (Figure 6).

As hosts of *Atropellis* spp. are present in most parts of the risk assessment area (see section 3.4.2) and considering also the biology of the pathogen (see section 3.1.2) and the similarities between the European climate and the climate in Canada and the USA where the pathogen is known to be present (see section 3.2.1), the Panel concludes that there are no obvious eco-climatic factors limiting the potential establishment and spread of the pathogen in the risk assessment area.

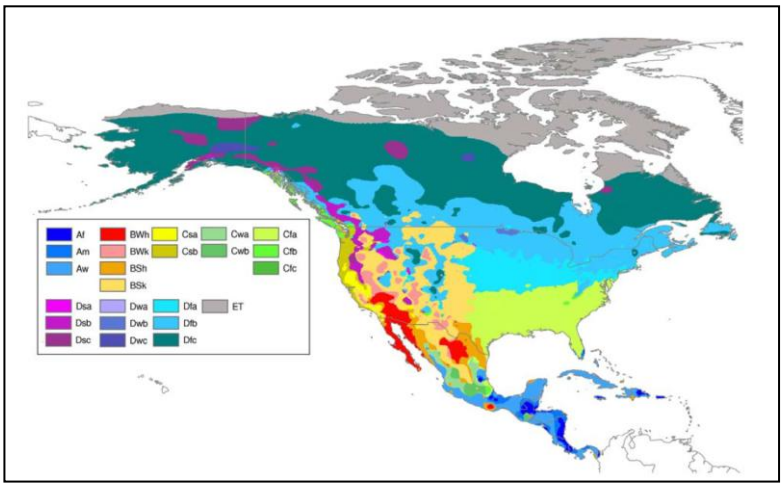

Figure 5: Köppen–Geiger climate map of North America (from Peel et al., 2007)

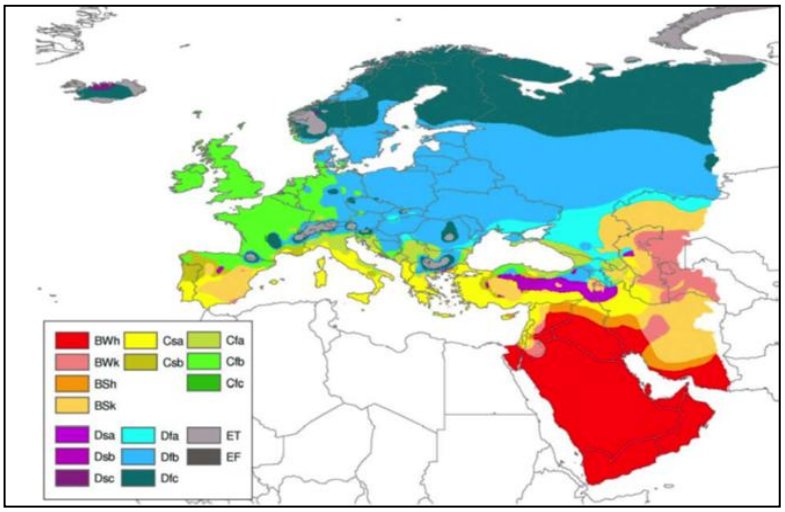

Figure 6: Köppen–Geiger climate map of Europe and western Asia (from Peel et al., 2007)

3.4.4. Spread capacity

3.4.4.1. Spread by natural means

Ascospores, the infectious spores of *Atropellis* spp., are produced within apothecia in cankers during the period early summer to early autumn (Lockman, 2005; Thomas and Pickel, 2010). Under wet conditions, ascospores are forcibly ejected into the air and are disseminated, primarily by wind, over a distance of up to 100 m from the inoculum source (Allen, 1994; Lockman, 2005). Rain is considered to play a secondary role in the dispersal of *Atropellis* spp. ascospores (Lockman, 2005; Rautapää, 2013).

3.4.4.2. Spread with human assistance

Atropellis spp. may spread over long distances by means of movement of infected host plants for planting, cut branches, wood or isolated bark (CABI/EPPO, 1997).

3.4.4.3. Spread rate

According to Baranyay and Stevenson (1965), a 10 % increase in the number of infected *P. contorta* (lodgepole pine) trees was recorded in a stand over a seven-year period, and the average number of cankers per tree increased three- to five-fold within eight years in another stand. Based on the above, and given that (i) *Atropellis* spp. do not grow quickly (Biais et al., 1951), (ii) depending on the age of the host, it takes 2–20 years for the fruiting bodies of *Atropellis* spp. to be produced on the cankered host parts (Hopkins, 1963; Lockman, 2005) and (iii) the ascospores of the pathogens can be dispersed over a relatively short distance (less than 100 m) by weather-related events (Lockman, 2005), it is expected that the rate of spread of *Atropellis* spp. by natural means, particularly wind, will be relatively low.

The rate of spread of the pathogens by human assistance (e.g. movement of infected host plants for planting, wood or isolated bark, etc.) is assumed to be more rapid and the dispersal distance greater than that by natural means.

3.5. Elements to assess the potential for consequences in the EU

3.5.1. Potential effects of *Atropellis* spp.

Atropellis spp. do not grow quickly and are not aggressive pathogens (Biais, 1951). Nevertheless, according to Baranyay et al. (1973), *Atropellis* canker caused by *A. piniphila* is important on

P. contorta (lodgepole pine), causing up to 31 % mortality in severely infected stands. The disease is rarely important on other pine species and generally never sufficiently severe to cause tree death (Rautapää, 2013). Although single cankers may occasionally kill small trees, mortality is uncommon in vigorous trees, and usually occurs only when multiple cankers encircle the stem. Disease incidence varies from low percentages (Van der Kamp, 1994) to 44–50 % (Biais et al., 1951; Hopkins and Callan, 1991) or up to 78 %, with the highest levels occurring in dense stands (Hopkins, 1963). Disease severity is also variable; according to Hopkins and Callan (1991), in one of the most severely infected stands in Alberta, a total of 40–60 stem cankers per tree were observed, and one tree had over 100 stem cankers.

The cankers may cause malformation of the trees resulting in lower wood quality or tree marketability (Biais et al., 1951; Hopkins, 1969; Sinclair and Lyon, 2005, Thomas and Pickel, 2010). In cankered parts of the host, copious amounts of resin are produced, and the bark is tightly attached to the underlying wood, thus affecting the debarking and chipping characteristics of the wood (Baranyay et al., 1973). According to Nevill et al. (1989) and Baranyay et al. (1973), the disease caused by *A. piniphila* on *P. contorta* var. *latifolia* may reduce the volume (tree height and diameter) of severely infected trees by up to 56 %. The blue-black stain of the wood associated with the presence of cankers does not affect the quality of wood. The static mechanical properties of infected wood are also unaffected; in contrast, the bending stiffness (modulus of elasticity) of lumber may be significantly reduced (Baranyay et al., 1973; Nevill et al., 1990). Baranyay et al. (1973) reported that pulp yield loss of *P. contorta* due to the disease was 5–6 % and pulp properties of infected wood were slightly lower than those of healthy wood. Bleaching of wood was very difficult and could be costly, as approximately 50 % more available chlorine was required (Hopkins, 1969; Hunt and Kuechler, 1970; Baranyay et al., 1973).

Sinclair and Lyon (2005) mentioned that *A. tingens* is economically important as a pathogen in Christmas tree farms, but no data were provided on yield or quality losses.

No recent information is available in the literature on the consequences of *Atropellis* spp. in the infested areas of North America. No information is available on possible environmental effect of the disease. In summary, in North America the impacts of *Atropellis* spp. in forests are minor. Damage caused by the pathogens tends to be sporadic and of limited extent. In Christmas tree farms, particularly in eastern North America, *A. tingens* is also of relatively minor importance as a pathogen that may cause damage which can reduce the value of trees, but it is not a significant cause of mortality. In both forests and in Christmas tree farms, damage from *Atropellis* spp. is minimal and can be controlled by appropriate sanitation.

3.5.2. Observed impact of *Atropellis* spp. in the EU

No impacts of *Atropellis* spp. have been observed in the EU, as the pathogens are not known to occur in Europe.

3.6. Currently applied control methods in the EU

No evidence of the disease is reported in the EU. Cultural practices and sanitary measures are used in the infested area in Canada and the USA to control *Atropellis* spp.

3.6.1. Cultural practices and sanitation measures

The following cultural practices and sanitation measures can be used against *Atropellis* species in the areas where the disease occurs.

(i) Thinning of dense stands. Thinning of 2 000–2 500 stems/ha is recommended (Stanek et al., 1986). Stands should be thinned before trees reach a susceptible age, especially if there are infected trees nearby (Hopkins, 1969).

(ii) Using a mix of species or an alternative, non-susceptible species for reforestation purposes (Hopkins, 1969).

(iii) Purchasing plant disease-free stock only (Thomas and Pickel, 2010).

(iv) Removal and burning of trees with cankers on the main stem or trees with a heavy infection (Thomas and Pickel, 2010).

(v) Pruning of cankered branches 15.2–30.5 cm below the canker or where the branch attaches to the main stem. Remove and burn infected material. Disinfect shears with 70 % alcohol or a bleach solution between cuts, as spores can be spread on tools (Thomas and Pickel, 2010).

(vi) Clear-cut, in strips or large blocks, heavily infected stands. Because the canker often occurs in concentrated pockets, clear-cutting may largely eliminate the disease in local areas (Lightle and Thompson, 1973).

(vii) Maintaining of a buffer of at least 100 m between old infected trees and regeneration, in order to minimise wind dispersal of viable spores to the regeneration (Hopkins, 1969).

(viii) Removal of host trees of a susceptible age (over 15 years) that are growing near young regeneration before the regeneration becomes susceptible (Hopkins, 1969).

3.6.2. Chemical control

No chemical control methods exist (Hopkins and Callan, 1991).

3.6.3. Host genetic resistance

No resistant host genotypes have been known to be selected against these pathogens.

3.6.4. Biological control

No biological control methods exist.

3.7. Uncertainty

Uncertainty on detection and identification of the pathogens: detection is based on visual symptoms but it is necessary that the apothecia are present, and apothecia may require several years to appear. Identification is also based on the presence of apothecia with ascospores.

Uncertainty about pest distribution in the EU: no information was received from eight NPPOs.

Uncertainty on host range of *Atropellis* spp. in Europe: susceptibility of pine species native to Europe and Eurasia to *Atropellis* spp. infection is not known. These pine species include *Pinus brutia*, *P. cembra*, *P. mugo*, *P. peuce*, *P. pinaster* and *P. sibirica.*

Uncertainty on the potential consequences of *Atropellis* spp. in the risk assessment area due to the lack of information on the susceptibility of some indigenous pine species to *Atropellis* spp.

CONCLUSIONS

The Panel summarises, in Table 7, below, its conclusions on the key elements addressed in this scientific opinion in consideration of the pest categorisation criteria defined in ISPM 11 and ISPM 21, and of the additional questions formulated in the terms of reference.

Table 7: The Panel's conclusions on the pest categorisation criteria defined in ISPM No 11 and No 21 and on the additional questions formulated in the terms of reference.

Criterion of pest categorisation	**Panel's conclusions on ISP M11 criterion** *Provide answers to the questions in the column below*	**Panel's conclusions on ISPM 21 criterion** *Provide answers to the questions in the column below*	**Uncertainties** *List the key uncertainties*
Identity of the pest	*Is the identity of the pest clearly defined? Do clearly discriminative detection methods exist for the pest* *Atropellis* spp. are clearly defined organisms and differentiation between species is based on their morphological and cultural characteristics		Uncertainty number 1
Absence/ presence of the pest in the risk assessment area	*Is the pest absent from all or a defined part of the risk assessment area?* *Atropellis* spp. are not known to occur in 20 EU MSs. No information exists for 8 MSs	*Is the pest present in the risk assessment area?* *Atropellis* spp. are not known to occur in the risk assessment area	Uncertainty number 2
Regulatory status	*Mention in which annexes of Council Directive 2000/29/EC and the marketing directives the pest and associated hosts are listed without further analysis. Indicate also whether the hosts and/or commodities for which the pest is regulated in AIIAI or II are comprehensive of the host range.* *Atropellis* spp. are regulated in Annex IIAI of Council Directive 2000/29/EC. Hosts are regulated in Annexes III, IV and V of Council Directive 2000/29/EC. Host plants of *Atropellis* spp. are explicitly mentioned in the following marketing directives: Council Directive 1999/105/EC and Council Directive 98/56/EC.		
Potential establishment and spread	*Does the risk assessment area have ecological conditions (including climate and those in protected conditions) suitable for the establishment and spread of the pest?* *Indicate whether the host plants are also grown in areas of the EU where the pest is absent.* *And, where relevant, are host species (or near relatives), alternative hosts and vectors present in the risk assessment area?* Since hosts of *Atropellis* spp. are present in most parts of the risk assessment area and there are similarities between the European climate and the climate in Canada and the USA where the pathogen is known to be present, there are no obvious eco-climatic factors limiting the potential establishment and spread of the pathogen in the risk assessment area.	*Are plants for planting a pathway for introduction and spread of the pest?* Infected host plants for planting, especially asymptomatic ones, are a pathway for the introduction and spread of *Atropellis* spp. in the risk assessment area	Uncertainty number 3

Criterion of pest categorisation	Panel's conclusions on ISP M11 criterion *Provide answers to the questions in the column below*	Panel's conclusions on ISPM 21 criterion *Provide answers to the questions in the column below*	Uncertainties *List the key uncertainties*
	Atropellis spp. can spread over short distances by means of ascospores, which are dispersed primarily by wind and secondarily by rain. *Atropellis* spp. may spread over long distances by means of movement of infected host plants for planting, especially asymptomatic plants, cut branches, wood or isolated bark.		
Potential for consequences in the risk assessment area	*What are the potential for consequences in the risk assessment area?* *Provide a summary of impact in terms of yield and quality losses and environmental consequences* Potential consequences of introduction and establishment of *Atropellis* spp. in the risk assessment area may include decreased value of certain pine products (lumber, wood chips, etc.) and possibly of nursery/ornamental pine plants. However, it needs to note that the level of damage caused by *Atropellis* spp. in Canada and USA, where the pathogens are known to be present, tends to be sporadic and of limited extent; in both forests and nursery tree farms, damage from *Atropellis* spp. is moderate and can be successfully controlled by appropriate sanitation. No information is available on possible environmental effect of the disease.	*If applicable is there indication of impact(s) of the pest as a result of the intended use of the plants for planting?* There is no indication on impacts of *Atropellis* spp. as a result of intended use of infected plants for planting.	Uncertainty number 4
Conclusion on pest categorisation	*Provide an overall summary of the above points* *Atropellis* spp. are clearly defined organisms and differentiation between the species is based on the morphological and cultural characteristics. *Atropellis* spp. are not known to occur in 22 EU MSs. No information exists for 8 MSs. Since hosts of *Atropellis* spp. are present in most parts of the risk assessment area and there are similarities between the European climate and the climate in Canada and the USA where the pathogens are known to be present, there are no obvious eco-climatic factors limiting the potential establishment and spread of the pathogens in the risk assessment area. *Atropellis* spp. can spread over short	*Provide an overall summary of the above points* Infested host plants for planting, especially asymptomatic ones, are a pathway for the introduction and spread of *Atropellis* spp. in the risk assessment area. There is no indication on impacts of *Atropellis* spp. as a result of intended use of the plants for planting	

Criterion of pest categorisation	**Panel's conclusions on ISP M11 criterion** *Provide answers to the questions in the column below*	**Panel's conclusions on ISPM 21 criterion** *Provide answers to the questions in the column below*	**Uncertainties** *List the key uncertainties*
	distances by means of ascospores and over long distances by means of movement of infected host plants for planting, cut branches, wood or isolated bark. Potential consequences in the risk assessment area include decreased value of certain pine products (lumber, wood chips etc.) and possibly nursery/ornamental pine plants. Damage caused by the pathogens in the infested areas tends to be sporadic and of limited extent; damage can be controlled by appropriate sanitation. No information is available on possible environmental effect of the disease.		
Conclusion on specific ToR questions	*If the pest is already present in the EU, provide a brief summary of the analysis of the present distribution of the organism in comparison with the distribution of the main hosts, and the distribution of hardiness/climate zones, indicating in particular if in the risk assessment area, the pest is absent from areas where host plants are present and where the ecological conditions (including climate and those in protected conditions) are suitable for its establishment, and* *the analysis of the observed impacts of the organism in the risk assessment area* The pest is not known to occur in the EU.		

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ABBREVIATIONS

EFSA	European Food Safety Authority
EPPO	European and Mediterranean Plant Protection Organization
EPPO-PQR	European and Mediterranean Plant Protection Organisation Plant Quarantine Retrieval System
EU	European Union
ISPM	International Standards for Phytosanitary Measures
MS(s)	Member State(s)
NPPO	National Plant Protection Organisation
PLH Panel	Plant Health Panel