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Pest risk analysis

PEST RISK ASSESSMENT SCHEME FOR QUARANTINE PESTS

DISCULA DESTRUCTIVA

DRAFT

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DECISION-MAKING SCHEME

Stage 1: Initiation

Reason for PRA:
The fungus *Discula destructiva*, which origin is unknown, caused since the late '70th serious losses to North American native flowering dogwood (*Cornus florida* and *C. nuttallii*) **(1).** The disease in EPPO region, was intercepted in 1995 by United Kingdom on imported *C.florida* from USA, found in Germany in 2002 and reported in Italy in 2003. *D. destructiva* has been added to EPPO Alert List **(2).**
In Lombardia region (North of Italy) the disease is responsible of severe tree damages on *C. florida* and *C. nuttallii* in one nursery and in 2004 it was found in private gardens and parks. **(3)**
In Europe and in Italy the main hosts *C. florida* and *C. nuttallii* and other ornamental *Cornus* (*C. controversa, C. kou*sa cv. 'Chinensis', *C.sericea*) are not naturally present in forest, but they are valuable ornamental plants for parks and gardens, for this reason *D. destructiva* could present a risk to the nursery industry. Data on the susceptibility of European *Cornus* species is lacking in particular on *C.s anguinea, C. mas* appears as broadly resistant **(4**).

Identify pest **This section examines the identity of the pest to ensure that the assessment is being performed on a real identifiable organism and that the biological and other information used in the assessment is relevant to the organism in question.**		
1. Is the organism clearly a single taxonomic entity and can it be adequately distinguished from other entities of the same rank? **if yes** **if no** Go to 3 Go to 2	**Yes**	***Discula destructiva*** **(**Redlin) Fungi.: Phylum Ascomycota; Subphylum: Pezizomycotina; Class: Sordariomycetes; Subclass: Sordariomycetidae; Order: Diaporthales; Family Gnomoniaceae; mitosporic Gnomoniaceae; Genus: *Discula*; Specie: Discula destructiva. **(5)** Anamorphic fungus Perfect stage: unknown **(6)** Phylogenetically related to Diaporthales **(7)**

2. Attempt to redefine the taxonomic entity so that the criteria under 1 are satisfied. Is this possible? if yes Go to 3 **if no Go to 22**		--
The PRA area **The PRA area can be a complete country, several countries or part(s) of one or several countries.** 3. Clearly define the PRA area. Go to 4		EPPO Region
Earlier analysis **The pest, or a very similar pest, may have been subjected to the PRA process before, nationally or internationally. This may partly or entirely replace the need for a new PRA.**		
4. Does a relevant earlier PRA exist? if yes Go to 5 **if no Go to 7**	**No**	
5. Is the earlier PRA still entirely valid, or only partly valid (out of date, applied in different circumstances, for a similar but distinct pest)? **if entirely valid: End** **if partly valid Go to 6** **if not valid Go to 7**		
6. Proceed with the assessment, but compare as much as possible with the earlier assessment. Go to 7		
Stage 2: Pest Risk Assessment		
Section A: Pest categorization (qualitative criteria of a quarantine pest)		

Geographical criteria **This section considers the geographic distribution of the pest in the PRA area.**		
7. Does the pest occur in the PRA area? **if yes Go to 8** **if no Go to 9**	**Yes**	Found in 2003 in one nursery in Mariano Comense (CO), Lombardia (Italy) In 2004 found in two private gardens in Carimate (CO) and in one park in Minoprio (CO), Lombardia (/Italy). The disease in EPPO region was intercepted in 1995 by United Kingdom on imported *C. florida* from USA, found with several outbreak in Germany since 2002 (G. Schrader, personal communication) and reported in Italy in 2003. **(2)**
8. Is the pest of limited distribution in the PRA area? *Note*: 'of limited distribution' means that the pest has not reached the limits of its potential range either in the field or in protected conditions; it is not limited to its present distribution by climatic conditions or host-plant distribution. There should be evidence that, without phytosanitary measures, the pest would be capable of additional spread. **if yes Go to 18** **if no Go to 22**	**Yes**	Every country in which flowering ornamental *Cornus* are cultivated could be threaten by the spread of the pathogen
Potential for establishment **For the pest to establish, it must find a widely distributed host plant in the PRA area (do not consider plants which are accidental/very occasional hosts or recorded only under experimental conditions). If it requires a vector, a suitable species must be present or its native vector must be introduced. The pest must also find environmental conditions suitable for survival, multiplication and spread, either in the field or in protected conditions.**		
9. Does at least one host plant grow to a substantial extent in the PRA area, in the open, in protected conditions or both? **if yes Go to 10** **if no Go to 22**		

10.	Does the pest have to pass part of its life cycle on a host plant other than its major host (i.e. obligate alternate host plant)? **if yes Go to 11** **if no Go to 12**		
11.	Does the alternate host plant also occur in the same part of the PRA area as the major host plant? **if yes Go to 12** **if no Go to 22**		
12.	Does the pest require a vector (i.e. is vector transmission the only means of dispersal)? **if yes Go to 13** **if no Go to 14**		
13.	Is the vector (or a similar species which is known or suspected to be a vector) present in the PRA area or likely to be introduced? If in doubt, a separate assessment of the probability of introduction of the vector (in section B1) may be needed. **if yes Go to 14** **if no Go to 22**		
14.	Does the known geographical distribution of the pest include ecoclimatic zones comparable with those of the PRA area? **if yes Go to 18** **if no Go to 15**		
15.	Is it probable, nevertheless, that the pest could survive and thrive in a wider ecoclimatic zone that could include the PRA area? **if yes Go to 18** **if no Go to 16**		

16. Could the ecoclimatic requirements of the pest be found in protected conditions in the PRA area? **if yes Go to 17** **if no Go to 22**		
17. Is a host plant grown in protected conditions in the PRA area? **if yes Go to 18** **if no Go to 22**		
Potential economic importance **Economic impact principally concerns direct damage to plants but may be considered very broadly, to include also social and environmental aspects. The effect of the presence of the pest on exports from the PRA area should also be allowed for.** **In deciding whether economically important damage or loss to plants may occur, it is necessary to consider whether climatic and cultural conditions in the PRA area are conducive to damage expression, which is not always the case even if both host and pest survive under these conditions.** *Note*: when performing a PRA on a pest that is transmitted by a vector, consider also any possible damage that the vector may cause.		
18. With specific reference to the host plant(s) which occur(s) in the PRA area, and the parts of those plants which are damaged, does the pest in its present range cause significant damage or loss? **if yes Go to 21** **if no Go to 19**	**Yes**	The damages found on *C. .florida* and *C. nuttallii* in the nursery in Mariano Comense (CO) were quite important for the number of plants attacked and for the entity of symptoms particularly serious for their esthetic and economic damage on high value ornamental plants such as flowering *Cornus.* **(3) (8)**
19. Could the pest, nevertheless, cause significant damage or loss in the PRA area, considering ecoclimatic and other factors for damage expression? **if yes Go to 21** **if no Go to 20**		
20. Would the presence of the pest cause other negative economic impacts (social, environmental, loss of export markets)? **if yes Go to 21** **if no Go to 22**		

21. **This pest could present a risk to the PRA area** **Go to section B**	**Yes**	The dogwood anthracnose could spread in *Cornus* plantations with severe damages and in gardens where flowering dogwoods are valuable ornamental trees.**(8)**
22. **This pest does not qualify as a quarantine pest for the PRA area** and the assessment can stop. However, if this is the first time that the decision-making scheme has directed you to this point, it may be worth returning to the question that led you here and continuing through the scheme in case the remaining questions strongly indicate categorization as a possible quarantine pest. In this latter case, seek a second opinion to decide whether the answers which led you to this point could be given a different reply.		

Entry **List the pathways that the pest could be carried on.** *Note*: a pathway can be any form of human activity that could transport the pest from a particular origin, e.g. plants and plant products moving in trade, any other traded commodity, containers and packing, ships, planes, trains, road transport, passengers, mail, etc. Note that similar means of pest transport from different origins can present greatly different probabilities of introduction, depending on the concentration of the pest in the area of origin. The pathways given should be only those already in operation, or proposed.		(1) Plants of *Cornus* species for planting. Nursery stock and other propagation material (scion wood) Plants for planting are a frequent pathway. The spread of the diseases have been attributed to movement of nursery tock from infested areas. Conidiomata on infected steams and on blighted leaves provide inoculum for new infection **(8)**. Scion wood could carry the pathogen without any visible symptoms, but if infected scion wood was grafted it is quite sure that that portion would die. Spread by scion wood has not been reported nevertheless there might be a potential danger in shipping the pathogen into new areas on infected scion wood . (2) Seeds of *Cornus* species *D. destructiva* is present in the seeds or seeds coats of infected dogwood fruits. Movement of infected seeds may contribute to the long distance spread of *D. destructiva.* **(9)** If infected seed remain viable, seed transmission of *D. destructiva* might contribute directly to the spread of anthracnose. Non viable seed might contribute indirectly by contaminating healthy seed. **(10)** Seeds and fruits are used for *Cornus* propagation and for produce root-stock. It is therefore advisable to avoid collecting any seeds for nursery production from trees in areas affected by anthracnose**. (9-10)** (3) Fruit of *Cornus* species High levels of infection of dogwood fruits by *D. destructiva* may also depend on favourable infection condition, throughout the season. Dissemination of infected fruits by wild life is also possible. **(10-11)** This pathway is theoretical and not relevant

Listing of pathways continued		(4) Wood of *Cornus* species. Raw wood and wood products of *Cornus* spp. may be infected but these pathways are not reported that are relevant to diffusion. (1) - (2) from *C. florida* and *C.nuttallii* infested areas in the USA and Canada **(12)**, Germany, Italy.
1.1 How many pathways could the pest be carried on? **(few = 1; many =9)**	**6**	See above
1.2 For each pathway, starting with the most important pathway identified above (i.e. that which carries the greatest trade or which is most likely to act as a means of introduction) and then in descending order of importance, answer questions 1.3 – 1.13. If one of the questions 1.3a, 1.5a, 1.7a or 1.12a is answered by 'no', the pathway could **not** act as a means of entry for the pest, and the scheme will return directly to this point, omitting later questions. Use expert judgement to decide how many pathways to consider. Go to 1.3		
1.3a Could the pest be associated with the pathway at origin? *Note*: does the pest occur in the area of origin? Is the pest in a life stage which would be associated with commodities, containers, or conveyances? **if yes Go to 1.3b** **if no Go to 1.2**	**Yes**	(1) Plants Yes (2) Seeds Yes
1.3b How likely is the pest to be associated with the pathway at origin? **(not likely = 1; very likely = 9)**	**8-9**	Generally, it is very likely, that plants, propagation material, seeds from (heavily) infested areas harbour the fungus. **(9)**
1.4 Is the concentration of the pest on the pathway at origin likely to be high? **(not likely = 1; very likely = 9)**	**7-8**	Plants, propagation material, seeds and fruits originating from (heavily) infested areas could harbour the fungus in high concentrations in infected tissue.

1.5a	Could the pest survive existing cultivation or commercial practices? *Note*: these are practices mainly in the country of origin, such as pesticide application, removal of substandard produce, kiln-drying of wood. **if yes Go to 1.5b** **if no Go to 1.2**	**Yes (1)** **Yes (2)**	
1.5b	How likely is the pest to survive existing cultivation or commercial practices? **(not likely = 1; very likely = 9)**	**(1) 8** **(2) 4**	No chemicals are usually applied on these crops and native plants to control fungal diseases. The most important pathway is represented by plants and nursery stock. The fungus survives in latent overwintering structures (conidiomata) on wood. Seeds are less important for the spread**.** Usually no treatments are used on propagation materials (plants and seed).

1.6	How likely is the pest to survive or remain undetected during existing phytosanitary procedures? *Note*: existing phytosanitary measures (e.g. inspection, testing or treatments) are most probably being applied as a protection against other (quarantine) pests; the assessor should bear in mind that such measures could be removed in the future if the other pests were to be re-evaluated. The likelihood of detecting the pest during inspection or testing will depend on a number of factors including: • ease of detection of the life stages which are likely to be present. Some stages are more readily detected than others, for example insect adults may be more obvious than eggs; • location of the pest on the commodity - surface feeders are more readily detected than internal feeders; • symptom expression - many diseases may be latent for long periods, at certain times of the year, or may be without symptoms in some hosts or cultivars and virulent in others; • distinctiveness of symptoms - the symptoms might resemble those of other pests or sources of damage such as mechanical or cold injury; • the intensity of the sampling and inspection regimes; • distinguishing the pest from similar organisms. **(not likely = 1; very likely = 9)**	**(1) 7** **(2) 9**	(1) Plants (score 1) Infected trees in field display symptoms and detection is possible on leaf and wood. If traded as pot plants it is possible to detect the disease. (score 9) Nursery stock from infested areas could carry the pathogen without any visible symptom. Infact the commodity is generally traded in autumn and winter when it is not possible to detect symptoms on leaves. (2) Seeds Infestation of seeds is not visible. It is therefore very likely that seeds from infested areas are highly infested. Contamination of seeds depends also on favourable infection condition, throughout the season. *D. destructiva* may colonize seeds rather than fruits**. (9)**
1.7a	Could the pest survive in transit? *Note*: consideration should be given to: • speed and conditions of transport; • vulnerability of the life-stages likely to be transported; • whether the life cycle is of sufficient duration to extend beyond time in transit; • the number of individuals likely to be associated with a consignment. Interception data can be used to estimate the ability of a pest to survive in transit. **if yes Go to 1.7b** **if no Go to 1.2**	**Yes**	

1.7b	How likely is the pest to survive in transit? **(not likely = 1; very likely = 9)**	**9**	The fungus is able to survive in infected tissues, blighted leaves, cankers, infected twigs and branches. **(8)** *D. destructiva* survive in seeds or seeds coats and fruits of infected dogwood. **(9)** There is no exact information how long it would survive in stored seeds.
1.8	Is the pest likely to multiply during transit? **(not likely = 1; very likely = 9)**	**(1) 3** **(2) 2**	(1) Plants. If conditions during transit favour the multiplication (moist and not too cold). (2) Seeds. Multiplication is unlikely. Non viable seed might contribute indirectly by contaminating healthy seed. **(9)**
1.9	How large is movement along the pathway? *Note*: the volume of material being moved. **(not large = 1; very large = 9)**	**2-3**	From USA, Canada, Germany the volume of dogwood material moving is not known, research for information is still in process, but it is estimated to be low. In Italy dogwood material moving between nurseries is estimated to be low according to the fact that nurserymen refer to propagate *Cornus* by themselves, by seeds and grafting.
1.10	How widely is the commodity to be distributed throughout the PRA area? *Note*: the more scattered the destinations, the more likely it is that the pest might find suitable habitats. **(not widely = 1; very widely = 9)**	**9**	From nurseries, flowering dogwood plants are scattered throughout the PRA area, first in garden centres than to private garden and parks; Mostly of the PRA area is climatically suitable for the establishment of the disease if the hosts are present. **(3)** No data have been found about the diffusion of European native *Cornus* in EPPO area.
1.11	How widely spread in time is the arrival of different consignments? *Note*: introduction at many different times of the year will increase the probability that entry of the pest will occur at a life stage of the pest or the host suitable for establishment. **(not widely = 1; very widely = 9)**	**4**	The number of arrivals of different consignments is not well known. At least it is estimated to be low according to the fact that nurserymen refer to propagate *Cornus* by themselves, by seeds and grafting .

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1.12a Could the pest transfer from the pathway to a suitable host? *Note*: consider innate dispersal mechanisms or the need for vectors, and how close the pathway on arrival is to suitable hosts. **if yes** Go to 1.12b **if no** Go to 1.2	**Yes** **Yes.**	(1)Plants. Dispersal with splashes of rain and wind. (Daughtrey et al., 1993). New accessions of *Cornus* species and cultivar from infected areas could represent a risk for introduction of *D. destructiva* in nurseries. (2) Seeds If infected seed remain viable, seed transmission of *D. destructiva* might contribute directly to the spread of anthracnose**. (9)**
1.12b How likely is the pest to be able to transfer from the pathway to a suitable host? **(not likely = 1; very likely = 9)**	**(1) 9** **(2) 9**	(1) This is very likely if infected *Cornus* plants and seeds were planted/sown in the vicinity of host plants, and possibly even, if host plants are far away. Spread by infected seeds and seedlings on nursery stock is possible. **(9)**
1.13 Is the intended use of the commodity (e.g. processing, consumption, planting, disposal of waste) likely to aid introduction? *Note*: consider whether the intended use of the commodity would destroy the pest or whether the processing, planting or disposal might be done in the vicinity of suitable hosts. **(not likely = 1; very likely = 9)**	**(1) 9** **(2) 9**	(1) and (2) are intended for sowing/planting and this use represent the best way to introduce and to spread pests.
Establishment		

1.14 How many host-plant species are present in the PRA area? **(one or very few = 1; many = 9)**	**9**	Flowering ornamental dogwoods *Cornus florida* (different cultivars) *Cornus nuttallii* (different cultivars) *Cornus kousa* cv. Chinensis *Cornus kousa* (different cultivars) *Cornus controversa* (different cultivars) European native dogwoods *Cornus mas* (resistant) *Cornus sanguinea* (no data about susceptibility**)**
1.15 How extensive are the host plants in the PRA area? **(rare = 1; widespread = 9)**	**Flowering dogwood in nursery (2)** **Native dogwood (4)**	No certain data are available about the extension of flowering dogwoods plantations, research for information is still in process. Flowering dogwoods are common in private garden and parks as ornamental trees. Native European dogwood (*C. mas* and *C. sanguinea*) are broadly present as understory trees in EPPO region, but their susceptibility is not clearly known but they seem to be resistant.
1.16 If an alternate host is needed to complete the life cycle, how extensive are such host plants in the PRA area? (rare = 1; widespread = 9)	**Not applicable**	
1.17 *[1]If a vector is needed for dispersal, how likely is the pest to become associated with a suitable vector? *Note*: is the vector present in the PRA area, could it be introduced or could another vector be found? **(not likely = 1; very likely = 9)**	**Not applicable**	

[1] Questions marked with an asterisk are to be considered as more important than the others in the same section.

1.18	(Answer this question only if protected cultivation is important in the PRA area.) Has the pest been recorded on crops in protected conditions elsewhere? **(no = 1; often = 9)**	**Not applicable**	
1.19	How likely are wild plants (i.e. plants not under cultivation, including weeds, volunteer plants, feral plants) to be significant in dispersal or maintenance of populations? **(not likely = 1; very likely = 9)**	**1**	The susceptibility of the European native dogwood is not clearly known but they seem to be resistant.
1.20	*How similar are the climatic conditions that would affect pest establishment in the PRA area and in the area of origin? *Note*: the climatic conditions in the PRA area to be considered may include those in protected cultivation. **(not similar = 1; very similar = 9)**	**9**	*D. destructiva* occurs on flowering dogwoods in areas of North America **(23)**, northwestern and northeastern USA, British Columbia and Ontario (Canada) **(24) (25)** which are climatically comparable to the central Europe.
1.21	How similar are other abiotic factors in the PRA area and in the area of origin? *Note*: the major abiotic factor to be considered is soil type; others are, for example, environmental pollution, topography/orography. **(not similar = 1; very similar = 9)**	**7**	Flowering dogwoods and *D. destructiva* occur in areas of North America, which are comparable to many areas of Europe. Flowering dogwoods are used in gardens and parks as shrubs and little ornamental understory trees often in shade position. **(13)**
1.22	How likely is the pest to have competition from existing species in the PRA area for its ecological niche? **(very likely = 1; not likely = 9)**	**9**	Though there is no information available, it is assumed, that this is true for the PRA area as well.
1.23	How likely is establishment to be prevented by natural enemies already present in the PRA area? **(very likely = 1; not likely = 9)**	**Not applicable**	

1.24 *If there are differences in the crop environment in the PRA area from that in the area of origin, are they likely to aid establishment? *Note*: factors that should be considered include time of year that the crop is grown, soil preparation, method of planting, irrigation, whether grown under protected conditions, surrounding crops, management during the growing season, time of harvest, method of harvest, etc. **(not likely = 1; very likely = 9)**	**1**	High density of cultivation in nursery, overhead irrigation may favourite the diffusion and infection processes. **(14)**
1.25 Are the control measures which are already used against other pests during the growing of the crop likely to prevent establishment of the pest? **(very likely = 1; not likely = 9)**	**7**	Usually no control measures against fungal diseases on *Cornus* are used during the growing.
1.26 *Is the reproductive strategy of the pest and duration of life cycle likely to aid establishment? *Note*: consider characteristics which would enable the pest to reproduce effectively in a new environment, such as parthenogenesis/self-crossing, duration of the life cycle, number of generations per year, resting stage, etc. **(not likely = 1; very likely = 9)**	**9**	The fungus reproduces by clonal growth. It can produce masses of conidia. **(6)**
1.27 How likely are relatively low populations of the pest to become established? **(not likely = 1; very likely = 9)**	**9**	The introduction in nursery of few infected plants is likely to spread infection.
1.28 How probable is it that the pest could be eradicated from the PRA area ? **(very likely = 1; not likely = 9)**	**9**	Because of the difficulty of detection and control of the fungus and the rapid spread, eradication is not likely to be successful.
1.29 How genetically adaptable is the pest? *Note*: is the species polymorphic, with, for example, subspecies, pathotypes? Is it known to have a high mutation rate? This genotypic (and phenotypic) variability facilitates the pest's ability to withstand environmental fluctuations, to adapt to a wider range of habitats, to develop pesticide resistance and to overcome host resistance. **(not adaptable = 1; very adaptable = 9)**	**7**	According to Zhang and Blackwell **(15)** the genetic diversity of *Discula destructiva* population in the eastern coast USA is significantly higher than that in the western coast of USA. In the eastern USA, there are more *Cornus* species distributed in a wider range of habitats than in the western USA. This correlation infers adaptation of *D. destructiva*.

1.30 *How often has the pest been introduced into new areas outside its original range? *Note*: if this has happened even once before, it is important proof that the pest has the ability to pass through most of the steps in this section (i.e. association with the pathway at origin, survival in transit, transfer to the host at arrival and successful establishment). If it has occurred often, it suggests an aptitude for transfer and establishment. **(never = 1; often = 9)**	**7**	The origin of fungus is unknown. The fungus is believed to have been introduced into North America in 1970s, then dogwood anthracnose has been reported in British Columbia and in Canada **(12).** The disease in EPPO region, was intercepted in 1995 by United Kingdom on imported *C. florida* from USA, found in Germany in 2002 and reported in Italy in 2003. **(7-15)**
2. Economic impact assessment Identify the potential hosts in the PRA area, noting whether wild or cultivated, field or glasshouse. Consider these in answering the following questions. When performing a PRA on a pest that is transmitted by a vector, consider also any possible damage that the vector may cause. According to the pest and host(s) concerned, it may be appropriate to consider all hosts together in answering the questions once, or else to answer the questions separately for specific hosts. Note that, for most pest/crop/area combinations, precise economic evaluations are lacking. In this section, therefore, expert judgement is asked to provide an evaluation of the likely scale of impact. Both long-term and short-term effects should be considered for all aspects of economic impact.		
2.1 *How important is economic loss caused by the pest within its existing geographic range? **(little importance = 1; very important = 9)**	**2**	Native *Cornus* trees do not have an economic importance (only from the environmental point of view) , while only the nursery plants have an economic interest.
2.2 How important is environmental damage caused by the pest within its existing geographic range? *Note*: environmental damage may be impact on ecosystem health, such as effects on endangered/threatened species, keystone species or biodiversity. **(little importance = 1; very important = 9)**	**9**	Tree impact assessment studies documented how anthracnose severely affected native population of *Cornus florida* in the mid-Atlantic and South eastern U.S. **(16-17)**
2.3 How important is social damage caused by the pest within its existing geographic range? *Note*: social effects could be, for example, damaging the livelihood of a proportion of the human population, or changing the habits of a proportion of the population (e.g. limiting the supply of a socially important food). **(little importance = 1; very important = 9)**	**1**	No social impact is reported in the countries where the pathogen occurs

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2.4 *How extensive is the part of the PRA area likely to suffer damage from the pest? *Note*: the part of the PRA area likely to suffer damage is the *endangered area*, which can be defined ecoclimatically, geographically, by crop or by production system (e.g. protected cultivation). **(very limited = 1; whole PRA area = 9)**	**4**	Dogwood crops are present in England, Germany, Netherlands, Belgium. No data about the extension of the plantation are available.
Spread potential is an important element in determining how fast economic impact is expressed and how readily a pest can be contained.		
2.5 *How rapidly is the pest liable to spread in the PRA area by natural means? **(very slowly = 1; very rapidly = 9)**	**5**	Rapidly inside Cornus cultivations, because of density of the host. **(11)** Isolate plant in garden, parks might be infected, but slowly due to their low number and scattered spread..
2.6 How rapidly is the pest liable to spread in the PRA area by human assistance? **(very slowly = 1; very rapidly = 9)**	**4**	This depends on planting/sowing of infected trees/seeds and the trade of such plants
2.7 How likely is it that the spread of the pest could be contained within the PRA area? *Note*: consider the biological characteristics of the pest that might allow it to be contained in part of the PRA area; consider the practicality and costs of possible containment measures. **(very likely = 1; not likely = 9)**	**6**	Eradication would be nearly impossible, but spread could be slowed down by the elimination of infected trees.
2.8 *Considering the ecological conditions in the PRA area, how serious is the direct effect of the pest on crop yield and/or quality likely to be? *Note*: the ecological conditions in the PRA area may be adequate for pest survival but may not be suitable for significant damage on the host plant(s). Consider also effects on non-commercial crops, e.g. private gardens, amenity plantings. **(not serious = 1; very serious = 9)**	**7**	The dogwood cultivation are not widespread in Lombardia however up to now, the damages in one nursery were quite important for the number of plant attacked. **(3)** Serious aesthetic damage is reported on plants in private gardens and parks.

2.9	How likely is the pest to have a significant effect on producer profits due to changes in production costs, yields, etc., in the PRA area? **(not likely = 1; very likely = 9)**	**8**	The spread of *D. destructiva* in nurseries will make the costs of productions increase (additional cost for chemicals). Severe anthracnose attacks damage the aesthetic value of the trees which will results depreciated or impossible to sell.
2.10	How likely is the pest to have a significant effect on consumer demand in the PRA area? *Note*: consumer demand could be affected by loss in quality and/or increased prices. **(not likely = 1; very likely = 9)**	**5**	The costs of dogwood will increase and the aesthetic quality could get worse. The consumer will be not stimulated to buy species, which could require additional cost for good health maintenance.
2.11	How likely is the presence of the pest in the PRA area to affect export markets? *Note*: consider the extent of any phytosanitary measures likely to be imposed by trading partners. **(not likely = 1; very likely = 9)**	**2**	No data are known about the quarantine status of the disease in other countries.
2.12	How important would other costs resulting from introduction be? *Note*: costs to the government, such as research, advice, publicity, certification schemes; costs (or benefits) to the crop protection industry. **(little importance = 1; very important = 9)**	**2**	Considering the intended use of the plants is unlikely that public institutions set big budget in research on this disease.
2.13	How important is the environmental damage likely to be in the PRA area? **(little importance = 1; very important = 9)**	**2**	Little importance. Flowering dogwood are not native plants in EPPO region and their diffusion is limited to private gardens and parks.
2.14	How important is the social damage likely to be in the PRA area? **(little importance = 1; very important = 9)**	**1**	No social damage is estimated.
2.15	How probable is it that natural enemies, already present in the PRA area, will affect populations of the pest if introduced? **(very likely = 1; not likely = 9)**	**Not applicable**	

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2.16	How easily can the pest be controlled? *Note*: difficulty of control can result from such factors as lack of effective plant protection products against this pest, occurrence of the pest in natural habitats or amenity land, simultaneous presence of more than one stage in the life cycle, absence of resistant cultivars). **(easily = 1; with difficulty = 9)**	**6**	The management of the disease in nurseries and gardens is possible using growing and chemical techniques (a. i. propiconazole, chlorthalonil, are active against pathogen, the authorized employ should be verified in each country), but in urban environment spraying chemicals is not a normal behaviour. **(18-19)**
2.17	How likely are control measures to disrupt existing biological or integrated systems for control of other pests? **(not likely = 1; very likely = 9)**		No biological system exists on these crops against pests.
2.18	How likely are control measures to have other undesirable side-effects (for example on human health or the environment)? **(not likely = 1; very likely = 9)**	**1**	Chemical controls in urban environment may show different problems: toxicity of the a. i., not homogeneous distribution of a. i. on the canopy, undesired drift effect.
2.19	Is the pest likely to develop resistance to plant protection products? **(not likely = 1; very likely = 9)**	**1**	

Mis en forme

3. Final evaluation

Evaluation of available information and major uncertainties

The data about identity and biology of *Discula destructiva* are known and well documented. The fungus as been reported as causal agent of anthracnose only on plants of the genus *Cornus* **(8)**. The disease in PRA area was founded on *C. florida* and *C. nuttallii*, which are the most common dogwood species, cultivated. Some information about the susceptibility of the native European *Cornus* species is lacking: *Cornus mas* seems already to be

resistant **(4)**, while no data exist on *Cornus sanguinea.* Population studies indicated that the Italian strains of *D. destructiva* isolated from infected plants are identical to the U.S. western coast isolates **(3)**. The fungus has been introduced in the PRA area with infected nursery stock, probably originally coming from North America. No data about the trade of flowering *Cornus* plants among the countries belonging to the PRA area. In Italy (Lombardia) it's right to suppose that the volume of trade is estimated to be low: this kind of ornamental plant has limited request, the nurserymen at the present refer that they produce new plants by themselves and that they have not import *Cornus* plants from other European countries for several years

Estimate of pest risk

From the nine questions marked with an asterisk (more important than the others) five are rated high (scores 7 to 9), tree are rated low (scores 1, 2 and 4). From the 42 questions of the scheme that have been given a score, 20 are rated high, most of them were scored 9 for at least one pathway.
This indicates an increased risk posed by the fungus. The most important pathway is the infected material, plants and nursery stock. On the other hand, trade with material that could be infected is estimated to be very low. Certainly the spread of the pest in nursery, by infected plants, is therefore estimated to be high (because of the density of host). The diffusion in the PRA area is strictly in relation to the previous presence of the hosts, which is often isolated and has scattered distribution. Inside the EPPO area where flowering dogwood are cultivated the more suitable conditions in which the pest could occur are those characterised by temperate weather with raining spring and autumn. Up to now, the pathogen is known to occur in German, Italy **(2).** Considering the findings in Italy and Germany, it is possible that the disease can be present also in other northern Europe countries.
Probable level of economic impact: high for the nursery specialised on production of *Cornus* **(8)**. Reliable control measures are available at the moment. **(18-19-20-21-22)**

It might be appropriate to take some phytosanitary measures to prevent further movements of infected material (no movement of material should be allowed from infected dogwood nursery) through the EPPO area. Extension plans would be important to let producers know about the disease.

Discula destructiva represents a threat only for flowering dogwood which are present but not very common in garden and parks inside the PRA area, so the decision to take phytosanitary measures should be evaluated also considering the risk for each EPPO countries especially where the populations

of such species are high. Detailed reports and data about sanitary conditions of flowering *Cornus* should be collected from each EPPO country where these plants are present.

At the present there are not enough data to evaluate the risks for European native *Cornus* and for flowering dogwood cultivated inside the EPPO area, so there is a lack of elements to estimate the opportunity to take quarantine measures against *Discula destructiva.*

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