Decision support scheme conducted for *Gibberella circinata*

Part A: Key information and selection of measures
A1. Basic information

A1.1 - Pest common name
Pitch canker disease

A1.2 - Scientific name
Teleomorph: Gibberella circinata Nirenberg et O'Donnell
Anamorph: Fusarium circinatum Nirenberg et O'Donnell
Synonyms: Fusarium subglutinans f. sp. Pini Hepting, Fusarium moniliforme Sheldon var. subglutinans Wollenweber, Fusarium lateritium f. sp. Pini Hepting.

A1.2b - Indicate the type
pathogen

A1.3 - Stage(s) of the life cycle present
Mycelium and spores

A1.4 - Location (attach maps if available)

Gibberella circinata has been recently reported in Europe but infested areas remain restricted (Anonymous 2009).
Pitch canker was described in several regions in Spain but it was always isolated outbreaks originating from nurseries (EPPO 2005 and 2006a).
It was first reported in France in 2006 on declining pines and Douglas fir (EPPO 2006b) and visual inspection combined with laboratory tests confirmed pest eradication (EPPO 2008). But new isolated outbreaks (Vosges 2008 and Vendée, Côtes d'Armor, EPPO 2009a) were reported and studies were initiated to identify the origin of the infection (EPPO 2009a and 2010).
During the same period, *Gibberella circinata* dieback symptoms in Italy were identified on the basis of morphological and cultural characteristics confirmed with PCR with specific primers (Carlucci et al. 2007) and the fungus was eradicated (EPPO 2009b) while in Portugal its presence on symptomatic plant samples was confirmed by PCR and pathogenicity tests after a first identification based on morphological and cultural characteristics (EPPO 2009c, Bragança et al. 2009).

A1.5 - Habitat type
Woodland, forest and other wooded land
Regularly or recently cultivated agricultural, horticultural and domestic habitats

A1.6 - Hosts
Pitch canker, one of the most important pathogens of Pinus species, is a significant threat to countries where non-native and susceptible Pinus spp. are grown intensively in plantations. (Wingfield et al. 2008). Most pine species may be infected but with susceptibility differences (Kim et al. 2008). Douglas fir (Pseudotsuga menziesii) may be affected too (EPPO 2009a) and its susceptibility has been tested (Gordon et al. 2006).

A1.7 - Is a pest risk assessment already available for this or a closely related organism? (Please indicate in justification: reference,risk assessor, date, institute, country, and whether it is appropriate to this particular case?)
yes
In 2000 EPPO published a Pest Risk Assessment (PRA) report about this pathogen.
Gibberella circinata PRA (00/8445 & annex1 & annex2) - PRA rep (01/8779) Final Data Sheet
Report extract 05-12064 Final decision A1 - 2002

A1.8 - Is a contingency plan already available for this or a closely related organism? (Please indicate in justification: reference,risk assessor, date, institute, country, and whether it is appropriate to this particular case?)

yes
I it believed that there is a European regulatory control system for this pest.

A2. Key factors to consider based on the current situation

A2.1 - What is the extent of the infested area(s)?
Small
Level of uncertainty: low
Outbreaks are isolated and far away from each other.

A2.2 - What is the size of the outbreak population(s)
Small
Level of uncertainty: low
Here, population is evaluated with number of infected trees or infected seed lots.

A2.3 - What is the reproductive capability of the current population?
Very large
Level of uncertainty: low
If we consider the fungus sporulation, "reproductive capability" could be very high.

A2.4 - What is the natural spread capacity of the organism/current population?
Medium
Level of uncertainty: medium
Tree infection is done by aerial dispersion of conidiospores or through vectoring by feeding insects (Gordon et al. 2001, Schweigkofler et al. 2004).

A2.5 - What is the spread capacity of the organism/current population due to human activity?
Very high
Level of uncertainty: high
Although the fungus may be introduced in Europe by several pathways (seedlings, wood, insect vectors), the most important risk of introduction is by **seed** trade (EPPO 2000).

A2.6 - How easy is the organism to detect?
With some difficulty
Level of uncertainty: low
The fungus may be present without any visible symptom and early detection remain a key factor for the disease control. A PCR-based diagnostic method was developed to detect the pathogen within infected host tissues as well as in infested soil (Ramsfield et al. 2008).
In order to develop a fast and reliable diagnostic test independently of the presence of disease symptoms, Schweigkofler et al. (2004) present a novel trapping approach using filter paper in combination with a rapid molecular method to detect the presence and to quantify inoculum in the air. The test can be used directly on trapped spores, without the need for spores to be germinated.

A2.7 - How easy is the organism to identify?
With some difficulty
Level of uncertainty: low
Compared to more traditional approaches, SYBR-green real-time PCR allows identification with increased sensitivity and higher selectivity independently of the presence of symptoms (Schweigkofler et al. 2004). Recently, a new detection protocol based on a biological enrichment step followed by a real-time PCR assay was developed in order to allow a quick and reliable detection of *Fusarium circinatum* in pine seeds (Ioos et al. 2009). A recent study confirmed IGS PCR-based diagnostic procedures specificity (de Wet et al. 2010).

A2.8 - How long has the species been present?
less than one year
Level of uncertainty: high

A2.9.1 - [Economic damage] What damage is the pest currently causing?
Moderate

Level of uncertainty: low

A2.9.2 - [Environmental damage] What damage is the pest currently causing?
Moderate
Level of uncertainty: low

A2.9.3 - [Social damage] What damage is the pest currently causing?
Minimal
Level of uncertainty: medium

A3. Additional key factors to consider based on the risk assessment
A3.1 - How likely is it that subsequent introductions of the organism may occur?
High
Level of uncertainty: medium
With increase of international trade.

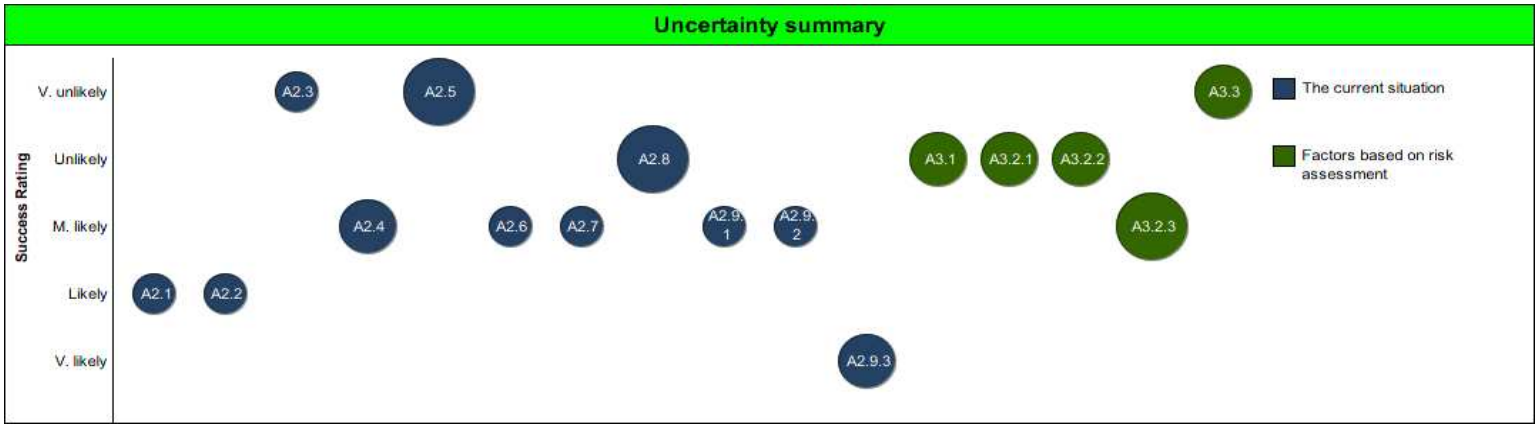
A3.2.1 - [Economic damage] What is the damage potential of this pest?
Major
Level of uncertainty: medium

A3.2.2 - [Environmental damage] What is the damage potential of this pest?
Major
Level of uncertainty: medium

A3.2.3 - [Social damage] What is the damage potential of this pest?
Moderate
Level of uncertainty: high

A3.3 - How large an area is still available for colonization?
Very large
Level of uncertainty: medium

A3.4 - Uncertainty summary based on the current situation and the risk assessment (Copy output from visualizer tool and paste into the comment box)



NB: Larger points (bubbles) on the chart represent greater uncertainty

A4. Definition of the risk management area
A4 - Define the risk management area to be considered in this assessment. I.e. the area beyond the immediate outbreak defined in A1.4.
Each outbreak of pitch canker disease detected in Europe was located in nurseries or in private gardens i.e. in restricted area.
For instance in France, intensive survey was conducted 5 km around the infected area the 2 years following detection (EPPO Reporting Service 2008/103).
Level of uncertainty: medium

A5. Feasibility of eradication, containment or suppression
A5 - Based on the current situation and the information from the risk assessment, is it already clear that no action is appropriate? If yes: justify your decision to take no action
If no or uncertain: continue by selecting and evaluating appropriate measures.
No
Level of uncertainty: low

A6. Selection of measures

A6 - List the eradication containment or suppression measures that may be appropriate for the pest in the current situation. Select from the proposed list or enter other candidate measures(free-text)

- Imported seed lots control
- Selective crop destruction

Part B: Comparison of measures
B1. Comparing the attributes of different risk management measures to determine their applicability in the current situation
Scoring matrix for comparing the attributes of different risk management measures to determine their applicability in the current situation

Imported seed lots control

B1.1a - Objective
Eradication

B1.1 - What is the likelihood that the measures will be successful?
likely
Level of uncertainty: low

B1.2 - How long will this management measure take to be successful?
less than one month
Level of uncertainty: medium

B1.3 - How difficult will it be to apply this measure taking into account enforcement, resources and operational factors?
Easy
Level of uncertainty: low

B1.4 - How high are the direct costs of the management measure?
Moderate
Level of uncertainty: medium

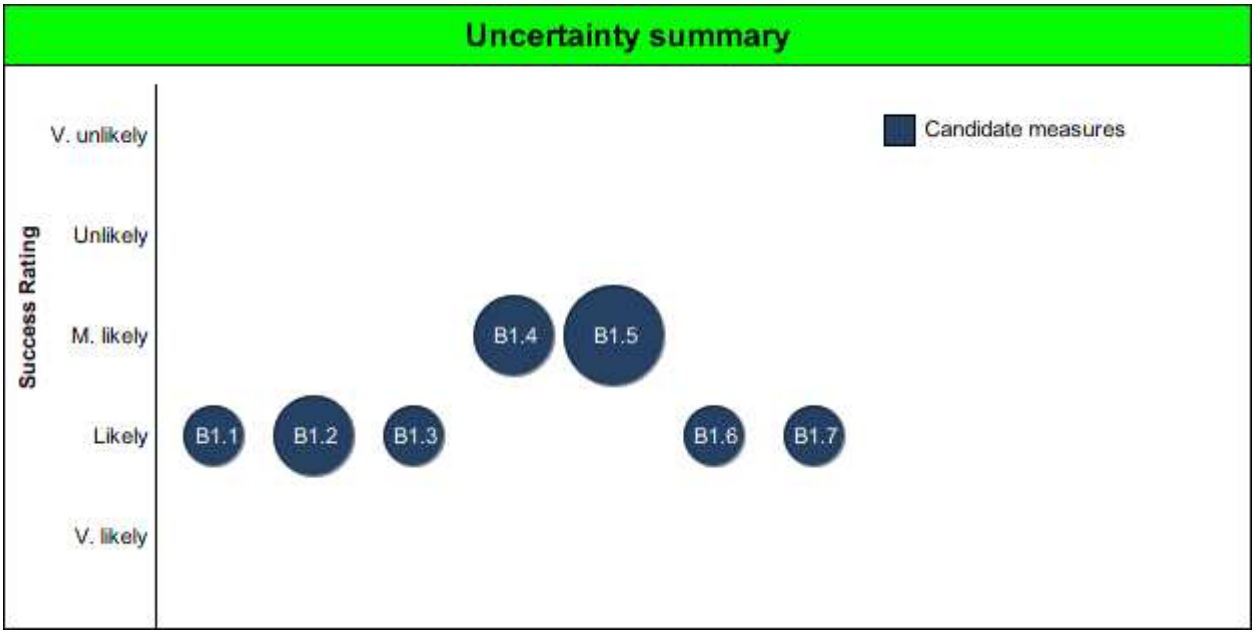
B1.5 - How high are the indirect costs of the management measure?
Moderate
Level of uncertainty: high

B1.6 - How high are the environmental impacts?
Minor
Level of uncertainty: low

B1.7 - How acceptable is the measure likely to be to the public?
Minor opposition
Level of uncertainty: low

B1.8 - Uncertainty summary for proposed measure (Copy output from visualizer tool and paste into the

comment box)



NB: Larger points (bubbles) on the chart represent greater uncertainty

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Selective crop destruction

B1.1a - Objective
Eradication

B1.1 - What is the likelihood that the measures will be successful?
very likely
Level of uncertainty: low

B1.2 - How long will this management measure take to be successful?
less than one month
Level of uncertainty: low

B1.3 - How difficult will it be to apply this measure taking into account enforcement, resources and operational factors?
Easy
Level of uncertainty: medium

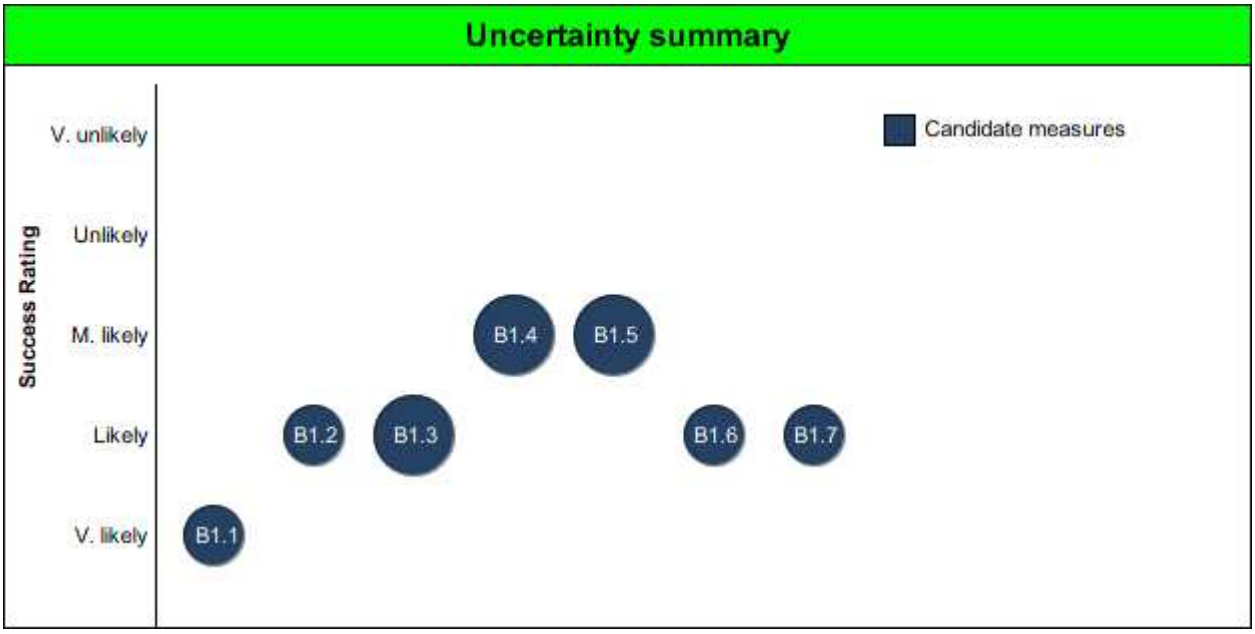
B1.4 - How high are the direct costs of the management measure?
Moderate
Level of uncertainty: medium

B1.5 - How high are the indirect costs of the management measure?
Moderate
Level of uncertainty: medium

B1.6 - How high are the environmental impacts?
Minor
Level of uncertainty: low

B1.7 - How acceptable is the measure likely to be to the public?
Minor opposition
Level of uncertainty: low

B1.8 - Uncertainty summary for proposed measure (Copy output from visualizer tool and paste into the comment box)



NB: Larger points (bubbles) on the chart represent greater uncertainty

B1.9 - Scoring matrix for comparison of candidate measures

Measures available	Objective	Efficacy			Costs		Acceptability and safety	
		B1.1 - What is the likelihood that the measures will be successful?	B1.2 - How long will this management measure take to be successful?	B1.3 - How difficult will it be to apply this measure taking into account enforcement, resources and operational factors?	B1.4 - How high are the direct costs of the management measure?	B1.5 - How high are the indirect costs of the management measure?	B1.6 - How high are the environmental impacts?	B1.7 - How acceptable is the measure likely to be to the public?
selective crop destruction	Eradication	very likely	less than one month	Easy	Moderate	Moderate	Minor	Minor opposition
imported seed lots control	Eradication	likely	less than one month	Easy	Moderate	Moderate	Minor	Minor opposition

Legend

greater likelihood of success/lower cost/fewer confounding issues				lower likelyhood of success/high cost/many confounding issues

B2. Detailed evaluation of the most appropriate scenario
The questions are considered again, but in the context of the final, selected strategy, i.e. the package of measures for action.

B2.0 - Strategy (may include a combination of measures selected from B1):
Imported conifer seed lots control combined with infected seed lot destruction and infected seedlings destruction.
Establishment of a buffer zone around infected area and intensive monitoring for 2 years following pathogen detection.

B2.1 - What is the likelihood that the measures will be successful?
likely
Level of uncertainty: low

B2.2 - How long will this management measure take to be successful?
less than one month
Level of uncertainty: medium

B2.3 - How difficult will it be to apply this measure taking into account enforcement, resources and operational factors?
Easy
Level of uncertainty: low

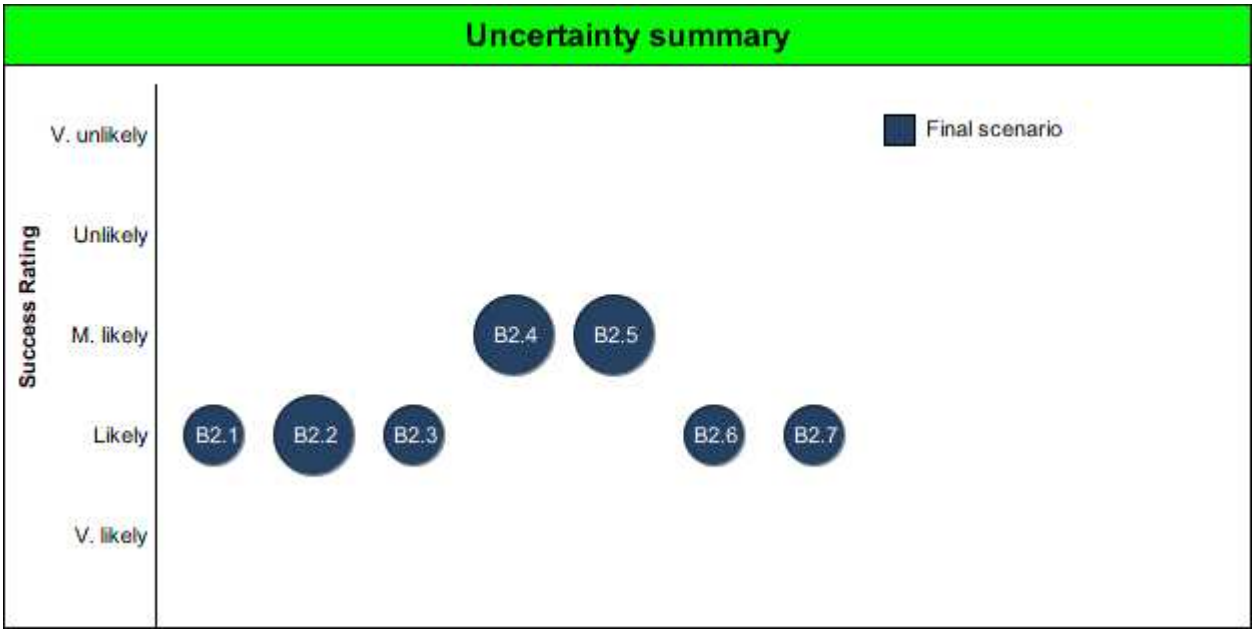
B2.4 - How high are the direct costs of the management measure?
Moderate
Level of uncertainty: medium

B2.5 - How high are the indirect costs of the management measure?
Moderate
Level of uncertainty: medium

B2.6 - How high are the environmental impacts?
Minor
Level of uncertainty: low

B2.7 - How acceptable is the measure likely to be to the public?
Minor opposition
Level of uncertainty: low

B2.8 - Uncertainty summary for final strategy (Copy output from visualizer tool and paste into the comment box)



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B3. Detailed analysis and justification of selected measure(s)

B3 - Describe which measure or combination of measures you propose for eradication, containment and suppression and why you have chosen this strategy. If you consider that more than one strategy would be viable, these options should be evaluated to help the decision-makers. Also describe why other potential options are not considered to be viable. In most cases, the merits of the optimal strategy or strategies can be best illustrated by comparing them with an evaluation of no action and the most stringent action, e.g. crop or habitat destruction.

During outbreak situations and when situations are changing, it is important to review the scheme and your justification accordingly.

Management and control of this disease are dependent on accurate and timely diagnosis of the pathogen (de Wet et al. 2010).

As for many other fungal diseases, visual inspection, symptomatic plant tissue sampling and isolation are the first step for pathogen detection and identification

As outbreaks found in Europe are isolated and far away from each other, it is important to focus studies on the origin of the infection.

When infected pines or infected seed lots are detected, eradication measures have to be carried out immediately (plants and seed lots destruction, buffer zone demarcation, increased monitoring,...)

Information have to be provided to stakeholders, nursery customers,...

Fungicide treatments or vectors destruction seem to be less adapted to an effective eradication of the pathogen. Their cost could be higher too if they are used as preventive actions.