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Pest risk assessment made by France on *Citrus chlorotic dwarf virus* considered by France as harmful in the French overseas departments of French Guiana, Guadeloupe, Martinique and Réunion[1]

Scientific Opinion of the Panel on Plant Health

(Question No EFSA-Q-2006-094)

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SUMMARY

Following a request from the European Commission, the EFSA Panel on Plant Health was asked to deliver a scientific opinion on 30 pest risk assessments made by France on organisms which are considered by France as harmful in four French overseas departments, i.e. French Guiana, Guadeloupe, Martinique and Réunion. In particular, the Panel was asked whether these organisms can be considered as harmful organisms for the endangered area of the above departments, in the meaning of the definition mentioned in Article 2.1.(e) of Directive 2000/29/EC and thus potentially eligible for addition to the list of harmful organisms in Directive 2000/29/EC.

This document presents the opinion of the Panel on Plant Health on the simplified[2] pest risk assessment conducted by France on *Citrus chlorotic dwarf virus*, with French Guiana, Guadeloupe, Martinique and Réunion considered as endangered area. The Panel will use the name *Citrus chlorotic dwarf* (CCD) agent in the following text, as the causal agent of citrus chlorotic dwarf disease has not yet been identified.

CCD is a virus-like disease that can affect almost all citrus species and cultivars. The causal agent is transmitted by the bayberry whitefly *Parabemisia myricae* Kuwana (Homoptera: Aleyrodidae) in a persistent or semi-persistent manner. In addition CCD is transmitted by grafting and can be experimentally transmitted by mechanical inoculation.

The Panel examined in detail the risk assessment provided, and considered the accuracy and quality of the information provided and of the methods applied for pest risk assessment

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[2] A simplified pest risk assessment contains in a "synthetic fiche" the information available allowing according to the risk assessor the assessment of the risk associated with the relevant organism (see the Terms of reference).

purposes. The review was based on the principles and terminology of the International Standard on Phytosanitary Measures ISPM No. 11[3] [Pest risk analysis for quarantine pests including analysis of environmental risks and living modified organisms (2004)] and the terminology of ISPM No. 5 [Glossary of Phytosanitary Terms (2007)] by the International Plant Protection Convention (FAO, 2007).

The simplified assessment provides limited evidence to justify the ratings given in the assessment. It concludes that the phytosanitary risk associated with CCD disease is low to moderate. After analysis of the French document, the references cited and additional references and in consultation with experts in Turkey, the Panel considers that the overall phytosanitary risk posed by the CCD agent is underestimated in the assessment provided.

The Panel concludes that:

- Although the causal agent of the CCD disease is not yet characterised, it produces distinct and consistent symptoms.
- The CCD agent is graft transmissible and can be reliably detected although not identified by biological indexing.
- The disease is currently restricted to the eastern Mediterranean region of Turkey
- The CCD agent is effectively transmitted in a semi-persistent or persistent manner by the bayberry whitefly, *Parabemisia myricae*, which is present in Guadeloupe. Uncertainty exists over the presence of this vector in the other French overseas departments under consideration.
- The main pathway of entry is through the import, from Turkey, of citrus plants or budwood for multiplication.
- If the CCD agent was to be introduced, it would remain in the French overseas departments for at least as long as the infected material is cultivated and propagated and, at least in Guadeloupe, it is likely to spread to other citrus plants through vector activity.
- Severe losses are reported in almost all citrus species with the exception of sweet orange which shows tolerance to the disease but may, however, act as source of inoculum.
- Once the CCD agent is introduced in a citrus growing area, it would be difficult if not impossible to control and/or to eradicate.
- Preventing entry of citrus plant material coming from the affected area would reduce the risks to the PRA area[4] to a negligible level.
- While the CCD agent can be detected by bioassays as a disease causing agent, its unequivocal identification is pending.
- A significant level of uncertainty also exists over the presence of *P.myricae* in the French overseas departments other than Guadeloupe.

Overall, the Panel considers the CCD agent appropriate for analysis of risk management options for the French overseas departments of French Guiana, Guadeloupe, Martinique and Réunion and thus potentially eligible for addition to the list of harmful organisms in Directive 2000/29/EC.

The Panel notes, in addition, that the CCD agent may pose a risk to other citrus-growing areas in the European Union, particularly areas where the vector is present (e.g. Spain), and which lie

[3] ISPM International Standard for Phytosanitary Measures. ISPM No. 11: Pest risk analysis for quarantine pests, including analysis of environmental risks and living modified organisms.
[4] PRA area is the area in relation to which a Pest Risk Analysis is conducted [FAO, 2007]

closer to Turkey, the area where the disease is present. The Panel therefore recommends further assessment of the risks posed for the wider PRA area of the EU.

Key words: **CCD agent, CCD disease, Citrus chlorotic dwarf virus, *Parabemisia myricae*, pest risk assessment, Turkey, whiteflies**

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BACKGROUND AS PROVIDED BY THE EUROPEAN COMMISSION[5]

The current Community 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 L169, l0.7.2000, p. l), as last amended by Commission Directive 2006/35/EC (OJ L88, 25.3.2006, p. 9).

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 EC or moved within the EC, the list of harmful organisms whose introduction into or spread within the EC is prohibited and the control measures to be carried out at the outer border of the EC on arrival of plants and plant products. A harmful organism is defined in its Article 2.1.(e) as: any species, strain or biotype of plant, animal or pathogenic agent injurious to plants or plant products.

However, the provisions of the Directive are at present not yet applicable to trade in plants and plant products between the French overseas departments and the remainder of the Community. In view of the special nature of the agricultural production of the French overseas departments, additional protective measures justified on grounds of the protection of health and life of plants and plant products therein should be given.

France has therefore prepared for 4 departments (Guadeloupe, Guyana, Martinique and Réunion 130 pest risk analyses (PRA) on organisms which are considered by France as harmful for the most important crops grown in these departments, such as banana, sugar cane, pine apple, rice, coffee, orchids, Palmae, etc. These PRAs cover a wide range of harmful organisms, such as insects and mites (54), fungi (14), bacteria (20) and virus (42).

In accordance with the discussions on this topic in the meeting of the Standing Committee on Plant Health on 27 and 28 April 2006, it was agreed that in a first phase France would select 30 PRAs among the 130 PRAs initially transmitted. They cover harmful organisms (insects, mites, fungi, bacteria and virus) affecting citrus fruit and bananas grown in the above departments.

Two types of PRA have been made: a full PRA for harmful organisms for which the probability of introduction into the French overseas departments is high with economic important crops and a simplified PRA for organisms for which the probability of introduction is extremely low.

The full PRAs have been made according to the Guidelines for the European and Mediterranean Plant Protection Organisation (EPPO) pest risk assessment scheme in EPPO Standard PM 5/3 (1) (EPPO Bulletin 27, 281-305). This scheme aims at assessing the potential risk of a particular pest (or harmful organism) for a clearly defined area through a quantitative evaluation of that risk based on questions to which replies are given on a 1-9 scale. Expert judgement is used in interpreting the replies. Moreover for each of the 130 harmful organisms a data sheet containing the most important data on the organism has been made according to the EPPO Standard PM 5/1 (1) on Checklist of information required for PRA (EPPO Bulletin 23, 191-198). The guidelines are based on many years experience of EPPO experts in the EPPO Panel on pest risk assessment and the EPPO Panel on phytosanitary measures. They conform with the International Standards on Phytosanitary Measures (ISPM) No 11 (Guidelines on pest risk assessment for quarantine pests) and use the terms of ISPM No 5 (Glossary of phytosanitary terms).

The simplified pest risk assessments contain in a “synthetic fiche” the information available allowing the assessment of the risk associated with the relevant organism.

[5] Submitted by the European Commission, ref. SANCO E/1/VE/svi D(2006)510488

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 scientific opinion on 30 PRAs made by France on organisms which are considered by France as harmful in 4 French overseas departments, i.e. Guadeloupe, French Guiana, Martinique and Réunion, and in particular whether these organisms can be considered as harmful organisms for the endangered area of the above departments in the meaning of the definition mentioned in Article 2.1.(e) of Directive 2000/29/EC and thus potentially eligible for addition to the list of harmful organisms in Directive 2000/29/EC.

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ASSESSMENT

1. Introduction

This document presents the opinion of the Panel on Plant Health on the pest risk assessment conducted by France (simplified version referenced as AGR-v3) on *Citrus chlorotic dwarf virus* with French Guiana, Guadeloupe, Martinique and Réunion considered as endangered area.

1.1. General introduction to *Citrus chlorotic dwarf virus*

Citrus chlorotic dwarf (CCD) is a virus-like agent that causes a naturally and experimentally transmissible disorder in citrus species. It was first observed in the eastern Mediterranean region of Turkey (mainly in Içel and Adana provinces) in the mid 1980s (Çinar *et al.*, 1993 and 1994; Kersting *et al.*, 1996; Korkmaz *et al.*, 1994a). CCD affected 49% of citrus trees in Içel, 0,5% in Adana, and 0% in Hatay in 1994 (Korkmaz *et al.*, 1994a). CCD currently affects 60-70% of citrus trees in Içel, 1-2% in Adana and in Kozan, and about 5% in Hatay province (including Erzin, Dörtyol and Samandag districts) in Turkey (Bozan O, personal communication, 2007).

The CCD agent can infect nearly all citrus species and cultivars. It is especially detrimental in *Citrus limon* (L.) Burm. (lemon), *C. paradisi* Macf. (grapefruit), *C. aurantium* (L.) (sour orange), *C. macrophylla* (Webster) (alemow), *C. jambhiri* Lush (rough lemon), *C. deliciosa* Ten. (common mandarin), *C. unshiu* (Makino) Marc. (Satsuma mandarin), *C. clementina* Hort. Ex Tan. (clementines) and in *C. reticulata* × *C. paradisi* (tangelo) cultivars. CCD causes obvious leaf symptoms on both mature and young leaves. These symptoms include crinkling, curling, inverted cupping, deformation d distortion. Young leaves frequently show chlorotic patterns and variegation. Leaf size is reduced and leaves appear to have a notch near the apex. Affected young trees show a bushy and stunted appearance, due to the shortened internodes. Symptoms may affect only a sector of the canopy of adult trees (Korkmaz and Garnsey, 2000). The CCD disease is considered to be the most serious disease of citrus in the Eastern Mediterranean region of Turkey (Çinar *et al*., 1993 and 1994; Korkmaz *et al*, 1994a). Yield of affected trees can be substantially reduced in sensitive cultivars, but an accurate evaluation of losses has not yet been performed. The CCD disease is not reported to be present in any area outside of Turkey.

The CCD agent is naturally transmitted by the bayberry whitefly *Parabemisia myricae* Kuwana (Homoptera: Aleyrodidae) in a persistent or semi-persistent manner (Kersting *et al.*, 1996; Korkmaz *et al.*, 1994a, 1994b and 1995; Korkmaz and Garnsey, 2000). The French document suggests that other whiteflies species could also be implicated in the transmission of the CCD agent. However, this is not supported by a reference and the Panel failed to identify information supporting this view. The CCD agent is also transmitted by grafting and, experimentally, by "stem slash-inoculation" but not by rubbing leaves with extracts from infected plants (Korkmaz and Garnsey, 2000).

1.2. The document under scrutiny

The assessment of risks of the CCD disease is presented by the French risk assessors in a so-called simplified version (AGR-v3) PRA made according to the Guidelines for the European

and Mediterranean Plant Protection Organisation (EPPO) pest risk assessment scheme [EPPO Standard PM 5/3 (1) of the EPPO Bulletin 27, 281-305].

1.3. Evaluation procedure

The Panel examined in detail the document provided, and considered the accuracy and quality of the information and methods applied for pest risk assessment purposes. The evaluation of the French document was conducted on the basis of an English translation from an original submission in French, which remains the reference language.

Detailed comments have been made only for the questions where it was considered that the French assessment is incorrect or could be improved upon. Where the Panel has uncovered new information that supports the pest risk assessment, this has been noted. While the literature has been checked and additional data has been sought, no new analysis has been undertaken. The Panel has noted where it considers the risk scores provided by France were too low or too high but has not suggested an exact score.

1.4. General comments on the document

The assessment of risks of the organism is presented by the French risk assessors in a simplified format. This follows the principal sections of ISPM No. 11 but also contains descriptive sections, e.g. geographical distribution, host plants and description of damage, which would normally form part of a datasheet. Although described as a pest risk analysis, only the pest risk assessment stage has been undertaken.

The document comprises four pages and includes three references.

The document was compiled in 2003 and the Panel has found further relevant information which has become available since that time, and in particular, updated information was obtained after consultation with experts in Turkey, the area of current distribution of CDD disease.

2. Evaluation of the pest risk assessment

2.1. Pest categorization

2.1.1. Identity of pest

The French document identifies the pathogen as *Citrus chlorotic dwarf virus.* However, no virus species has been identified as the causal agent of the CCD disease and this fact is acknowledged in the French document, which states that the viral nature of the causal agent of the CCD disease has yet to be confirmed. Ultrastructure analyses of infected tissues were not conclusive in the identification of virus particles, although some filamentous material has been observed (Howd *et al.*, 2002). Recently, round shaped virus-like particles, sensitive to chloroform clarification, have been observed in infected material and are under investigation (Hill M, pers. com., 2007), supporting previous observations of isometric phloem-limited particles (Korkmaz and Garnsey, 2000).

Since the causal agent of this disease has not yet been confirmed as a virus by the International Committee on the Taxonomy of Viruses, the Panel has decided to use throughout this opinion the name “Citrus chlorotic dwarf” or CCD for the causal agent of this virus-like disease. The French document does not indicate the availability of any detection method. The Panel reviewed the available information and concluded that currently the only available detection

method for the CCD agent is graft-inoculation of seedlings of sensitive citrus cultivars, such as *C. macrophylla*, rough lemon or sour orange, under greenhouse conditions (Korkmaz and Garnsey, 2000). The first symptoms are observed on the first or second new flush of growth, five to eight weeks after inoculation. Systemically infected plants are also stunted. Symptoms occur at 20-25ºC and are more pronounced at 30-35ºC (Korkmaz *et al.*, 1995).

The Panel therefore concludes that a reliable detection assay is currently available for the CCD agent.

2.1.2. Presence or absence in PRA area

The Panel confirms that CCD is not reported to be present in the French overseas departments under consideration.

2.1.3. Regulatory status in PRA area

The CCD agent is not a regulated pathogen in the French Overseas departments or in any other region of the world.

2.1.4. Potential for establishment and spread in PRA area

The French document states that CCD can affect almost all citrus species and cultivars and the Panel agrees with this statement. The Panel also confirms that the CCD agent is transmitted during graft propagation of infected citrus material and by the bayberry whitefly, *P. myricae.*

The French document indicates that the vector is present in the USA (California and Florida), Venezuela, Australia, China, Japan, Taiwan, Malaysia, Israel and Turkey, but is not present in the PRA area. However, the Panel found that the vector is present in Guadeloupe (Martin, 1987; Streito *et al*., 2007). This whitefly has a wide host range, as stated in the French document and supported by additional authors (Byrne and Bellows, 1991; Evans, 2007). Therefore, the Panel concludes that the confirmed presence of the vector in Guadeloupe substantially increases the potential for establishment and spread of the CDD agent in this French overseas department. The situation is less clear concerning the other French overseas departments under consideration, since the potential presence of the vectors in these areas carries significant uncertainty.

2.1.5. Potential for economic consequences in PRA area

Yield losses caused by CCD are reported in Turkey, and have been estimated to be 50% on grapefruit, due to decrease in the number and size of the fruits. There is, in addition, a negative impact on fruit quality (Bozan O, pers. Com., 2007). The Panel considers the CCD disease to be the most serious citrus disease occurring in the eastern Mediterranean region of Turkey (Çinar *et al.*, 1993 and 1994; Korkmaz *et al.*, 1994a) and observe that it can have a devastating effect on almost all citrus species and cultivars (Korkmaz and Garnsey, 2000). In addition, the disease easily spreads under natural conditions (Korkmaz *et al.*, 1994a) as stated in the French document, which mentions that 40 % of trees became affected in some citrus-growing regions of Turkey over a 6-year period.

The Panel overall concludes that in the absence of effective cultural control strategies and particularly in areas where the vector is present, CCD could be a damaging disease for citrus crops.

2.1.6. Conclusion of pest categorization

Although the causal agent of CCD disease has yet to be taxonomically ascribed, it can de readily detected using biological indexing on suitable hosts, as it causes distinct symptoms. In addition, the CCD agent can be efficiently transmitted by the whitefly *P. myricae*, and causes severe losses in almost all citrus species.

2.2. Assessment of the probability of introduction and spread

2.2.1. Probability of entry of the pest

2.2.1.1. Identification of pathways

CCD is currently only present in the eastern Mediterranean region of Turkey. As stated in the French document, international movement of propagation material (budwood and plants) and ornamental citrus plants is seen by the Panel as the main means by which the CCD agent may gain entry into the PRA area.

Additional pathways identified by the Panel include the remote possibility that viruliferous whiteflies could enter the PRA area or that *P. myricae* present in Guadeloupe would acquire and transmits the CCD agent from infected fruits imported from Turkey. However, these pathways scenarios are extremely unlikely and are therefore not considered further.

2.2.1.2. Probability of the pest being associated with the pathway at origin

Given the biology of CCD and the relative isolation of the French overseas departments, the Panel agrees with the French document conclusion that entry of the CCD agent from another country by a process not involving host plants seems highly unlikely.

2.2.1.3. Probability of survival during transport or storage

Given the biology of the CCD agent, it is likely to survive during transport of infected citrus planting material. This would also be the case for survival of viable CCD in fruits, however the Panel considers fruits as sources of inoculum for vector transmission, highly unlikely.

2.2.1.4. Probability of pest surviving existing pest management procedures

Current EC legislation 2000/29/EC prohibits entry of citrus propagation material from third countries into the EU and thus, as long as the distribution of the CCD agent is restricted to Turkey, existing pest risk management measures prevent entry in the PRA area *via* infected propagation material.

2.2.1.5. Probability of transfer to a suitable host

The Panel confirms that CCD can be transferred by graft-propagation of infected budwood. The presence of *P. myricae* in Guadeloupe and the availability of citrus hosts, further increases the probability of transfer of the CCD agent to a suitable host. The situation is more uncertain in the other French overseas departments under consideration since *P. myricae* has not been reported there.

2.2.1.6. Conclusion on the probability of entry

The French document concludes that the probability of CCD entry is low. The Panel agrees with this statement given the very limited geographic distribution of the disease and existing EC legislation preventing entry of citrus planting material, which is identified as the main pathway. However, should citrus plants or budwood for propagation be introduced illegally from Turkey, the probability of entry of the CCD agent would be significant.

2.2.2. Probability of establishment

2.2.2.1. Availability of suitable hosts, alternate hosts and vectors in the PRA area

In Réunion, the citrus area has been estimated to be 301 ha with an annual production of about 8000 tons (Agreste, 2007a). The main commercial species are mandarins and mandarin hybrids (Ortanique tangor (*C. reticulate* × *C. sinensis*), common clementine and Beauty and Dancy mandarins) accounting for about 50% of the citrus area, limes (Tahiti and Mexican species) and lemons accounting for about 34%, and sweet oranges (mainly Washington navel) for 16% (FAOSTAT, 2008).

In French Guiana, the citrus growing area has been estimated to be 1100 ha. The main commercial species are limes (Tahiti and Mexican species) and sweet oranges accounting for 44% and 43% of the total acreage, respectively. A small area is devoted to mandarin (11%) and grapefruit and pummelo (2%) (FAOSTAT, 2008).

In Martinique, the citrus growing area is estimated as 327 ha with an annual production of 1891 tons (AGRESTE, 2007b). The main commercial species is sweet orange accounting for 82% of the total acreage. A small area is devoted to grapefruit and pummelo (10%) and lemon and limes (8%) (FAOSTAT, 2008). In addition, lime trees are commonly grown in small holdings and backyards for home consumption.

In Guadeloupe, the citrus growing area has been estimated to be 360 ha with an annual production of about 6230 tons (Agreste, 2007c) for local consumption. The main commercial species are sweet oranges and limes accounting for 50% and 47% of the total acreage, respectively. A small area is devoted to mandarin (3%) (FAOSTAT, 2008). In addition, citrus trees, mainly limes and sweet oranges, are commonly grown in backyards for home consumption.

Citrus are also grown in family gardens in the French overseas departements for household consumption. In 2006 family gardens occupy 1080 ha in Martinique, 615 ha in Guadeloupe and 2890 ha in Réunion (Agreste, 2007a). In the French documents it is noted that citrus, including lime, lemon and sweet orange trees are commonly grown in small holdings and backyards for home consumption.

The French document states that almost all citrus species and cultivars are sensitive to the CCD agent. The Panel agrees with the French document and confirms that no further hosts other than citrus are known for this agent.

In addition, the whitefly *P. myricae,* is an efficient vector of the CCD agent and has a wide host range besides citrus (Byrne and Bellows, 1991; Evans, 2007). Given the transmission biology of semi-persistent or even persistent mode of transmission, the vector can carry virus in absence of citrus hosts over long distances, hence favoring its establishment and the wide dissemination of the CCD.

2.2.2.2. Suitability of environment

The French document indicates that there is little climatic similarity between the PRA area and the eastern Mediterranean region of Turkey where the CCD disease is currently spreading. However, ecoclimatic conditions are not considered to be a limiting factor in the establishment of the CCD agent due to its close association with the host plant. The Panel therefore concludes that, once CCD-infected material enters the PRA area (especially in Guadeloupe where the vector is already present), the CCD disease is likely to establish wherever citrus plants are grown.

2.2.2.3. Cultural practices and control measures

The document does not provide any information on current pest management strategies employed in citrus cultivation in the PRA area. However, the Panel agrees that there are no known control practices that would affect the establishment of the CCD agent. It further states that control of the insect vector, even if successful in reducing its populations, may slow the spread of the CCD agent but may not be able not prevent CCD movement over long periods of time (Korkmaz and Garnsey, 2000).

The Panel considers that the exclusive use of certified, pathogen-free, citrus planting materials is important for preventing the spread of CCD by propagation and establishment of new infection *loci* and reservoirs.

2.2.2.4. Conclusion on the probability of establishment

The French document concludes that the probability of establishment is low. The Panel disagrees with this conclusion. It concludes that the probability of establishment would be high, because given its biology, once brought into the PRA area in infected citrus material, the CCD agent would remain in the area for as long as this material is cultivated.

2.2.3. Probability of spread after establishment

The French document indicates that CCD is also transmitted mechanically, but the Panel found that mechanical transmission of CCD disease has only been confirmed experimentally by "stem-slash inoculation" but not by rubbing leaves with extracts from infected plants (Korkmaz *et al.*, 1995; Korkmaz and Garnsey, 2000). The probability of the CCD agent spreading in this way appears rather remote.

However, the CCD agent has evidenced a high epidemic potential in Turkey. Indeed, the spread rate of the CCD disease on new citrus orchards planted with CCD-free plants and on citrus nurseries has been reported to be very high, reaching 56% in satsuma mandarin orchards (Korkmaz and Bozan, 2001).

Given the presence of *P. myricae* in Guadeloupe, the Panel considers the probability of CCD spread to be high. For the other French overseas departments, where *P. myricae* is not known to be present, the probability of spread would be low but a high level of uncertainty is attached to this rating as the status of *P. myricae* has to be considered itself to be uncertain.

2.2.4. Conclusion on probability of introduction and spread

The French document concludes that the probability of introduction is low. The Panel agrees that the probability of entry is negligible if no citrus plants or budwood are imported from Turkey but considers the ratings for probability of establishment and spread to be

underestimated at least for Guadeloupe in the French document. The probability of spread is lower for the other French overseas departments but carries a higher uncertainty level.

2.3. Assessment of potential economic consequences

2.3.1. Direct pest effects

2.3.1.1. Crop quality and/or yield losses

The CCD agent can infect nearly all citrus species and cultivars. It is especially detrimental in *Citrus limon* (L.) Burm. (lemon), *C. paradisi* Macf. (grapefruit), *C. aurantium* (L.) (sour orange), *C. macrophylla* (Webster) (alemow), *C. jambhiri* Lush (rough lemon), *C. deliciosa* Ten. (common mandarin), *C. unshiu* (Makino) Marc. (Satsuma mandarin), *C. clementina* Hort. Ex Tan.(clementines) and in *C. reticulata* × *C. paradisi* (tangelo) cultivars. Thus, the Panel confirms that susceptible citrus crops are present in all four French overseas departments. *C. sinensis* (L.) Osbeck (sweet orange) cultivars are reported as tolerant (Korkmaz *et al.*, 1994b; Korkmaz and Garnsey, 2000), and the Panel notes that in Martinique, sweet oranges account for 82% of citrus production and therefore, although such plants would provide an important source of inoculum, the direct pest effects will be less in this French overseas department.

CCD agent causes leaf symptoms including crinkling, curling, inverted cupping, deformation, distortion, and young leaves frequently show chlorotic patterns and variegation. Leaf size is reduced and young trees show a bushy and stunted appearance, due to the shortened internodes. Yield of affected trees can be substantially reduced in sensitive cultivars, but an accurate evaluation of losses has not yet been performed. The CCD disease is considered to be the most serious disease of citrus in the Eastern Mediterranean region of Turkey (Çinar *et al*., 1993 and 1994; Korkmaz *et al*, 1994a).

The French document mentions the potential direct damage caused by CCD disease on citrus plants and in ornamental citrus production, but provides no precise data on the potential economic consequences (yield and/or quality loss, cost of eradication and control, etc.) of the introduction of the disease into the four French overseas departments. The French document estimates the potential economic impact as low to medium.

The Panel notes that the impact of the CCD disease in the affected citrus area of Turkey is severe based on published references (Çinar *et al*., 1993 and 1994; Korkmaz *et al.*, 1994a), and on information from Turkey (Bozan O, pers. com., 2007). For example, losses associated with the CCD disease in grapefruits have been estimated at 50% of the normal production (Bozan O, pers. com., 2007). In Turkey, where CCD is spreading it has devastating effects on almost all citrus species, with the exception of sweet orange.

Therefore, although the effects of the CCD agent on the production of affected trees have not been assessed in detail, the Panel disagrees with the overall estimation of low impact given in the French document and considers the potential impact to be higher; based on the susceptibility of citrus cultivars grown in the different French overseas departments. The impact of CCD is considered to be higher in French Guiana, Guadeloupe and Réunion than in Martinique, due to the limited production of susceptible citrus species on this island.

2.3.1.2. Control measures and their efficacy and costs

The French document does not estimate costs associated to the control of CCD. In the absence of information on this aspect, the Panel cannot evaluate precisely the cost of control of the CCD disease for the four French overseas departments under consideration, should the CCD

agent be introduced. However, given the high epidemiological potential of CCD evidenced in Turkey, the Panel considers that the cost of control would probably be high.

2.3.2. Indirect pest effects

2.3.2.1. Export markets

The presence of the CCD agent in the PRA area is not envisaged to affect export markets as citrus fruits are produced for local consumption.

2.3.2.2. Social consequences

The French document does not address any potential social consequences that may result from the establishment of the CCD agent in the PRA area.

2.3.2.3. Environmental consequences

Potential environmental consequences associated with the introduction and establishment of CCD have not been considered in the French document. The introduction of the CCD agent in areas infested with *P. myricae* may result in an increase in the use of pesticides, aimed at reducing whitefly vector populations.

2.3.3. Conclusion of the assessment of economic consequences

The French document concludes that economic consequences would be low to medium. The Panel considers these to be higher due to:

- The severe effects of CCD agent infection on the production of most citrus species, with the exception of sweet orange.
- The significant proportion of sensitive species in the citrus crops of the French overseas departments under consideration, with the exception of Martinique for which sweet orange represents 82% of the total citrus acreage.
- The potential increase in the use of pesticides to control vector whitefly populations should the CCD agent be introduced. Biological control agents reported as effective against *P. myricae* will not contribute to the reduction of CCD spread and subsequent incidence of the disease.

2.4. Comments on the conclusion of the pest risk assessment

The French document concluded that the probability of entry of CCD is low and the Panel agrees with this. The Panel disagrees with the French analysis that the probability of establishment is low and considers it to be high. Similarly the probability of spread upon establishment is considered to be higher, at least in Guadeloupe, due to the presence of host plants and of an efficient vector.

The French document concludes that economic consequences would be low to medium. The Panel considers these to be higher.

The final conclusion reached by the French document is that the phytosanitary risk associated with CCD disease is low to medium for the French overseas departments.

An analysis of the French document, of the references cited in it, of additional references and consultation with experts in Turkey, has allowed the Panel to conclude that the overall

phytosanitary risk posed by the CCD agent is under-estimated in the assessment provided. The risks associated with this agent are considered to be medium to high for all parameters, with the exception of the low probability of entry. In fact, the only identified mitigating circumstances are the limited geographical distribution of the disease and, for French Guiana, Martinique and Réunion, the fact that the *P. myricae* vector is not known to be present.

2.4.1. Degree of uncertainty

The Panel considers that despite the fact that the CCD agent still remains to be identified, the level of uncertainty attached to most of the parameters is relatively low, with the exception of the potential for spread in the three French overseas departments from which the *P. myricae* vector has not been reported to date.

CONCLUSIONS AND RECOMMENDATIONS

The simplified assessment provides limited evidence to justify the ratings given in the assessment. It concludes that the phytosanitary risk associated with CCD disease is low to moderate. After analysis of the French document, the references cited and additional references and in consultation with experts in Turkey, the Panel considers that the overall phytosanitary risk posed by the CCD agent is underestimated in the assessment provided.

The Panel established the following points:

- Although the causal agent of the CCD disease is not yet characterised, it produces distinct and consistent symptoms.
- The CCD agent is graft transmissible and can be reliably detected although not identified by biological indexing.
- The disease is currently restricted to the eastern Mediterranean region of Turkey.
- The CCD agent is effectively transmitted in a semi-persistent or persistent manner by the bayberry whitefly, *Parabemisia myricae*, which is present in Guadeloupe. Uncertainty exists over the presence of this vector in the other French overseas departments under consideration.
- The main pathway of entry is through the import, from Turkey, of citrus plants or budwood for multiplication.
- If the CCD agent was to be introduced, it would remain in the French overseas departments for at least as long as the infected material is cultivated and propagated and, at least in Guadeloupe, it is likely to spread to other citrus plants through vector activity.
- Severe losses are reported in almost all citrus species with the exception of sweet orange which shows tolerance to the disease but may, however, act as source of inoculum.
- Once the CCD agent is introduced in a citrus growing area, it would be difficult if not impossible to control and/or to eradicate.
- Preventing entry of citrus plant material coming from the affected area would reduce the risks to the PRA area to a negligible level.
- While the CCD agent can be detected by bioassays as a disease causing agent, its unequivocal identification is pending.
- A significant level of uncertainty also exists over the presence of *P.myricae* in the French overseas departments other than Guadeloupe.

Overall, the Panel considers the CCD agent appropriate for analysis of risk management options for the French overseas departments of French Guiana, Guadeloupe, Martinique and Réunion and thus potentially eligible for addition to the list of harmful organisms in Directive 2000/29/EC.

The Panel notes, in addition, that the CCD agent may pose a risk to other citrus-growing areas in the European Union, particularly areas where the vector is present (e.g. Spain), and which lie closer to Turkey, the area where the disease is present. The Panel therefore recommends further assessment of the risks posed for the wider PRA area of the EU.

DOCUMENTATION PROVIDED TO EFSA

1. Letter, dated 14 July 2006 with ref. SANCO E/1/VE/svi D(2006) 510488 from P. Testori Coggi to C. Geslain-Lanéelle.
2. Analyse du Risque Phytosanitaire AGR-v3 : *Citrus chlorotic dwarf virus*. Rédaction : C. Vernière / CIRAD – Septembre 2003 (Simplified version of Pest Risk Analysis).

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