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de la formation et de la recherche DEFR

Agroscope

Synthesis Flavescence dorée

In collaboration with



ADVID

Cluster dos Vinhos da Região do Douro
Douro Region Wine Cluster

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What is the flavescence dorée?

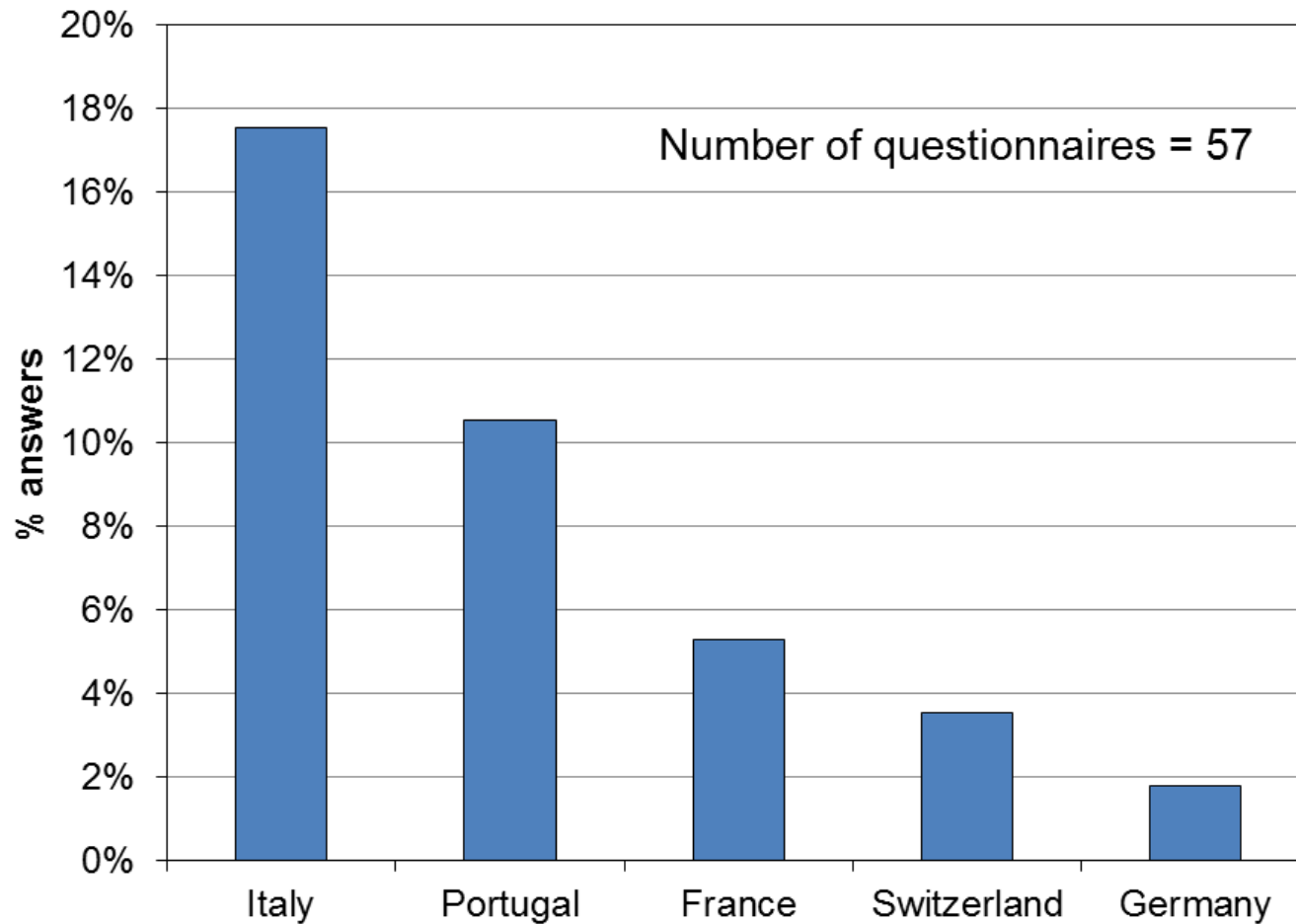
- Flavescence dorée is caused by phytoplasma «*Candidatus Phytoplasma vitis*» belonging to the ribosomal group 16Sr-V.
- It is a quarantine disease submitted to mandatory control.
- The confirmed vector for FD is the leafhopper *Scaphoideus titanus*.





Introduction: questionnaire pour les scientifiques

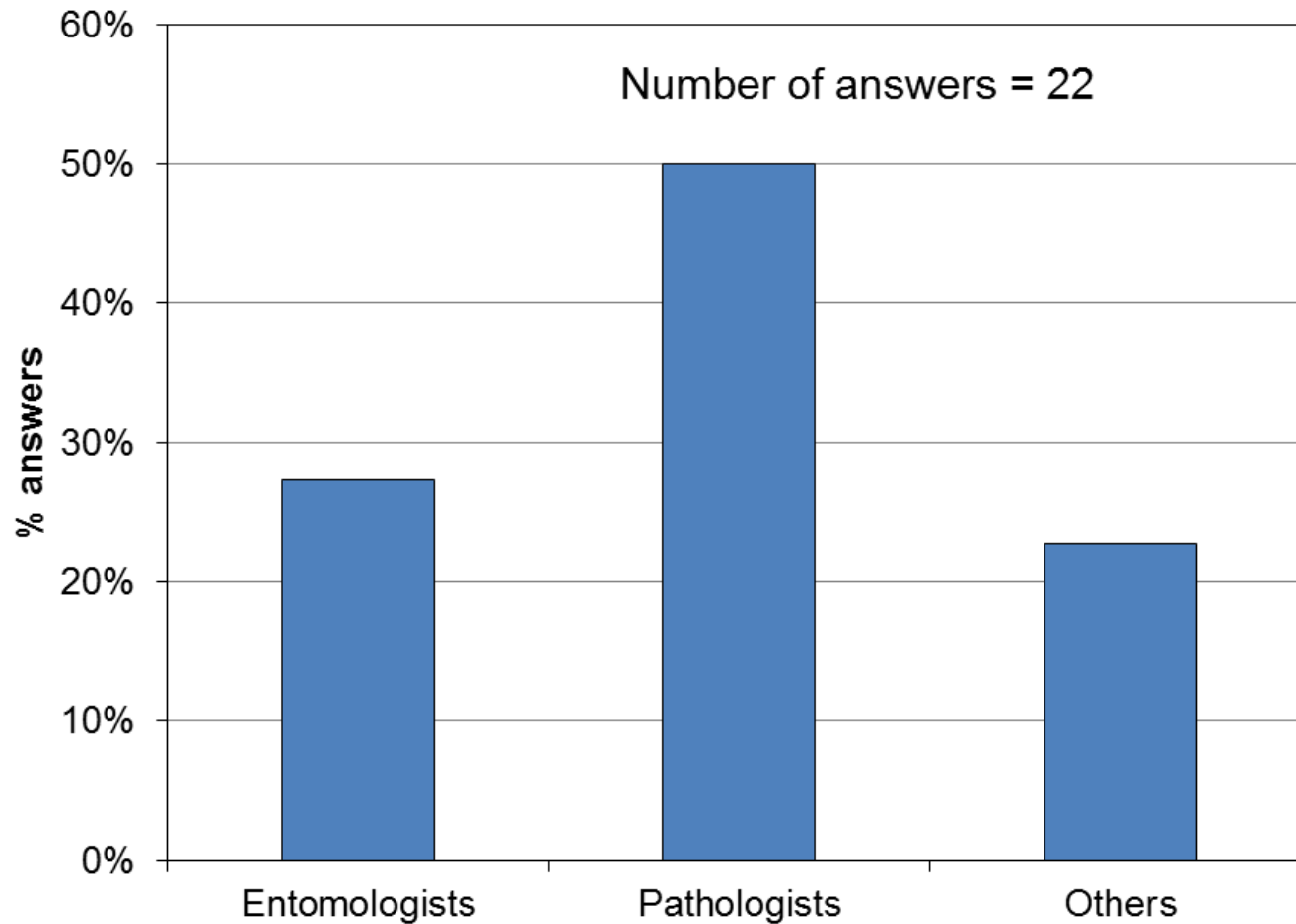
Questionnaire for the scientifics





Introduction: questionnaire pour les scientifiques

Questionnaire for the scientifics





Question 1. Situation de la flavescence dorée (FD) dans votre région et stratégies de lutte.

Situation of the Flavescence dorée (FD) in your country and control strategies

A common approach

- Monitoring of *Scaphoideus titanus* and FD symptoms in commercial vineyards, nursery and vineyards of mother plants grafts and rootstocks based on a protocol.
- Application of the mandatory control plan in infected vineyards against the vector.
- Coordination of the control strategies in collaboration with growers associations, official services, municipalities.
- Regional training of the vine grower.





Question 1. Situation de la flavescence dorée (FD) dans votre région et stratégies de lutte.

Situation of the Flavescence dorée (FD) in your country and control strategies

More regional specific

- Mandatory control plans against *S. titanus* include 1-3 insecticide applications.
- Definition of the different infected area.
- Uprooting of plants presenting symptoms of grapevine yellowing (FD and Bois Noir =BN).
- Thermotherapy of the material for multiplication and the young plants for FD control.
- Elimination of disease outbreaks and vector constituted by the presence of abandoned vineyards or wild regrowth in fringe areas.

Not study FD and BN separately, but as a complex of grapevine yellows.





Question 2. Quels sont les principaux défis dans votre région pour une lutte efficace contre la FD ? *What are the main challenges in your area for an effective control of the FD?*

- Respects the mandatory treatments and coordination of the collective control with particular attention to the small producers (amateurs).
- Increase the quality and quantity of the surveys, need to finance the genetic analysis.
- Steep vineyards, where treatments are difficult, important dispersion/fragmentation of vineyards.
- Management of abandoned vineyards and presence of wild vine regrowth (rootstock) in forests near the vineyards.
- Existence of alternative vectors and host plants.
- Difficult to inform all growers and particularly the aged or part-time growers.
- Laxity at the phytosanitary quality of marketed material by some nurseries.





Question 3. Les voies de dissémination sur longue et moyenne distance de la FD

Dissemination of the flavecence dorée on long and medium distance

Clear convergence of views on the role of human activities, especially over long distances. This risk is related to the material that is not submitted to thermotherapy. Nevertheless it is important to:

- increase preventive survey in the mother plants and the plantlets.
- characterize the origin of FD strains detected in new regions.

S. titanus could play a role for the dissemination on medium distance, but the influence of the prevailing winds or maintenance equipment movements between plots is difficult to study.

Risk that the epidemic could begin by the passage of wild plants such as clematis, alder or *Ailanthus altissima*.





Question 4. Principaux axes de recherche sur le sujet FD et motivations.

Main research topics on the FD and reasons.

- Genotyping phytoplasma strains taking into account their epidemic and ecological capacity.
- Recovery (entophytic bacteria, abiotic stress)
- Plant resistance/tolerance (functional genomics, molecular components).
- FD quantification in the varieties and their role in the ability of the vector to acquire the phytoplasma.
- Role of wild alternative hosts and vectors.
- Development and validation of models.
- Biological cycle and population dynamic of *S. titanus*.
- Implementation of diagnostic protocols and their international harmonization.
- Development of a method of mating disruption of adults.
- Biological control of *S. titanus* (antagonists and entomophagous fungi).





Question 4. Principaux axes de recherche sur le sujet FD et motivations.

Main research topics on the FD and reasons.

- biological efficacy of insecticides and study of the side effects on beneficial organisms.
- Improvement of the sampling of *S. titanus*.
- Reduced risks of infestation by adults from abandoned vineyards and forest edges.
- Incidence of FD and title of phytoplasmas in wild vineyards.
- Forcing the professional community to treat (thermotherapy) the *Vitis* vegetative material destined for sale.
- Grafting of healthy Muscat on FD infected Barbera plants.
- Sanitation of the vineyard.

In institutes of northern Italy, the axes are oriented rather to BN, considered actually more important than FD.





Question 5. Les axes de recherche que vous pensez important d'exploiter

The research subjects, that you think important to expand

- Quality control of vegetal material in nurseries.
- Early detection of phytoplasma (rapid and cheaper diagnostic tool).
- Determination of bio-ecological conditions favorable to the presence of *S. titanus* and development of techniques to avoid its presence in the vineyard.
- Effective control of *S. titanus* by cultural, biological and chemical methods.
- Development of a control strategy focused on the use of less susceptible grape varieties.
- Research of candidate genes for the disease resistance.
- New control techniques against FD more respectful towards the environment and human beings.
- Increase the number of studies on the cultivar susceptibility to *S. titanus* or FD.





Question 5. Les axes de recherche que vous pensez important d'exploiter

The research subjects, that you think important to expand

- The phenomenon of recovery.
- Studies on mixed infections FD - Leafroll virus 3 – grapevine trunk diseases.
- Comparative study of different levels of severity from the strains present in Europe (large scale genotyping and development of a database).
- The impact of global warming on pathogen and vector.
- Genome sequencing, mutagenic treatments, genetic manipulation.
- Disseminate the knowledge for correct and sensitive diagnosis of the disease.
- Managing of external sources of contamination.





Question 6. Développement future d'une stratégie de lutte intégrée à la FD

Future of the development of an integrated control strategy for the FD

- Development of an integrated control strategy of the FD-S. titanus complex through the various European countries (monitoring plans and models, the use of eco-friendly active ingredients and a precision viticulture).
- Use of resistant / tolerant varieties
- Use of bacteria for the biological control and ground cover by flora that attracts or repels vectors.
- Less legislation and more direct action with growers and nurserymen (intensive prospecting system, monitoring of insect populations, information and training of professionals).
- An important effort of prevention and information in the unaffected areas.
- A more important effort should be carried for the protection of stock nursery of rootstocks.





Question 6. Développement future d'une stratégie de lutte intégrée à la FD

Future of the development of an integrated control strategy for the FD

- Elimination of the external sources of disease (abandoned vineyards, wild vines) and then treatment of all vineyards.
- Modeling the spread of the disease by adding the vector population models.
- Understanding of macrobiotic and environmental factors that influences the expression of symptoms and severity of the disease on infected plants.
- Requires the involvement of universities in the process and a close collaboration with the ministry of agriculture and farmers associations.
- Living with the disease and its management over the time.





Question 7. Opinion sur l'organisation de la lutte obligatoire.

Opinion on the organization of mandatory control

- **Portugal.** The National Action Plan has been completed and implemented by the contribution of many public and private organizations (need of more investment in human and financial resources).
- **France.** 1) Necessity to support the regional effort; 2) The management of the coordination at regional level seems effective in areas where viticulture is important.
- **Switzerland.** The situation is generally good, but some tensions can arise between the different actors.
- **Italy.** 1) Need to make more effective the mandatory control; 2) The exchange of information is quite positive; 3) Improve a direct dissemination of technical and scientific knowledge to stakeholders; 4) Creation of a national committee for the coordination of activities at regional and provincial level.





Question 8. Evolution de la FD et de son vecteur vs changement climatiques

Future evolution of the FD and its vector vs climate change

The majority believes that climate change will promote the colonization of the northern European vineyards by *S. titanus* and major aggressiveness of FD.

A lot of questions remain open:

- Influence on the ecological adaptation of vectors and alternative hosts and on the epidemiology of the disease.
- Influence of the increase of plant stress situations on its sensitivity.

Application of predictive models on the spread of vector and phytoplasma in new ecosystems





Question 9. Collaboration internationale pour la recherche.

International research collaboration

YES

To realize:

- Pilot wine-growing areas in an international and multidisciplinary framework.
- The organization of a workshop for information exchange and activities coordination with involvement of all stockholders .
- Harmonization of the methods.
- Database at European level.
- Need to consider a different approach of collaboration with countries where FD is still not arrived.





Merci pour votre attention



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