



The most popular practices in Europe against Flavescence Dorée

Result of observations from the field realized in Winetwork project framework

The WINETWORK project has the ambition to stimulate collaborative innovation in the wine sector. Project's approach is mainly based on the interactions between a network of facilitator agents, several regional technical working groups and one European scientific working group. A participatory approach is used to translate results from science and practical knowledge into technical datasheets that are used to prepare materials adapted to end-users. In the WINETWORK project, the approach will be implemented in ten regions from seven countries representing more than 90% of the EU wine production. The main topic addressed in the network concern the control and the fight against diseases that jeopardise the future production potential of the EU: Grapevine Trunk Diseases and Flavescence Dorée. As many winegrowers are testing innovative and sustainable approaches to fight these diseases, it is very beneficial to capture these ideas and to share them between EU countries. Innovative practices will be synthesized, tailored and translated to become fully accessible to innovation support services and to winegrowers. The project will then deliver a vast reservoir of existing scientific and practical knowledge related to sustainable vineyard management.

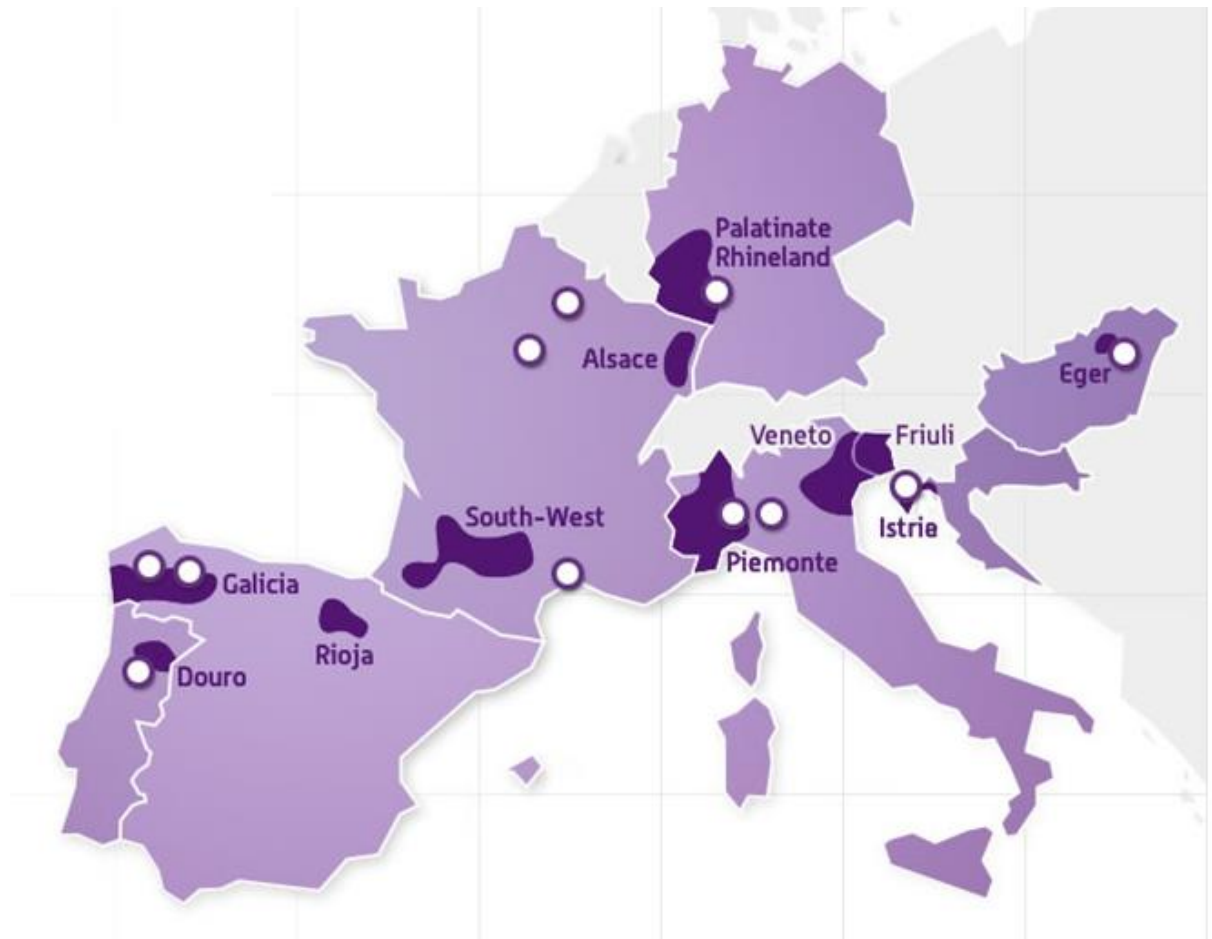
This document is the result of interviews made on field by the facilitator agents with the principal objective to highlight the diversity of techniques used in field. To date, no assessment, no validation or checking efficacy of these practices was made. In the absence of any assessment, their success in different conditions of the ones exposed is not guarantee and the responsibility of Winetwork partners can't be involved.



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The 10 facilitator agents of Winetwork project had the task to collect information from practice and to detect innovation. From december 2015 to May 2016 they collected practical knowledge on Flavescence Dorée management on field across 10 wine regions of 7 european countries.



219 interviews were realized of winegrowers, technicians, advisors and cooperatives.

- ⇒ What is winegrower's knowledge regarding the disease ?
- ⇒ What are they doing to control, to limit Flavescence Dorée ?

The practices showed in this document are not exhaustives and are not representing the whole winegrowers population. This is the result of practices made on field by a sample of winegrowers (from 20 to 30 people according to the region). These people were previously selected for their good knowledge level and for their dynamism in field. **The most popular ones and some atypical practices that have no scientific validation nor scientific basis are presented here.**



What is Flavescence Dorée ?

Flavescence Dorée is a disease that need three characters :

The plant, the vector insect (*Scaphoideus titanus*) and the infectious agent (phytoplasma).

When a vine plant is contaminated by this disease several symptoms appears :

Leaves discolorations (turn yellowish/reddish) that can be limited by leaf ribs, leaves are rolling on themselves and turn cracking, no (or bad) lignification of the infected shoot(s), death of clusters and vinestock decline sometimes quick, can leave to total leaves decay can lead to death.



Flavescence dorée belong to the yellow diseases group, and it is very difficult to distinguish FD from Bois Noir that belong to the same group.

There is one main vector insect known for transmitting the disease from vineplant to vineplant : a leafhopper, *Scaphoideus titanus*. This insect is a stinging-sucking insect univoltine who feeds in vines vessels (phloem and xylem). *Scaphoideus titanus* lives and feeds at the inner face of vine leaves. After hatching the leafhopper molt to 5 larvae stages before become adult.





What are the most popular practices used by european winegrowers to control FD ?

FD yellowish, innovative practices in the experience of the Facilitator Agent WINETWORK

The survey of facilitators agents at European level didn't, unfortunately, highlight real "innovative solutions" but some efforts, about the already known practices, regarding time and method of execution, and some experiences of induction of resistance / resilience, with uncertain results. Some growers claim good results using microbial consortia, but there is no scientific validation.

So far, the cornerstones of the defense still are:

1. Fighting against the vector
2. Removal of symptomatic vinestocks
3. Land management: destruction of American vines in uncultivated land.
4. Nurseries management

1.a. Fighting against the vector, the ordinary practices

Spraying chemical insecticides (or pyrethrum extracts for organic growers) against the vector is the more common practice in Europe against FD. The treatments against ST are a fundamental part of mandatory decrees for vine protection against FD in the countries where the disease is present. Many different active substances are authorized and employed for this purpose: growth regulators (against larvae), neonicotinoides (against both larvae and adults), phospho-organics (mainly against adults), pyrethroids (adults).

Depending on the consistency of populations, 1 (rarely), or more often 2 or 3 spraying for year are made. In some case 4 or more. In the nursery fields usually 4-5.

The 2 T scheme (2 treatments) is the same in all the countries: the first one against larvae at 4-5 age (nymphae), that is the first stage when they can acquire the phytoplasma (about 30 days after eggs hatching); the second when adults appear (usually about 40 days later).

A third treatment can be made between the two, or, as an alternative, in the late season, if the flight of the adults is prolonged, and depending on the population consistency.

The population should be monitored, and it is in most regions. Monitoring the eggs hatching (bioclimatic models are available) and youth population is a rather specialized job and is usually made by public services or technical development-extension services. It is a very critical point, to establish the best time for the first spraying.

The adults can be monitored more easily through the yellow sticky traps. But not many growers do, and are able to recognize the insect. Only the most professional.

Organic farming: Pyrethrum extract is the more common mean, but it is not permitted in all the countries. It is quite effective against the larvae but have only a partial effect on adults, due to its short persistency, which allow the winged insects to come back to the vineyard without damage few hours after the treatment.

Azadirachtine is also permitted in some region but doesn't seem to be very effective. The same for Spinosad, that is another possibility.

1.b. Fighting against the vector, some alternative practices for organic farming

- **Kaolin**

The kaolin spraying has repellent function towards the leafhoppers; but some studies also prove mortality of larvae. It is mainly used in organic farming, where the only/main insecticide admitted and slightly effective is the pyrethrum. It is not an alternative but a possible integration. More effective on early instars than towards adults, according to a test carried out in 2007 in France. Given the high cost of the product and its proven, even if partial, effectiveness, the optimization of timing and doses should be further studied.





- **Citrus essential oils**

The main active ingredient identified as an insecticide is the D-limonene, a terpyneol. These products are considered effective in the dehydration of the body of the larvae. The French study AIVB 2007 first mentioned has also experienced am orange oil. Instead of the kaolin test, this one gave no significant differences vs. the untreated control. In Hungary, a product based on orange oil + boron (WETCIT) is indicated as effective in larvae killing for dehydration, stages L1 to L3.

2- Removal of symptomatic vines and canopy portions

It was highlighted the importance of timely intervention. Usually the symptoms of FD and the vector adults are likely to appear at the same time. It's important cutting after the treatment against adults all canopies showing symptoms, and constantly monitoring and cutting, from now until ripening. The vinestocks can be uprooted later but it is important to immediately remove the symptomatic foliage. This must be considered a specific job in the vineyard (not "when I pass and see, I cut"). Symptomatic leaves are those that certainly transmit, so you need to minimize their presence.

Do not cut in the days immediately preceding the treatment against the vector adults, to prevent the possible migration of infected adults from infected to healthy vines.





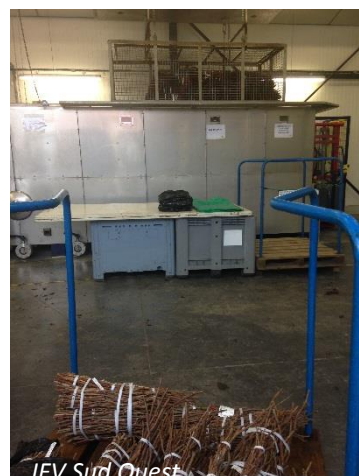
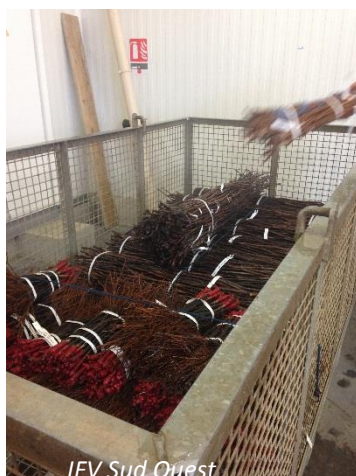
3- Land management : destruction of wild vines

It is important to cut and destroy the American vines from the rootstocks in abandoned vines. This must be done in absence of the vector adults, to prevent their migration to vineyards. A "Guide to contain wild vines" was published by IPLA in Piedmont and can be downloaded in digital format by Knowledge Reservoir WINETWORK (in Italian).

A synthetic protocol was developed by the Asti Consortium (D. Eberle) and is available on Knowledge Reservoir as well.

4- Nurseries management

1. Treatment in hot water. Recent work under the Piedmontese project INTEFLAVI confirm previous Italian and French data on the effectiveness of hot water treatment of nursery materials in breaking phytoplasma, and do not reveal any problems of vinestocks vitality and development, except for a slightly later budburst. Other works do not agree with this second aspect. Efficiency and precision of the machines, timing, temperature, pre-heating, regular water flow are critical points. The practice is quite expensive.



2. Some nurseries from Northern Italy made plantations of scions and rootstocks mother plants fields in regions free from FD, as Calabria and Sicily.

3. Even the nurseries are on the trail of biocontrol, with inoculation of mycorrhizae and Trichoderma before laying the plants in the field after callusing process.

5- Other

- Induction of resistance/ resilience – an atypical practice

Some experiences in Piedmont with ambiguous outcomes.

A test of University of Alessandria (ELIFITO project) in collaboration with University of Torino, has just detected significant differences in the cuttings treated with abiotic elicitor BTH (benzothiadiazole).

Then there are field experiences with a microbiological consortium of arbuscular- mycorrhizal fungi and bacteria, isolated on healthy vines in very infected vineyards. Some growers claim to have had some result, and three farming equipment manufacturers have developed models of micro-granulators for radical treatments of vines in the field. Scientific confirmation of effectiveness currently lacks.



The advice is to use the product in two stages: at planting and along the regular vineyard management.

The treatment at planting is considered a key treatment. It consists in wetting the roots with a mix of water, microbiological consortium and a sticking pasta, at 4-5 grams per vine. It is strongly suggested to plant vines with long root.

A root early mycorrhization, beyond the supposed effectiveness in resistance stimulation, offers other agronomic advantages such as better development and greater resistance to drought.

In the vineyard the product is distributed in the subsoil, along the rows, at a depth of 15-20 cm, with equipments derived from deep fertilizers, in autumn. Dose 15-20 kg / ha.



A lot of Information on Flavescence Dorée is available on Knowledge reservoir

- Scientific information
- Practical information
- Winetwork outputs