

New Resistant Grape Varieties

Bottlenecks and conditions for adoption in different European grapevine-growing regions

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Clockwise from top left: Resistant varieties Regent, Felicia, Cabernet Carol and Johanniter.
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New resistant grape varieties

Following the introduction of three severe fungal diseases into Europe from America at the end of the 19th century, viticulture in Europe with traditional *Vitis vinifera* varieties has been impossible without considerable applications of fungicides. The first efforts in France to breed new fungus-resistant varieties by crossing resistant American *Vitis* species with traditional European *Vitis vinifera* led to hybrids which often produced an undesired off flavour. Thus for consumers, resistant varieties today are still associated with the off flavours of these hybrids and their poor wine quality. Only a few breeding stations in Europe continued with the work to cross back the hybrids with *vinifera* varieties to get resistant varieties with the traditional flavours that we are used to. In the meantime numerous new high quality/high resistance varieties not based on genetically modified organisms are available or in preparation in some countries. These new varieties are mostly unknown to consumers. They require only a small percentage of the fungicide applications that are necessary for cultivating traditional varieties. Thus their cultivation makes it possible to reduce drastically the number of sprays used in viticulture.

Prerequisites for the application of resistant varieties

- > There must be a legal framework which allows resistant varieties to be planted.
- > The viticulture in the region should not be identified by the consumer with specific traditional grape varieties (for example, Riesling in the Moselle region, Cabernet Sauvignon and Merlot in Bordeaux, Gewürztraminer in Alsace and Dolcetto in Piedmont).
- > There should be a demand from growers and consumers to produce wine with fewer sprays.
- > The grower must be convinced of the high quality of the wine produced by resistant varieties and must be able to sell it.
- > There must be a market for the wines. This means consumers should be open to innovations. As the wine market is very traditional, changes or innovations in the wine business are not always welcomed even if they are a lot more sustainable than the traditional approach.

Factors affecting the efficacy of resistant varieties

- > As for traditional varieties, resistant varieties should be adapted to particular *terroirs*. Here there is still a huge lack of experience which would enable possible adaptations to be identified.
- > If a variety is resistant only to powdery mildew (*Erysiphe necator*) and downy mildew (*Plasmopara viticola*) but planted in an area with high disease pressure from other fungal diseases (for example, Black Rot, or Rotbrenner or Anthracnose) there may be disease outbreaks if the number of fungicide sprays is reduced.
- > Pyramidized resistant genes from different resistance sources leads to more secure varieties than varieties with only one resistance gene.
- > If the resistance is monogenic, it can be knocked out by some strains of the pathogens

Factors influencing the decision of growers to use resistant grape varieties

- > Extensivisation: The new varieties require reduced input of labour and reduce pesticide costs.
- > The output question: Can the product be sold at an acceptable price?
- > The quality of the wines.
- > The protection of both the environment and the user from pesticides.
- > The absence of pesticide residues in wines.
- > A possible alternative in steep slope viticulture.

Bottlenecks for resistant grape varieties in different countries

	Chile	France	Germany	Hungary	Italy	Netherlands	Switzerland
Legal framework	No	Yes	No	No	Yes	No	No
Number of new registered resistant varieties	0	0	21	10	0	10	10
Number of new varieties registered as <i>Vitis vinifera</i>	0	0	21	0	0	8	?
Number of new varieties in registration process	0	0	15	?	0	0	1
% vineyard area with resistant varieties	0	0	<5	<10	0	>60	<5
Ongoing breeding programmes	No	Yes	Yes	Yes	Yes	No	Yes
Absence of consumer demand	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Absence of performance knowledge by producers	Yes	Yes/ No	No	No	Yes	No	Yes/ No
New varieties not known by consumers	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Nowadays, the new resistant varieties available have been bred in Germany and Hungary, and these resistant varieties are becoming increasingly well known among producers.

However, the legal situation in producer countries is varied. If we examine geographically protected wine systems, such as the AOCs of France and DOCs of Italy, the cultivation of these new resistant varieties is possible in Germany, the Netherlands, Switzerland and Hungary, while in France, Chile and Italy it is not.

And only in Germany and the Netherlands are new resistant breeds available which are classified as *Vitis-vinifera*-varieties. This means they can even be used even for quality wine production, while in other countries they can be used only for the production of table wines. It is important to highlight that in a new vine growing country, such as the Netherlands, these new resistant varieties are the ones that are most commonly planted and are well accepted.

In some countries, there might be a need for vinification knowledge for the new varieties. In countries such as Switzerland, Germany and the Netherlands, where the cultivation of resistant varieties is allowed, the bottleneck for their adoption in viticulture is probably the absence of a market for the wine. Wine is mostly made from traditional, well known varieties. And while winegrowers often have good knowledge of the newly bred varieties, consumer awareness of them, and their possible positive environmental impact, is low or non-existent.

This might sometimes be coupled with the belief among environmentally conscious consumers that organically produced traditional grape varieties are not sprayed at all. For example, in the Bordeaux region, organic viticulture is difficult to successfully manage because of the disease pressure resulting from the humid climatic conditions. In this case, the use of resistant varieties may perhaps be an alternative to traditional viticulture.

New resistant grape varieties

How to promote the dissemination of fungus-resistant grape varieties in Europe

The dissemination of resistant varieties is strongly influenced by the socioeconomic parameters of the market. The trends in wine consumption are not comparable to other products because of there is a lot of fuss made about wine.

- > The legal framework needs to be adapted for each country.
- > Target groups for new wines must be identified (for example, innovatively thinking young people with high environmental consciousness).
- > Vinification experience with the new varieties should be more professionalised.
- > Products with a perfect wine quality should be used to promote the new varieties, both towards consumers and winegrowers.
- > Wines from resistant varieties should create a certain image which the target groups are looking for.

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About ENDURE

ENDURE is the European Network for the Durable Exploitation of Crop Protection Strategies. ENDURE is a Network of Excellence (NoE) with two key objectives: restructuring European research and development on the use of plant protection products, and establishing ENDURE as a world leader in the development and implementation of sustainable pest control strategies through:

- > Building a lasting crop protection research community
- > Providing end-users with a broader range of short-term solutions
- > Developing a holistic approach to sustainable pest management
- > Taking stock of and informing plant protection policy changes.

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