

Situation of the breeding of fungus-resistant Portuguese grape varieties

While science in the Germanic countries has been successfully experimenting with the introduction of resistance to mildew and downy mildew in grape varieties since the 1960s and 1970s, the Mediterranean countries have only recently become aware of this new type of ecologically sustainable vine, after the first interspecific variety was officially recognised for wine production in the EU in 1996.

Viveiros PLANSEL Lda imported 38 resistant, late-maturing genotypes from Germany in 1980 and systematically tested the performance of these varieties. To this end, research agreements were concluded at national level with the University of Evora and the national research centre EAN in Oeiras. At the end of the 1990s, a project for the transgenic introgression of resistance genes was launched and later a first program for resistance breeding with own crosses.

In Portugal, however, the wheels turn more slowly. The need to limit the use of pesticides was not recognized until this decade, when it was realized that plant protection products have an unfavorable effect on soil structure and the environment, as well as on the biodiversity of fauna and flora and ultimately on human health. However, despite the recognition of the first resistant variety (our Defensor variety), which managed to pass the complicated process of official recognition by the competent plant protection office in 2020 (entry in the National Catalogue of Varieties), but the grapes of this variety can still not be transformed into wine. Research into this has also been excluded from funding. The dream is that there will be sufficient possibilities with biopesticides to be able to fulfil the "Green Deal".

Nevertheless, the Viveiros PLANSEL research program is still active:

- a. **Increasing the biodiversity of resistant genotypes:** Creation of biodiversity with new genotypes through introgression of *Vitis* material from different species with resistance genes in order to respond sustainably to the pathogen. Elimination of traits that do not correspond to *Vitis vinifera* (trueness to type) through systematic backcrossing until an optimized combination of resistance loci with cultural and oenological traits (DHS and VAU) is achieved in genotypes. The new varieties should be derived from Portuguese reference varieties.
- b. **Strategy applied:** recombination of imported multiple resistance traits by backcrossing with native Portuguese varieties. In this way, it was possible in Portugal to skip the preparatory improvement phase of the decades-long "pyramidisation" (accumulation) of resistance genes in order to arrive directly at multi-resistant progeny. (A total of around 40,000 controlled crosses were made with resistant pollen and national lead vine varieties).
- c. **Existing experimental facilities** for the creation of biodiversity and sexual propagation of the genetic material obtained with subsequent ecological screening to check cultural suitability and varietal typicality:
 - In the greenhouse (3-6 months), repeated in 4 years: Germination of fertilized grapevine seeds; there are currently around 1000 candidates.

- Field for seedling rearing. In 2021, a propagation field was created in the vine-free (to avoid phylloxera infestation) "Safira" estate. In this field, the characteristics, with marker-assisted selection and phytosanitary stress, as well as the morphological and cultural behavior are evaluated. Genotypes of the 2019-2021 crosses were continuously planted here and replaced by others if the breeding objectives were not met.
- There are currently 65 different clonal populations of the vegetative agreements of these plants in the nursery.
- There is a Germoplasma field (6 plants each) with 10 of our resistant cultivars from previous years.
- In the same germplasm field there are 20 of the most important international resistant varieties (Germany, Switzerland, France and Italy)- A second seedling field has just been planted with 650 entries.
- - At the University of Evora, the conditions for PCR analysis of the resistance loci and Mikrovinifikation of the resistant candidates have been created.

Concluding summary: The objectives that we pursued with the PDR 784-042746 research project with the help of JKi Geilweilerhof were achieved in accordance with the program-specifications.

To this end, the first regional trial plantings are already underway with the aim of initiating the process of approval for certification in accordance with the DL 194/2006 legal regulation, which is currently facing opposition from the National Association of the Wine and Spirits Industry, which dominates the Wine Institute with its veto, which is responsible for authorizing entry in the list of authorized varieties for wine production. If the EU takes the "farm to fork" project seriously, it is to be expected that professional viticulture will soon resort to resistant genotypes from advanced Western European wine-growing countries, as national measures have been slowed down too much until today, Viveiros PLANSEL is currently working together with the vine nursery association (VITICERT), the University of Évora and INIAV Dois Portos on a vine breeding concept that will be presented to our government. This had already been presented to Parliament in an initial hearing. But after our Prime Minister had to resign once again due to suspected corruption, this may take some time. In the meantime, Italian vine growers are active on the Portuguese market with their resistant varieties.

Jorge Böhm Nov 2023 - hjorge.boehm@gmail.com