

A Farmer's Toolbox for Integrated Pest Management

AGRI/2020/OP/0003

Case study "ADVID – Vine and Wine Cluster in the Demarcated Douro Region"

Abstract

This case study focuses on the activity carried out by ADVID, which is an association created in 1982, which aims to contribute to the modernisation of Portuguese viticulture, in particular the Demarcated Douro Region, and, consequently, contribute to improving the quality and profitability of Portuguese wines and vineyards.

The Association was created by the initiative of a group of companies linked to the production and trade of wines from the Demarcated Douro Region (namely Porto wine), who understood that it was important to have a structure that would ensure the transfer of knowledge from academia to the field, and that knowledge was not only concentrated at the level of the R&D entities existing at the time. The initial concerns of the association were related to the need to promote a continuous source of information, to support the technical decisions of the associates, namely regarding new land systematisations, vine mechanisation, work rationalisation, and choice of vegetative material. These first actions later gave rise to the implementation of integrated pest management programmes and more recently to integrated production, an essential tool for quality production that is safe for the consumer.

As a result of its journey and importance, ADVID was recognised in 2009 as the Managing Body of the Douro Region Wine Cluster, in 2017 as the Managing Body of the Vine and Wine Cluster, and in 2018 was awarded the title of Collaborative Vine and Wine Laboratory.

1. Introduction

ADVID is one of the main organisations in the vineyard and wine sector in Portugal, with particular relevance in the Douro region.

Its genesis was linked to a need felt by the main Port wine producing and exporting companies to have a structure that would support the production of knowledge and its dissemination among producers.

The evolution of its structure and its functions has been adjusted over the years, and it now has a very relevant role in the technical support of Integrated Pest Management to the wine growers in the Douro region.

The interaction with the ADVID structure has allowed for access to a set of information and details on the operation and history of the organization that enrich this document and its relevance to the pilot project, providing clues on the structure, funding, difficulties, and solutions encountered along the organisation's path.

2. Research theme

ADVID is linked to the vineyard and wine sector, providing a wide range of services to its members, and promoting continuous improvement in the technical, economic, and environmental performance of producers, as well as the consolidation of the national wine sector.

With this case study we sought to explore the nature of ADVID, identifying its history, its organisation, and its objectives, to understand the importance of these factors for the success of its development.

Furthermore, we wanted to learn more about the service provided related to IPM, namely what led to the start of this process, the difficulties they have experienced over time, and the opportunities that this service has generated within the organisation.

3. Methodology

This case study was conducted through an information survey in which the project team collected a set of information through desk research about the history of ADVID, ensuring a thorough background knowledge and allowing to focus the conversations carried out and identify any points that needed to be explored. In a second step, interviews were conducted with relevant actors of ADVID. In a final step, ADVIS has also validated the information gathered to ensure that the case study reflects the correct reality of the organisation.

4. Activities and results

4.1 Objectives

ADVID is a non-profit institution, established in 1982, which aims to contribute to the modernisation of viticulture in the Demarcated Douro Region, and Portuguese viticulture in general, and, consequently, contribute to improving the quality and profitability of Portuguese wines and vineyards. The association's mission is to promote the sustainable development of

Douro and national vitiviniculture, in a context of cooperation and networking, as well as the transfer of knowledge accumulated through research and experimentation carried out within the scope of ADVID's activities.

The association's initial concerns were related to the need to promote a continuous source of information to support the technical decisions of members, particularly regarding new land systematisation, mechanisation of the vineyard, rationalisation of work, and choice of vegetative material. These first actions later gave rise to the implementation of integrated protection programs and more recently to integrated production, an essential tool for quality production that is safe for the consumer.

To these goals, ADVID has been equipped with technical staff and facilities that enable the association to carry out research and experimentation activities, which constitute a substantial part of its activity and are an important contribution, through the results obtained, to the prestige of the association.

The recognition and success that ADVID has achieved is also based on the collaboration of members, in various areas, particularly in hosting association technicians on their properties for field trials, and lending equipment. Having pioneered the implementation of a collective strategy in the viticulture sector, ADVID maintains the spirit of its foundation, constituting a rare case of optimisation of differentiated efforts and consequent equitable sharing of results and knowledge.

As part of this journey, ADVID applied for and was recognised in 2009 as Managing Entity of the Douro Region Wine Cluster, in 2017 as Managing Entity of the Vine and Wine Cluster, and in 2018 was awarded the title of Collaborative Vine and Wine Laboratory.

These current recognitions, i.e. Managing Entity of the Vine and Wine Cluster and Vine and Wine CoLAB, fall within the object of ADVID, defined in its statutes, namely "the study, experimentation, demonstration and dissemination of viticulture techniques suitable for the enhancement of National Viticulture and very specifically the characteristics of the Demarcated Douro Region, with a view to the competitiveness and quality of wines on national and international markets" and will contribute significantly to the pursuit of the Vision established for ADVID, and for which it has been working since it was set up - transfer of knowledge and identification of problems in national vitiviniculture.

4.2 Governance and functioning of the initiative

On 11 February 1982, the Associação para o Desenvolvimento da Viticultura Duriense - ADVID (Association for the Development of Douro Viticulture) was created on the initiative of a group of companies linked to the production and trade of wines from the Demarcated Douro Region. These companies understood that it was important to have a structure that would take on the transfer of knowledge from academia to the field, and that knowledge was not only concentrated at the level of the R&D entities existing at the time.

ADVID was therefore set up with the aim of studying, experimenting with, demonstrating and disseminating winegrowing techniques appropriate for the enhancement of Portuguese vitiviniculture and, more specifically, the characteristics of the Demarcated Douro Region. These activities were to be carried out with a view to the competitiveness and quality of wines on national and international markets, on its own initiative or in collaboration with state or

private bodies or services, national or foreign, and also to represent and defend the interests of members before all official or private entities of national, regional or international scope.

ADVID is statutorily composed of a Board (of 3 or 5 members), the General Meeting and the Supervisory Board. In addition, a Technical Board was also set up, with nine members appointed by the Board of Directors, to prepare opinions and recommendations on activities developed and to be developed.

The operational structure of ADVID, shown in **Figure 1**, consists of 21 people, with 7 people currently allocated to the Technical Services Department, which includes support services for Integrated Production.

Figure 1 - Functional organisation chart of ADVID



In 1997, the revision of the ADVID statutes allowed for the expansion of its membership base, as well as the appearance of new member categories. In addition to full members, there are now also collective member members (companies) and individual member members. This first revision of the ADVID statutes was followed by another one in 2016, which extended the scope of the association to national territory.

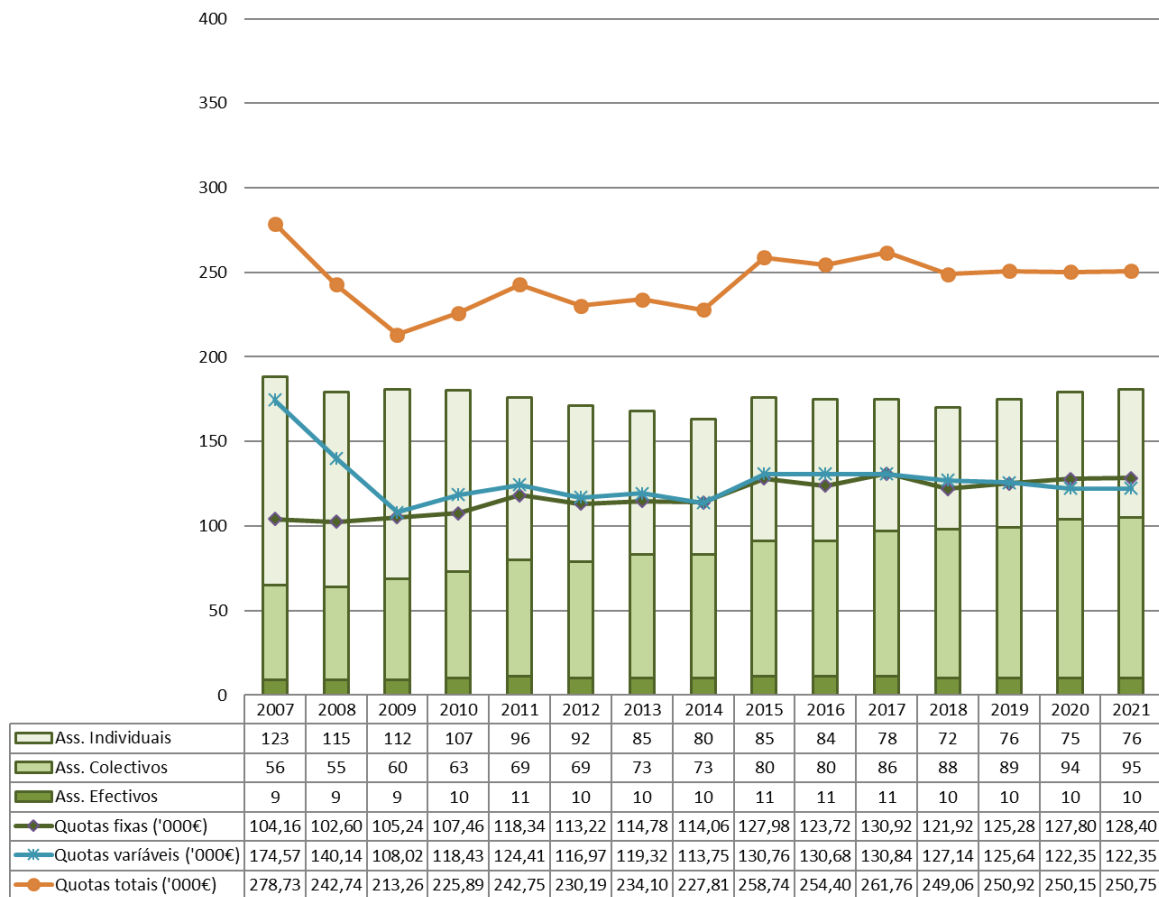
ADVID currently has 10 full members, 95 collective members and 76 individual members (**Figure 2**). These are the members who have active participation in the life of the association and pay fees, which are differentiated according to status, and which take the form of distinct vote numbers. ADVID also has several partner entities (68 in 2020), mainly in projects developed by the association, some of which accumulate with the status of collective member.

ADVID's statutes define that the purposes of the association are:

- promotion of activities to support research and development, such as knowledge management, idea management and evaluation of R&D opportunities;
- development of activities necessary for the execution of research and development projects, such as knowledge creation and transfer, planning, preparation and execution of tests and experiments in laboratory and real production situations;
- dissemination of technical and scientific knowledge with a view to adding value and sustainability to the National Winegrowing activity, with special attention to the Douro Demarcated Region;

- collection, processing, and dissemination of information of interest for the development of the vitiviniculture activity;
- professional training, namely in the fields of recycling and specialisation courses;
- promotion and defence of genetic, environmental and landscape heritage and tourism potential of the Demarcated Douro Region, as well as of the other National Wine Regions;
- promotion of sustainable viticulture practices such as IPM, organic production methods, among others, technical support and promotion of the products obtained; and
- organisation and maintenance of services of interest to the associates and the exercise of any other functions that, according to the Law and by its nature, are its responsibility.

Figure 2 - Evolution of the associative structure



In 2003, ADVID was recognised as an approved entity for the practice of Vine IPM, an agri-environmental measure with great impact on respect for the ecological and landscape balance of the Douro region. This recognition has enabled technical assistance to be strengthened in this production method and follows on from the recognition, in 1997, of ADVID as an IPM Farmers' Organisation (Order no. 12 782/97 dated 16 December 1997).

4.3 Results (and successes)

IPM is a practice adopted in viticulture in the Douro Demarcated Region, and the Common Agricultural Policy has contributed to its dissemination. The application of the CAP IPM measure in the mid 90's contributed to a change in viticultural practices, making them more sustainable. Before the adoption of the IPM principles, the phytosanitary protection strategies were based on "blind" chemical control, often inadvisable, with little care in the use of more sustainable practices.

With the introduction of IPM, technical advice, as well as the implementation of risk estimation adapted to the different enemies and taking into account the economic levels of attack defined for each one, damage levels that did not represent damage to the crop started to be "tolerated". On the other hand, cultural practices have been implemented that promote an improvement in preventive conditions and an increase in auxiliary fauna, which have also reduced the presence of harmful organisms. These practices have led to the implementation of policies aimed at promoting environmental sustainability, with the enforcement of rules for the proper (or sustainable) use of pesticides, contributing to a better management of pests and diseases of the vineyard accompanied by a reduction in the use of pesticides.

In the Douro region, there has been an increase in terms of area and number of wine growers who have joined the IPM. Among ADVID members, there are around 5 500 ha under IPM and 250 ha under Organic Farming. ADVID has promoted the use of sustainable viticultural practices, defending and promoting, in particular, the use of IP principles in the Demarcated Douro Region. To this end, it has invested in technical support for winegrowers, through technical visits to members. The promotion and dissemination of practices to promote functional biodiversity as well as other sustainable agricultural practices have been carried out through various activities developed, and continuous training provided to winegrowers.

Over time, tools have been developed to support decision-making, such as pest/disease prediction models and phenology, the promotion of precision agriculture and research into alternatives to conventional pesticides.

Some of the most emblematic initiatives developed by ADVID within the scope of Integrated Protection are listed below:

- Creation of a restricted area, for each member, on the ADVID website that allows the sharing of all data collected as part of the provision of technical support to wine growers;
- The field notebooks (compulsory document for all producers) are computerised so that, today, all the data from the field notebook of each viticulturist, which is monitored by the Technical Services, are in the restricted area on the website and allow a dynamic analysis over the years;
- Creation of its own network of weather stations (currently 7) to ensure the monitoring of the most relevant areas of its members, to which is added the information from weather stations that some larger members also have on their holdings. The weather stations were acquired by ADVID and their maintenance costs are also assumed by the association (these stations are different from the network of stations managed by the Ministry of Agriculture, which, due to lack of resources, end up not being much updated or used);

- Own warning service, which is shared in each member's reserved area on the ADVID website, and which is complemented with direct contacts, via cell phone, in cases of greater pest and disease pressure (e.g. a very strong forecast of powdery mildew attack);
- Creation, in 2014, of the "Viticultural Observatory", which consists of a network of 25 plots (constant over time) for monitoring and biological and phenological observations-This observatory allows for the behaviour of the region to be characterized throughout the year, ensuring the detection of differences in the evolution of phenology and/or biology, a monitoring of the evolution of diseases and pests, a forecast of production and optimal time of harvest (through pollen capture and sampling), and a monitoring of the results of the harvest (to understand what factors may have had more impact on the quality and productivity of wines obtained);
- Development of forecasting models for the development of pests and diseases in the region, namely the grape moth;
- Promoting the development of master's theses and doctoral dissertations, in partnership with national universities, for the treatment of data collected in the region and for the integration of more knowledge in the provision of technical support to wine growers;
- Development of a list of possible plant protection products to be used by the viticulturists, to facilitate the research by the producers, namely, to identify which active substances are specific for each enemy of the culture; the current public database (SIFITO) is not very user-friendly for an easy and quick search;
- Development of technical manuals about different diseases and practices, which are made available to all the grape growers in the region (example: powdery mildew of grapevine, containing all the information about its symptomatology, preventive strategies and treatment measures).

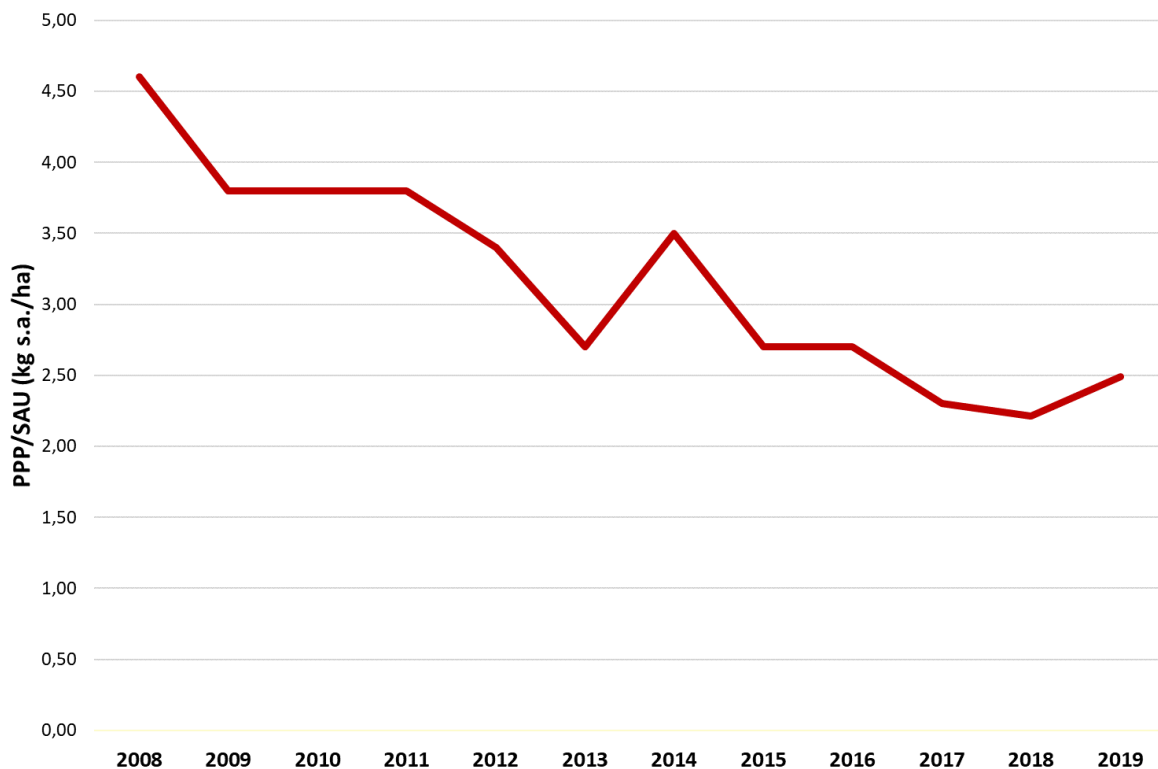
The use of pesticides in a generalised and ill-advised manner, the use of excessive amounts of powdered sulphur or copper and the indiscriminate use of herbicides have been replaced by more sustainable practices such as the use of pesticides in a manner appropriate to the phenology and incidence of the pest/disease and the use of alternative methods to chemical protection (sexual confusion, promotion of ecological infrastructures, inter-row greening of the vineyard, covered slopes), among others. For example, with the use of sexual confusion and functional biodiversity, it has been possible for the overwhelming majority of ADVID members not to use insecticides for many years, or to do so only occasionally, and when there are no alternatives, when in the past there was a scheduled use of insecticides.

In **Figure 3** we can see the reduction in the application of phytopharmaceuticals per useful agricultural area, in Portugal, which proves the great technological evolution that has taken place in the last years in Portuguese agriculture.

There has been greater training of wine growers, who understand the principles of integrated protection and value technical advice, using data to support decision-making, such as meteorological data, phenology and pest and disease models, and encouraging preventive cultural practices and alternatives to chemical control.

ADVID has played an important role in the development of the Demarcated Douro Region, and there were several factors that contributed to this success. First, the very nature of the association and its creation. There is a great predisposition for the provision of specialised services that are based on technical knowledge and the close partnership with R&D institutions, resulting in a greater transfer of knowledge to the sector; the very willingness for innovation of the associated wine companies which serves as an example for the adoption of new practices by the other winegrowers in the region. The promotion of decision support tools, aiming at a more rational use of pesticides, has been an extremely important point to transmit more information to the viticulturists and to guarantee an increase in knowledge. The existence of support under the CAP has been very important to promote the adoption of good viticultural practices in the field.

Figure 3 - Evolution of Sales of Plant Protection Products, between 2008 and 2019, by agricultural area used (Source: DGAV, 2021)



The Association, because of its regional leadership in terms of technical knowledge, seeks to develop a set of tools to support winegrowers in the region that are very relevant to the success of reducing the use of phytopharmaceuticals.

In this aspect we highlight:

- 1) the production (which they have always done) of a list of authorized products in IPM and in Organic Farming, with their respective side effects and easier consultation by farmers;
- 2) the production of specific technical booklets on pests, diseases and/or techniques (e.g. powdery mildew, grape moth, wood diseases, spraying, sexual confusion of the grape moth);
- 3) the development of disease prediction models that allows supporting, through circulars, decision making at the right time by producers; and
- 4) the dissemination of good agricultural practices to the society in general.

4.4 Barriers (to implementing the project)

The main difficulties experienced over the years were related to:

- The physiographic nature of the region itself, which gives rise to difficulties in phytosanitary management in a hillside viticulture context (phytosanitary treatments on a single vineyard face when systematized in 2-row “patamares” (plateau), weed control on slopes, mechanization not adapted to hillside viticulture, propensity for a diversity of microclimates in a vineyard plot);
- The reduction in the number of active substances available for the control of vine pests and diseases, which greatly limits the tools that winemakers can use;
- The outdated economic levels of attack due to lack of means from the national authorities; in practice, the data recorded for years in the field notebooks are used only for compliance and are not used for monitoring results and data processing that would allow a more detailed analysis of results;
- The lack of manpower in the region that allows better management of cultural operations in the field, which means that producers have to intervene, increasingly, in a preventive way and without the possibility of adjusting the timing of product application to the actual development of the pest / disease;
- The high cost for the implementation of some alternatives to chemical control, which prevents producers from further developing the use of some techniques; this aspect has been further penalized with the disappearance of product listings;
- Climate change has led to lower yields and increased pressure from new enemies and some weeds; and
- The degradation of the public image of the agricultural sector that associates production with the use of toxic chemicals and with negative impacts on health, clearly lacking a communication strategy that involves the producers themselves.

5. Discussion and conclusions

The fact that ADVID was created by private entities who understood that it was pertinent to have a structure that would lead the process of transferring scientific knowledge to winegrowers in the Douro region, has been central. Its creation was not born in response to a stimulus from public policies, or in search of support for the operation of an organisation or for the provision of a service, which is quite distinctive compared to most farmers' associations in Portugal, and greatly marks the entire path of the organization.

With the existence of agricultural extension support associated to the provision of IPM services, supporting producers through an agro-environmental measure created in the mid-90's, it was possible to disseminate in a faster and more universal way a set of cultural practices that promote an improvement of the preventive conditions and a promotion of auxiliary fauna, which reduce the pressure of pests and diseases, and that allowed avoiding the use of chemical control in a scheduled way and without taking into account the economic level of attack of the crop enemies.

The IPM practices have contributed decisively to the promotion of environmental sustainability, with compliance with rules for the appropriate (or sustainable) use of pesticides,

contributing to a better management of pests and diseases in the vineyard accompanied by a reduction in the use of pesticides.

Based on the provision of IPM services, ADVID has “built” a set of tools and complementary services that enable a very complete response to be provided to wine growers and give importance to the service that enables them not to depend exclusively on the existence of public support for producers.

The initiative described here is a very consolidated example of a farmers' association that has been able to create a solid technical body and a very professional response to producers. As a result, the association is seen as a model by other organizations, from different sectors, in the national panorama. Given the consistency of its activity and the sectoral and national relevance that ADVID has today, it seems to be an example that can be replicated in other countries and that can contribute to a successful implementation of IPM practices in different contexts and sectors.