SUSTAINABLE FARMING

Spurred on by environmental concerns, there has already been a small-scale viticultural revolution: biodynamics. The more thoroughly scientific approach of integrated farm management (IFM), which encompasses not just pest and disease control, but also soil health and plant nutrition, may offer a more palatable solution, thinks Dr. Jamie Goode.

While there's nothing terribly new about environmental issues, people with serious concerns about the state of the planet used to be conspicuous only as a vocal minority of activists. But spurred on by increasing concerns about global warming, many more people are now taking environmental issues seriously, to the extent that they are influencing their purchasing activity, and the wine industry will need to take into account this change in public sentiment. Wine has benefited from possessing the image of a natural product. Most consumers, however, simply aren't aware of just what is sprayed on vineyards and some of the trickery that take place in wineries.

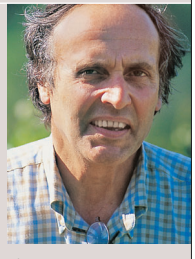
In certain regions of the world there has already been a small-scale viticultural revolution: biodynamics. This supercharged version of organic viticulture, with its range of sometimes bizarre preparations, adherence to a celestial calendar and an underlying philosophy that speaks of mysterious life forces, is currently undergoing a renaissance in the vineyards of Europe. The Saahs family of Nikolaihof in Austria's Wachau were the first to apply this agricultural system to wine growing in the 1970s, but in recent years it has taken strong hold in many European wine regions, most notably in Alsace, Burgundy and the Loire.

It's hard to know exactly how many wine growers are practising biodynamics – in part because many are in the process of conversion and are not yet certified, and in part because some practice it without really telling anyone – but a rough estimate is that there are some 750 producers worldwide. Nicolas Joly, unofficial ambassador of biodynamic viticulture, describes his conversion to biodynamics as having its nascence in environmental concerns. When he returned from a spell as a banker in the US to his family's estate in the Loire in 1977, he decided that he wanted to make wines that expressed the "spot" of Coulée de Serrant. Early on in his tenure, he was visited by an official from the chamber of agriculture. "They told me that my mother had been running the estate well, but in an old fashioned way, and it was now time for some modernity," he recalls. "I was told that if I started using weed killers, I'd save 14,000 francs." Joly took this advice, but soon regretted it. "Within two years I realized that the colour of the soil was changing; insects like ladybirds were no longer there and all the partridge had gone," he says. Then Joly read a book on biodynamics. "I wasn't attracted to the green movement, but this book fascinated me, and I had the crazy idea of trying to practice this concept."

QUOTE UNQUOTE

» I had the crazy idea of trying to practice biodynamics. «

Nicolas Joly



Nicolas Joly from the Domaine de la Coulée de Serrant on the Loire is the unofficial ambassador of biodynamic viticulture. His conversion to biodynamics had its nascence in environmental concerns.

While the biodynamics renaissance offers the most visible solution to the problems of high-input chemical-laden viticulture, it has its detractors. First, to adopt biodynamics as a package requires the grower to buy into a philosophical system that is at odds, in many places, with scientific understanding. For many university-trained wine growers, to adopt biodynamics would necessitate an extremely difficult cultural shift. Most wouldn't contemplate it, and despite its high visibility in the wine world, it seems that it will remain in a niche.

Criticism and scepticism

A second criticism is that biodynamics doesn't always produce the effects it claims. Growers struggle with it in rainy vintages or in regions that are consistently damp, and have to supplement their preparations for countering disease with the solutions copper sulfate and elemental sulfur, which is justified on the grounds that these are natural chemicals.

One winemaker I spoke to was extremely sceptical about the efficacy of biodynamics, and cites its effects on the property of one of his colleagues. "I've seen his vineyard, and the weeds are higher than the vines!" he reported. But his major criticism was that in regions where biodynamics is becoming well established, covert pressure may be placed on the other leading producers, leading some to support the system for the sake of appearances. Of course, this problem is not unique to biodynamics: where there are kudos associated with any particular form of vineyard management, far more will claim to practice the desired regime than actually do.

Perhaps the biggest problem with biodynamics, however, is that it is drawing attention away from a far more significant revolution in the world's vineyards: the scientifically based sustainable viticulture that goes under a range of names. Integrated pest management (IPM) is the most widely used term, along with the broader term integrated farm management (IFM), which encompasses not just pest and disease control, but also soil health and plant nutrition. In France, which is leading the way with the application of these in viticulture, *lutte raisonée* (which translates best as the "rational fight") and *viticulture raisonée* are the corresponding terms.

IPM represents a paradigm change in agriculture. Previously, the prevailing attitude was one of blitzing all pests with a chemical arsenal, leaving just the crop species, perfect and unblemished. Farmers intervened to prevent any crop loss to disease or pests. However, there has recently been a sea change in attitudes, partly because such practices simply don't work, due to the problem of resistance, and also because farmers are realising that the only morally acceptable way of farming is to do so sustainably, in a way that doesn't involve the next generation picking up the tab for our bad practices.

Natural ecosystems have evolved with checks and balances to produce a stable system, a bit like a ceasefire arrangement. Farming creates an artificial ecosystem, where just one species is grown at high density, creating the ideal conditions for suitably equipped insect, fungal and nematode pests, as well as the problem of weed species. The simplistic, 20th-century response was for chemists to develop an arsenal of sprays targeting these problem species, but this created a more serious problem of pests with resistance to fungicides and pesticides - and also killed the natural enemies of these pest species that had previously kept their population under some control. In addition, the widespread use of agro-chemicals has in some cases led to degradation of soil quality.

Vitis vinifera, the grape vine, is susceptible to attack by fungal diseases and insect pests. The American fungal diseases of powdery and downy mildew that were imported into Europe in the 19th century are severe enough to make growing wine grapes close to impossible without some means of control. Insect pests are also a big problem for wine growers, and can lead to huge crop losses. The worst vinifera pest of all, phylloxera, has been managed, but not eradicated.

Scientific approach

IPM rests on a thorough scientific knowledge of the biology of pest, weed and disease organisms, in the context of the larger ecosystem. Practitioners use this knowledge to monitor populations of potential problem organisms, and then anticipate when they will reach damaging levels. In essence, it is about reconciling rather disparate aims: farmers want to reduce crop losses while at the same time reducing environmental degradation and avoiding pest resistance build-up. Farmers using IPM are making choices based on a broad outlook that takes into account the whole ecosystem rather than just a part of it.

Data and knowledge are both key for IPM and can help reduce the number of chemical inputs by predicting when certain pests or diseases are likely to be a problem. Spray programmes can be scheduled intelligently, applied only when they are really needed. This climatic monitoring is inexpensive to implement, and can actually save money as sprays and the labour required to administer them are costly. Viticulturalist Marius Cloete at Glen Carlou in South Africa's Paarl region explained that this technology helped him do his job not only better, but also cheaper. He uses in-vineyard environmental data gathering, which is linked up to a computer in the winery running a software package called Plant-PLUS. This is a decision support system that is used to predict the incidence of pests and diseases, allowing control only where it is needed. The system uses data collected from various parts of the vineyard and combines these with weather forecast data, indicating when control might be needed. Further data on the growth phase of the vines can be added manually by the viticulturalist. As a result, minimal chemical inputs are used, and the system paid for itself from these savings in just one season.

Biological control is another one of the foundations of IPM. If you have a pest problem, introduce the natural enemies of this pest – be they predators or diseases – and let them control the problem. Many IPM strategies rely on the identification of natural enemies of pest arthropods. These are also known as "beneficials". Natural enemies might be predators, who eat the problem species, or parasitoids, which are insect parasites. An example of the latter are parasitic wasps: these might lay eggs in a problem caterpillar that produce larvae that then grow inside the caterpillar, using it as a food source and killing it in the process.

Biopesticides are a new development that may prove important in the future. These are pesticides that use specific microbes as the active agents. One example is that of Trichoderma harzianum, a fungal enemy of another fungus, Botrytis cinerea, which causes bunch rot on grapes, and Ampelomyces quisqualis, an antagonist of powdery mildew. Some are already being used in vineyards.

QUOTE UNQUOTE

» Integrated farming is more efficient than organic growing. «

Christophe Mangeart

Christophe Mangeart is the quality director at Yvon Mau in Bordeaux, where he founded a producers' club for the group's 20 best suppliers, all of whom have been certfied in agriculture raisonnée by the Department of Agriculture.

If parasitoids or predators of pests are introduced into a vineyard, they will need somewhere to live, and they might not find vines an ideal home. Added to this, clean-cultivated vineyards are barren places during the dormant season, with nowhere for over-wintering insects to hide. This is where ecological compensation zones come in handy. These are patches of ground given over to specific patterns of vegetation, such as scrubland, woods or hedgerows that can act as refuge areas for the natural enemies of problem species. This sort of biodiversity can offset some of the negative effects of monoculture. It is likely that the efficacy of these compensation areas will be enhanced by the use of cover crops or by allowing some vegetation to grow between vine rows. These compensation zones are not a panacea for all vineyard problems: there is a risk that growing certain types of vegetation near vineyards could attract insect species that turn out to be a problem, either as pests themselves or as the transmission agents of viral or bacterial diseases.

Positie results

I spoke to Maarten Van Helden, who works for the Ecole Nationale d'Ingénieurs des Travaux Agricoles (ENITA) in Bordeaux, whose research develops the science behind ecological compensation areas so they can be used as an IPM tool in vineyards. "Viticulture is particularly interesting for IPM, because there is little risk of increasing the pressures of diseases or pests on the vines: this is not the same with other crops," he explains. Vineyard insect pests are usually a problem late in the summer: in vineyards in early summer there will be a build-up of natural enemies on the hedgerows, which eat pest species there and then move to the vines. "Our experiments have been ongoing for five years now," says Van Helden. "We don't have solid results, but a lot of farmers are interested."

As well as his work in Bordeaux, Van Helden is involved in a project that will see ecological compensation areas being trialled across a whole appellation, that of Saumur-Champigny in the Loire. "We want to see if we can recreate functional biodiversity in an existing situation," says Van Helden. "We want to see what we can adapt; we don't want to re-do the landscape entirely." It will be an interesting project because it will explore which landscape elements are most significant for encouraging viable natural enemy populations. While hedgerows are a vital component in this type of project, because they act as refuges and are also linker elements and corridors, alone they might not be enough. Some natural enemies prefer larger natural sites such as patches of scrub or woodland. The hedges can act as "roads" directed towards the vineyards. In the vineyard, small landscape elements such as undergrowth provide important refuge areas. In the Saumur-Champigny experiment, Van Helden will be advising growers on what sorts of plants might be useful for ecological compensation areas and vineyard undergrowth. Farmers might find space for these around their plots, or plant hedgerows in or at the boundaries of their vineyards. He estimates that the cost of planting a hedge is around €4–5 per metre, with some soil preparation, mulching and a year or two of follow-up also involved. There are possibilities for funding this through the local chamber of agriculture or local government.

IPM is also gaining support in Champagne, and has been championed by the Comité Interprofessionnel du Vin de Champagne (CIVC), which provides technical support and advice to growers in the region. Champagne claims to be the first wine region in the world to run environmentally friendly programs at a regional level. IPM in Champagne goes under the name of *viticulture raisonée*, and since 2001 the region has issued a *guide practique* for growers.

Who can benefit?

Perhaps the greatest appeal of IPM or IFM is that they are scaleable, applicable to the largest producers as well as the smaller ones, and can pay for themselves within a short time. I spoke with Christophe Mangeart of Yvon Mau about its successful implementation of *viticulture raisonée*. In recent years Yvon Mau has organized its best suppliers into a producers' club, and they have now all been certified in *agriculture raisonée* by the Department of Agriculture. This involves 20 producers and 60,000 hectolitres of wine. "We think it is the best way forward for the future of agriculture, and particularly viticulture, which uses lots of chemical inputs," says Mangeart. He adds, "Organic winegrowing is not efficient enough in terms of quality of product and environmental protection of soils and biodiversity. Integrated farming succeeds in preserving the environment and the economic balance of properties. We launched this programme because it gives good results in terms of the environment, costs, and quality of product."

An outlook

How much does implementing IFM cost? "Not so much," according to Mangeart. "We have one technician taking care of the producers. This is necessary because otherwise the producers might not do it, as it requires effort." The producers need to do things differently in order to conform to the regulations, but there are considerable savings to be made in terms of agrochemicals. Currently, there is no premium attached to wines that have been made according to *viticulture raisonée*. "The market doesn't ask for this yet, so we have to do it for free," says Mangeart. "But we think this may change in the future, as we feel there's an increasing demand by consumers for products that respect the environment." Mangeart thinks that *viticulture raisonée* has the potential to be used by almost all producers because anyone can apply it.

It may be that when it comes to sustainable, natural wine-growing, biodynamics currently has centre stage. But perhaps more important for the majority of wine growers worldwide is IPM in its various forms. With its potential for cost saving, its efficacy and its green credentials, it's the future of wine the natural way. ■