Watching the wine with new technology

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(PhysOrg.com) -- Steeped in tradition, Europe's vintners have found themselves hard pressed to compete with the modern processes used to produce New World wines. Now European researchers are offering the continent's winemaking industry the opportunity to improve quality, save water and reduce pesticide use without giving up age-old practices.

An automated wireless precision monitoring system that uses sensors to check soil moisture, air temperature and humidity is being commercialised by Italian company Netsens, set up in 2005 as a spin-off from the EU-funded GoodFood project.

Currently in use in several Italian vineyards, Netsens' Vine-Sense system allows vintners to accurately time harvesting, fight pathogenic attacks, cut water consumption and lower the cost of chemical treatments without even having to visit the vineyard.

"All the data gathered from the sensors is transmitted wirelessly via an internet gateway and can be accessed by the farmer from anywhere," explains Gianfranco Manes, the head of the Multidisciplinary Institute for Development, Research and Applications at the University of Florence, Italy, and one of the GoodFood coordinators.

Precision monitoring systems have gradually become more accepted in the wine industry in recent years, but most have relied on planting sensors in the vineyards and then traipsing through the fields to manually check each one.

In contrast, data from the sensors developed by Manes' team are collected every 15 minutes and automatically analysed to provide winegrowers with detailed information about how well their grapes are growing, how much water they need and what risks are present from fungal infections and pests in light of the air humidity, soil moisture and temperature.

Better for wine lovers, better for the environment

The system addresses three critical issues in particular, says Mane. First, it allows farmers to use water more efficiently – knowing that 80 percent of world water consumption goes on agriculture. Second, winegrowers know when they have to use pesticides, so instead of spraying chemicals on the vineyards every two weeks as is common today, they only do so when there is a risk to the vines. And third, they can monitor how well the grapes are developing in order to determine exactly the right time to harvest the wine.

Those production, cost and environmental benefits are immediate in the first year of the system being installed, but in the mid-term, closer monitoring also offers advantages by letting farmers identify different microclimates on their land. This helps them choose the vines best suited to different growing conditions – a procedure known as 'microzonation'. The upshot is better wine.

"Winegrowers have told us that they are not interested in increasing the size of the harvest but in producing better wine, which evidently boosts their revenue. Consumers, logically, also appreciate it," Manes says.

Cost-effective technology

Though Italian and European winemakers have traditionally been

reluctant to incorporate new technology into their ancient practices, Manes says there has been considerable interest in the system being marketed by Netsens. One key factor is price.

Deploying the sensor nodes and communications infrastructure costs €500 to €1,000 per hectare, with three or four nodes – at a cost of €280 each – needed to provide accurate and comprehensive data.

That compares to the €400 to €600 per node that it costs to install rival systems currently being marketed by US firms, Manes says. He also notes that the rival systems are not well suited to European agriculture because they require a direct communications link to the farmers' home.

Farmers in the USA tend to live on or near their farm, whereas in Italy and much of Europe, winegrowers can be far away from their vineyards. According to Manes, this makes the internet an obvious choice for accessing the data.

Even higher quality Chianti?

Vine-Sense is currently in use at the Castello di Ama and Montepaldi vineyards in the Chianti region of Tuscany, Italy. By the end of the year, Manes expects systems to be up and running at between 10 and 15 vineyards across the country. He notes that Netsens has had inquiries from winegrowers as far afield as Egypt and Jordan, where water use is a particularly critical issue.

Versions of the system are evidently not limited to use in the wine industry – though it is a particularly high-value sector – and could be used to monitor other crops. The GoodFood project, which received funding under the European Union's Sixth Framework Programme for research, also developed a range of other technologies for agricultural and food monitoring.

Among them are a range of portable devices to detect toxins, pathogens and chemicals in food, which allow tests that are currently run in a laboratory to be carried out on the farm or at the processing plant.

While these systems require further research before they will be ready to deploy commercially, Netsens is looking to rapidly expand sales of the Vine-Sense system and is seeking partners in other European countries and around the world to help it achieve that goal.

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