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Smart Vineyard

Wireless sensor network for pest control

Flavescence dorée is a grapevine disease that ravages wine crops each year. In the Canton of Ticino, a company called Dolphin Engineering is working on an innovative wireless sensor network that continuously takes air temperature readings. Armed with this data, winegrowers will be able to fight the disease more efficiently.

The North American leafhopper is the vector for the bacteria that causes flavesence dorée.
(Source: Agroscope)

Ein Mikrocomputer in diesem Vogelhaus steuert die Sensoren und leitet die Information an die Software weiter.

This microcomputer controls the sensors and transmits data to the software program.

Ticino vineyard: in order to protect grapevines from flavescence dorée, a wireless sensor network will be set up to simulate the spread of the disease vector.
(Source: Dolphin Engineering)

Mauro Prevostini came across his business idea by accident: in 2005, this electrical engineer and founder of the start-up company Dolphin Engineering decided to attend a venture ideas course. Participants were asked to develop a business idea and present it to a larger audience. Prevostini remembered that US researchers had been using wireless sensor networks to moni-

tor the spread of grapevine pests and wondered whether the same approach could also be used in the Canton of Ticino. His idea won him third place in the final assessment and the young entrepreneur then forgot about it – until 2008, when winegrowers in Ticino suffered a major crop loss from the grapevine disease flavescence dorée. The federal research facility Agroscope Changins-Wädenswil contacted Prevostini to suggest that this might be the right time for him to develop his idea further. Prevostini agreed.

Feasibility studies

Over a five-month period, a trainee from the University of Lugano (USI) worked on an initial prototype of a small wireless sensor network as well as on an algorithm that could be used to calculate the spread of the disease vector, the North American leafhopper. The Commission for Technology and Innovation CTI provided funding for this pilot project in the form of an Innovation Cheque worth CHF 7,500. "For us, it was the right amount of money at the right time," recalls Prevostini. It was just enough to demonstrate that the project was feasible.

In the future, sensors will be placed directly on grapevine stems and shoots to take air temperature readings. The data will then be transmitted over a wireless sensor network to a computer, which will use the temperature readings to simulate the spread of the disease vector. The warmer the temperatures become, the faster the pests will proliferate. As a result, winegrowers will be able to monitor the state of health of their grapevines at all times: once a critical threshold has been reached, the system will issue an alert enabling winegrowers to act at the right time. "With this approach, pesticide will only be used when it is absolutely necessary," explains Umberto Bondi from the USI's Advanced Learning and Research Institute (ALaRI), who has helped to develop the software program. "This protects both the environment and workers."

The prototype now needs to be turned into a marketable product. CTI has given its approval for a two-year project involving Agroscope, the Canton of Ticino's Crop Protection Office, the University of Milan and three winegrowers.

Field testing

Starting in the spring of 2011, researchers will be field testing the software for the first time in three actual vineyards. Since the leafhopper is only active during the growing season, field tests are only possible between April and July. Until then, researchers will be feeding Meteoschweiz data into their computer to simulate real temperature readings. After two or three harvest seasons, the Smart Vineyard should be ready for the market. "I'm certain that winegrowers with vineyards of about 100 hectares or more will be interested in our product," predicts Prevostini. In addition to the Canton of Ticino and the Lake Geneva area, he intends to market the product mainly in major winegrowing regions in Spain, Italy and France – 10 to 15 customers should suffice for the venture to be profitable. "When we present the system to them, it has to be glitch-free and readily deployable," adds Bondi. Winegrowers should be able to reduce their pest control costs by about 25% with the new system.

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