

RFID Helps California Crops Grow

Ceàgo Vinegarden is using passive tags and active sensors to improve the quality of its grapes, reduce environmental impacts and increase efficiencies.

By Beth Bacheldor

Jan. 4, 2007—A California farm is using passive RFID tags, active wireless sensors and geographic information systems (GIS) to improve the quality of its grapes, as well as to reduce the crop's environmental impact on the surrounding countryside and make its operations more efficient.

Ceàgo Vinegarden, situated in Lake County, Calif.—about two hours north of San Francisco—is an organic and biodynamic farm owned by Jim Fetzer, one of 11 siblings of the Fetzer family that owned the well-known Fetzer Winery until 1992. Biodynamics is a farming method designed to promote biodiversity by raising a number of different crops and animals. At Ceàgo Vinegarden, for example, fruit and nut trees grow alongside herbs and perennial plants to attract beneficial insects, and a herd of sheep graze on seasonal vineyard cover crops and grasses.

In addition to the naturalistic practices, however, is a host of high-tech methods, including handheld RFID readers equipped with GPS functionality linked to Google Earth (a satellite imaging application); wireless battery-powered sensor pods that measure air temperature, humidity, solar radiation, soil moisture and temperature; and a variety of software applications that help perform a number of functions, such as calculating the grapes' ripeness.

Fetzer is working with Geovine, a California consulting firm specializing in geographic information systems and technologies related to winegrowing and natural resource management, and engineering and construction firm CH2M Hill, located in Denver.

To date, approximately 500 passive RFID tags have been affixed to posts at the ends of the vine rows, says Josh Metz, president of Geovine. Metz is also an employee of Ceàgo Vinegarden, working in business development, marketing and sales at the vineyard. As workers document various processes, such as checking the grapes' progress, they use handheld readers to interrogate the tags to identify the row.

"Traditionally, they would go down the row, grab bunches of grapes from different parts of the rows and then check them for sugars and acids," says Metz. By interrogating each row's tag, workers can electronically record that samples were taken and identify the row from which each bunch came.

"We can also document if a row was pruned, and then link that with the person who did the pruning, and how long it took," he says.

Twelve sensor pods, developed by SensorWare Systems, are situated in different sections throughout the vineyard, linked together wirelessly. One such pod is linked to a server connecting the network to a Web-based application. Vineyard employees can access this Web site to check temperatures, moisture levels and other metrics.

SensorWare Systems was created by a research group working on the NASA Sensor Webs Project at the [NASA Jet Propulsion Laboratory](#) (NJPL) in Pasadena, Calif.; the company's sensor pods were originally developed for that project (see [NASA Creates Thinking RF Sensors](#)). The pods communicate wirelessly by means of standard 900 MHz radio components typically used for cordless phones.

"The sensor system is pretty unique," says Metz. "Each of the units, or pods, communicates omnidirectionally, so it functions more like a brain. You can develop algorithms that look at percentages across an area. So if 70 percent of the sensors reach a certain preset threshold, you could have an alert sent [by the server] to someone's cell phone."

Ceàgo Vinegarden, Geovine and CH2M Hill say they hope to take the RFID and wireless sensor implementation to the next level, so the data collected can help prevent events that would hurt the grapes' health, such as mold growth. "We want to create programs of different risk models, so the [RFID tags and sensors] could create warnings that trigger automated irrigation events," Metz explains.

According to Metz, the current implementation—which started last January and has been up and running since mid-summer—has provided a basic "proof-of-concept" that all the technologies can work together. The project has also yielded a wealth of data to the vineyard's management. "We are now interested in focusing the analytical power of the data," he says. To that end, the group is currently seeking funding for continued research and development.

RELATED_ARTICLES "It is one thing to put a bunch of technology together and have it be advanced and look cool, but it is another thing to begin incorporating previously unused and unavailable information into a workflow that has long been traditional and conservative," Metz says.

"In a year, I think we'll have more to say on the business value. That's what we're really interested in—and people want to know: What is the bang for the buck?"

Copyright ©2005 RFID Journal, Inc. All Rights Reserved