

Weather stations join space, subterranean ages

By MARK LESLIE

Data Transmission Network Corp.'s (DTN) purchase of Broadcast Partners and Golf Links in May underscores the rising stock of weather stations — in the world general, and on golf courses in particular.

"The golf superintendent has taken a quantum leap in the last five years in evaluating the value of weather information," said Peter Levy of Weather Metrics in Lenexa, Kan.

While many green committees might say, 'It's just another toy,' weather stations can save more money than they cost — in terms of using less water, fertilizer and chemicals, and using them at the right time.

The idea of weather stations has been that of a superintendent feeding information into a computer on the maximum inches per week a green needs and the weather station keeping track of rain, along with wind speed and direction, wind gusts, high and low temperatures, humidity, dew point, wind chill, and barometric pressure rising and falling. The software has allowed superintendents to see if there are any trends that might cause disease.

But, today's most advanced weather stations are so sophisticated they contain "disease models" to inform the superintendent when conditions are ripe for certain diseases, calculate the

evapotranspiration rate (ET) according to type of grass and height of cut, and transmit readings from multiple soil-temperature probes on the course back to the office.

"I think having weather information in your hands to make decisions is going to be a bigger factor down the road," said Jerry Lemons, a superintendent and golf course designer in Hermitage, Tenn., who developed GolfLink, a weather, lightning and golf information service tied into satellites. "The regulations on how we apply pesticides and fertilizers are going to become a little more critical as time passes. If we have a better handle on the weather forecast in a period when we want to make an application, then we can manage it better."

"You can really fine-tune your scouting and your irrigation," said Dan Dinelli, superintendent at North Shore Country Club in Glenview, Ill., who owns the Australian-made Metos station. "It's slick. Not only does it provide raw weather data updated constantly (not once a day), but it has disease models for pythium blight, brown patch and dollar spot. It graphs the severity of the disease pressure. It also tracks degree days, which is a great help for emerging weeds or insect pests, so you can create a calendar of events that will occur according to weather conditions and not the calendar — because every year is different."

The new breed of weather station goes beyond these basic irrigation concerns, and it is gaining enthusiasts among the ranks of superintendents.

"That's pretty incredible," said Country Club of the Rockies superintendent Kevin Ross of the Weather Metrics station's five different ET rates. Those rates are calculated according to type of grass, height of cut and other factors. "Plus it has many soil-temperature probes in the field that register back to the office. It costs \$10,000, but it's absolutely worth it."

The \$6,000 cost of the Metos system, Dinelli said, "can be realized in savings in one day. One of our pythium applications, for example, can be as high as \$6,000. We can use a scientifically developed disease model and be able to more accurately say whether the disease pressure merits spraying. In the past our gut feeling may have pushed us to spray. Now, this tool can tell us [information like] it needs to get 5 degrees warmer, or it needs to get 3 degrees hotter for another three hours."

"We try to give the superintendent a variety of information that he can customize for his specific course," Levy said. "Most systems give them one ET and they have to figure in what they have on the tees, roughs, fairways and greens. By the time they apply all the different factors it's such a pain that

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Disease forecasts are strength of future stations

By HAL PHILLIPS

RALEIGH, N.C. — The real value of weather stations, according to North Carolina State University researcher Jack Bailey, is the body of information they yield over time. Any superintendent worth his salt can observe the occurrence of disease, said Bailey. The critical question is, "When will it happen?"

Bailey believes a valuable weather station wouldn't merely record meteorological trends, it would add them, compare them and contrast them with previous recorded patterns. The resulting weather-based models would supply superintendents with a valuable agronomic tool.

"It's sort of like having someone who's read all the literature sitting in the window 24 hours a day," Bailey explained. "He might say there have been 10 hours today that have been favorable for brown patch. Taking that information, the superintendent will still have to make a decision: 'Do I spray today or not?'"

"But suppose a superintendent is

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More disease models to be incorporated into tomorrow's stations

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superintendents are currently making these decisions without this information. They have these models in their heads — it's called experience. But even though they're relying on their histories and the course history, a weather modeling system could augment that experience."

Bailey and Raleigh-based Agricultural and Meteorological Systems (AMS) are collaborating on a product that would provide superintendents just this

sort of information. The AMS product — which measures air and soil temperature, rain levels and relative humidity — assesses conditions every 15 minutes and automatically downloads the data to a central computer, where the information is added to, then set against existing weather-based models for, say, brown patch.

The AMS brown patch model, developed by Dr. Gail Schuman at the University of Maryland, has yet to be thoroughly tested,

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— Jack Bailey, researcher
North Carolina State University

said Bailey. The more superintendents get involved, he added, the more reliable that model, and others, will be.

Bailey has seen weather models work. For the past 15 years, he has been executing weather-based models in the peanut busi-

ness, where information gathered by computerized stations has been used successfully in controlling leaf spot and stem diseases.

"With other crops, like peanuts, management isn't so intensive. That's why I thought golf was perfect for this sort of modeling," said Bailey. "Superintendents are educated people who are attuned to high-managed crops. There's also a great deal of pressure, as I understand it, to have beautiful turf; but there are also limits on what superintendents can do.

"It's important for supers to realize that models for turf are in their infant stages," Bailey continued. "We have a brown patch model and a pythium blight model. But there are others, like dollar spot, which we need to build."

Bailey admits that researchers have been studying this aspect of crop management for years. However, he said, the approach has always been "yes/no" — it's time to spray; or it isn't time to spray.

Bailey would rather show superintendents how favorable conditions are to disease; how long they've been that way; and what's the historical precedent for disease at a particular time of year.

"The analogy is a fuel gauge," Bailey said. "In the past, models would say, Fill up or Don't. We need to have a model that says, Almost Full or Almost Empty.

"You need a sliding bar showing how dangerous conditions are. If all 24 hours of the previous day have been favorable for a pest, then the bar would be long... I'm not in favor of getting rid of pesticides. But you don't want to spray too much if you don't have to. And sometimes you need to spray more. Nineteen ninety-five was a good example. Brown patch came early in 1995, and it could have been mitigated."

Though he's currently on study leave, Bailey hasn't abandoned science or N.C. State to pursue the weather-modeling business with AMS. Every time an AMS system is sold the school is paid a royalty; Bailey receives 25 percent of the royalties.

"As a scientist, I don't believe in proprietary software," said Bailey. "My software has what is called open-book architecture, so my peers can pick it apart and improve it.

"There is nothing to set up with this system: No programming, no input involved. You just look at it. Also, we've created a uniform output, a common denominator for delivery. I wanted a fuel gauge that people could recognize. So regardless of the disease, this system will describe conditions in terms of hours in a day.

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