

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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By MARK LESLIE

While weather stations today are light-years ahead of the past, great advances are still expected in the future.

Having completed its purchase of Broadcast Partners, DTN has already invested in turf-related developments and has hired a turfgrass expert to manage the golf end of that research, according to DTN Director of Public Relations Eric Miller.

"We want to be able to use short-wave frequencies and download the information right into the computer rather than use a modem," said John Gehr, a salesman for Spectrum Technologies, Inc., which distributes

the Davis station but with Spectrum ET software.

"We've tried to design a system that's adaptable for the future in case a superintendent wants to add soil moisture, soil temperature, water temperature monitoring," said Peter Levy of Weather Metrics in Shawnee Mission, Kan.

"Considerable work is still needed to establish historical databases for weather data and to accumulate field observations that relate to it," said

superintendent Dan Dinelli of North Shore Country Club in Glenview, Ill. "More disease models must be constructed. Degree-day models need to be calculated for other pests as well as for beneficial insects. There is a lot of room for home-grown research based on collected data, coupled with field observations.

"We are looking at soil temperature readings to help fine-tune the timing of green cover applications, day length and how it may affect plant

responses, solar thermal units to further refine degree units, and soil temperature versus root growth. The uses and applications are limited to your imagination — that's what makes this tool so exciting."

Levy adds his own vision — that of using, say, four sensors at different depths at every green to monitor such factors as moisture and pH content.

Beyond that? How about using the Smart Sensor, an available technology, for turf?

"Just think," Levy said, "a little chip that can make decisions. You can put one on every sprinkler head on the golf course and wire it back into the office. You could monitor different parameters at every sprinkler head. These sensors are getting smaller and smaller."

"The value of water, etc. is much more than, say, 20 years ago. The market will dictate when the Smart Sensor and other new technologies come along. We all can see that if we had four sensors at every green giving constant feedback, it would help protect a \$30,000 to \$40,000 asset."

Weather stations gaining favor

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they don't do it. With five ET rates, they can input up to five different grasses and five mowing heights. It is continually calculated every second, while most systems take an average reading for the day."

Donelli is also enthusiastic about the new record-keeping abilities of weather stations and Metos' use of sensors.

The station has 10 sensors; a thermometer for air temperature 5 inches above the turf and one for soil temperature 2 inches below the turf; a rain gauge; two leaf-wetness sensors; a solarimeter to record solar radiation and day length; and a soil moisture probe two inches deep.

Soil temperature and moisture largely govern microbial activity as well as the nutrient release by some fertilizer carriers.

And insect development relies on many of the factors tracked by weather stations.

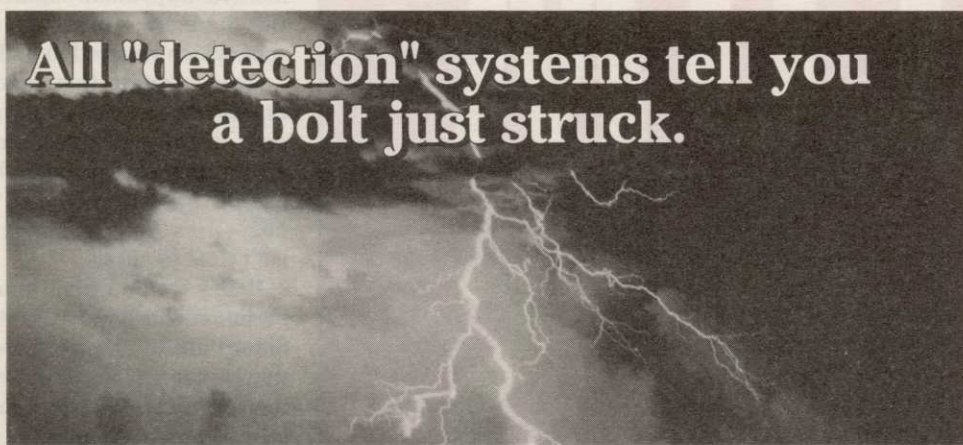
The record-keeping element of weather stations can be a job-saver as well as a help in court (see sidebar), Donelli added.

"We don't have time to go out every 12 minutes and document air and soil temperature, moisture, etc., like the station does," he said. "So it comes in handy, especially in extreme weather conditions. We can enter the software and pull out historic weather data to demonstrate any goings-on that may be in question."

"For example, we had a record-breaking hot, humid summer last year. We were able to document, with tremendous accuracy, what the soil temperatures were, which reflects why the turf was under such stress."

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