GOLF 'SCAPING

Weather stations:

At the forefront of new golf course technology

■ As the golf course superintendent's job becomes more sophisticated, so does the technology available. An important part of that technology is the weather station, which can be used to control irrigation, predict disease outbreaks, guard against liability issues, and much, much more.

"The temperature dictates everything we do," says Mike Handrich, CGCS, of Racine (Wis.) Country Club. "Our new weather station makes the decision-making process—on a day-to-day basis—a lot easier. And we can get the information at the touch of a button."

Full-function weather stations are now available for as little as $760 or as much as $8,000. Most can be hooked up to computers, and feature many of these components:

- a **micrologger**, a mini-computer that can generate hourly, daily, weekly or monthly averages, extremes or totals; the data is stored in 24-hour time blocks and retrieved by authorized users
- a **thermometer** to measure air temperature
- a **barometer** to measure atmospheric pressure
- **relative humidity** sensors
- an **anemometer** to record wind speed and directions
- a **pyronometer** to record solar radiation
- a **rain sensor** or gauge, the most common being tipping buckets or cups
- an **evapotranspiration** gauge that calculates the amount of water lost from the soil to evaporation
- an **atmometer** that measures evaporating capacity of air, most typically an evaporation pan or "Bellani plate"

Workers install the Georgia Turfgrass Foundation Trust's new weather station adjacent to its research green in Duluth. *Photo by Doug Moody*

- **soil moisture** sensors, metallic probes buried in the soil or tensiometers to measure temperature and/or wetness; some are even equipped with relays to locally control irrigation valves in areas where there might be flooding
- **wind chill** gauges
- stand-alone **lightning detection** systems
- **clocks and alarms** that can be set to activate when given parameters are programmed (e.g. when rainfall for any one month reaches a certain total, or when the temperature reaches a certain level for so many consecutive days, etc.)
- **telephone modems** to relay data to outlying points

Many states like California, Nebraska and Georgia offer information based on their own weather station readings. These networks were originally formed to provide data to the agricultural community, but more golf superintendents are taking advantage of them.

At the University of Georgia, for instance, Dr. Gerrit Hoogenboom hooked

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up one of 18 weather stations (in its Automated Environmental Monitoring Network) at Atlanta Athletic Club. Another will be installed at the Georgia Turfgrass Foundation Trust's research green in Duluth.

"This is something that golf course superintendents and turf managers have needed for a long time," notes GTFT vice president Mark Esoda of Atlanta Country Club. "This is a specific source of valid weather information that does not come from Hartsfield Airport. We'll (now) have area-specific information available on a daily basis.

Contributors to the GTFT receive the proprietary phone number that links them to the weather station's data.

"We are trying to find answers and develop management strategies for the problems of high heat, high humidity and low air circulation during the summer," notes Esoda. "Every superintendent finds himself faced with problems on bentgrass greens under these conditions, (and) we want to know what practices will avert the problems."

Handrich bought his own weather station earlier this year. He sings its praises.

"It shows members that we're not flying by the seat of our pants," he says. "In this day and age, the members want the course as close to perfect as we can get it, every day."

Handrich says his unit comes in handy when determining daily spray programs.

"First, we're using it for wind speed, to see if we should be spraying at all. We've got sprayers going out nearly every day, so we've got to be on top of the wind speed. Whenever we spray, we log the temperature, wind, humidity, what we're spraying and why. Secondly, having the weather station data helps avoid liability and gives people the idea that we're very conscious of our spraying."

Local and on-site weather stations can also provide a relatively inexpensive way to determine the amount of water to apply, given the conditions. They can also be hooked up to what experts term a "reactive" irrigation system. Using a central control coupled with an on-site weather station and sound irrigation scheduling can save thousands of dollars a year.

Some weather stations can "communicate" (interface) directly with irrigation systems through a microcomputer, which has a software program that is designed to calculate the ET rate from the weather data.

The golf superintendent, experts note, is still an important cog in this chain because he or she is the person who must translate management information into practical daily operation. "On a golf course, the superintendent is the irrigation expert, a walking, talking database," says Rene Evelyn-Veere of Rain Bird. "The superintendent or landscape manager can modify the weather station data for specific weather conditions. Then, once the turf manager gets 'tuned into' the system, he can slowly, more precisely replace the water."

—Jerry Roche

What's out there?

■ Here are some of the manufacturers who make weather stations, and what their models offer:

Automata: Makes Data-Lynx Agricultural Management System software that can be hooked to Data-Lynx telemetry equipment, including Aqua-Tel soil moisture sensors, Aqua-Tel+S soil salinity sensors and other Automata weather monitoring equipment.

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C&M Meteorological Supply: Has the ET Gage, an inexpensive device that gives you evapotranspiration rates within 2-3 percent accuracy. Optional equipment will allow you to link to virtually any computer datalogging system for regular reports or graphs.

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Karsten Turf: Manufacturers the Turf Anser Weather Station, which includes a data collection weather station connected through a Turf CAD computer to your irrigation system. The system can make daily computations of ET rate.

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Rain Bird Golf: Makes the WS-100 Maxi Weather Station, which can be hooked up to its Maxi System V irrigation equipment for "ET-sensitized" scheduling. High-end system includes state-of-the-art weather software that calculates ET values for you.

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Spectrum Technologies: Makes the Weather Monitor II and Weather Wizard III, a pair of low-cost (less than $1,000) stations. Main difference is that the Weather Wizard III does not track humidity, dew point or barometric pressure data while the Weather Monitor II does. Weatherlink can be used with Lotus 1-2-3 or Dbase III spreadsheet to build weather history easily.

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Toro Irrigation: Makes the Network 8000, another high-end irrigation system with weather station. User can choose one of four ET measurement methods (temperature, solar radiation, historical data or CIMIS data) to determine the amount of water needed to replace that lost by ET.

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—J.R.