

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 **pyrometer** 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

ELSEWHERE

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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.

Deep-tine aeration solves wetness, compaction woes

It's given credit for helping Midwest courses bounce back from the rains of 1993 and other problems.

■ The rain indeed fell mainly on the Plains last year. It was a record-breaking wet summer in many parts of the Midwest, with some areas experiencing severe flooding. Mother Nature was especially unkind to golf courses in the region, leaving many saturated or under water.

"The amount of turfgrass lost last year due to the weather has been devastating to many Midwest clubs," observes Bryan Wood, owner of Commercial Turf, a contractor and distributor of turf maintenance equipment in Chillicothe, Mo.

Wood visited a dozen courses in Missouri, Iowa, Kansas, Nebraska and Illinois last fall. "Almost every course I visited, or superintendent I spoke to, had problems with wet wilt, algae, pythium root rot and/or brown patch," Wood says. "In addition, at times during the hot, dry days between rains, dry wilt became a factor due to the turf's shallow root systems caused by the wet weather."

Wood observed two other problems surfacing:

1) Open pore spaces in greens soil were reduced to a bare minimum from continuous days of saturation and water coverage, creating an immediate need to re-establish a desirable oxygen level.

2) Because of the large amount of chemicals used to fight disease, some courses developed a toxic chemical hardpan layer three or four inches below the surface, which could have led to compaction.

Wood made recommendations on a case-by-case basis, but in general he combined Verti-Drain deep-tine aeration, which had been successful in treating clay or heavily-compacted soils, and reseeding.

To re-seed more than 1.5 million square feet of turf last year, Wood used the Verti-Seed, a machine designed specially

for minimal turf surface disturbance.

Three other Midwestern clubs faced similar problems: Bob-O-Link Golf Club and North Shore Country Club in the Chicago area, and Oak Hills Country Club in Omaha, Neb.

Bob-O-Link—Even before last year's rainy season, Bob-O-Link had poor drainage. According to assistant superintendent Rick Bowden, poor percolation was caused by severely compacted clay soil.

"By the late 1980s, the turf simply couldn't absorb water effectively," Bowden says. "After a one-half-inch rain, we couldn't use carts for two days.

Five years ago, Bob-O-Link began a deep-tine aeration program, using $\frac{3}{4}$ -by-14-inch solid tines to penetrate to depths up to 12 inches.

"The course is ready for play again within hours, even after a one-inch rain," Bowden reports. "In addition, we find that we're watering less. The water gets deeper into the roots."

North Shore—This state-ranked course, home to the 1983 U.S. Amateur,

had extremely high levels of sodium in its well water. Foliage and trees that were irrigated were being burned up by July. The soil also had a crusty layer of compaction developing under the clay-based, push-up greens.

Six seasons ago, superintendent Dan Dinelli hired an outside contractor to deep-tine aerate the greens, and he's seen steady improvement in them.

"Root growth has been spectacular," Dinelli confirms. "And our aeration equipment is getting easier to use because the ground is more and more receptive."

Dinelli uses $\frac{1}{2}$ -by-12-inch solid tines so play isn't disrupted. He chooses not to fill the resulting holes, believing the turf's roots will breathe better that way.

Oak Hills—When the USGA Greens Section toured the course in 1989, representatives told superintendent Mark Stewart that 16 greens would have to be rebuilt. "The only alternative," Stewart says, "according to the USGA, was deep-tine aeration."

Stewart has been using his Model 105 Verti-Drain twice a year since just after that 1989 inspection. In the spring, it's fitted with $\frac{3}{4}$ -by-12-inch solid tines, in the fall with $\frac{3}{4}$ -by-10-inch hollow-core tines. After each treatment, the greens are top-dressed with sand.

"The last time the USGA visited," Stewart relates, "they pronounced the greens in their best condition ever. Root penetration has increased from three or four inches to as deep as 10 inches."



Bryan Wood of Commercial Turf uses a Verti-Drain deep-tine aerator to relieve compaction, increase percolation rates and introduce much-needed oxygen to the soil. The solid tines reach a foot below the surface.

Practice facilities made perfect

■ If you're looking for a new golf course project for 1995, consider installing a practice area.

A well-designed practice area can increase the traffic to your course, and perhaps give it the edge you need to beat the competition.

Several options are available, according to the American Society of Golf Course Architects:

- stand-alone driving range;
- extra holes;
- training centers that feature driving ranges and putting greens;
- practice bunkers (which would eliminate having to watch out for people chipping onto the regular practice putting green).

Large practice tee areas enable the superintendent and club pro to spread the foot traffic over a larger area.

Teeing areas can be a half acre in surface area.

Target greens at designated distances from the teeing area are more common nowadays, says the ASGCA. These help keep golf balls in the middle of the facility by giving the golfer a target similar to the targets on the course. These greens can be spruced up with mounds or sand bunkers.

Lesson tees are often designed as separate teeing areas at the end of the practice range or at the sides of the teeing area.

If the lesson tees are located at the end of the range, an adequate buffer distance of about 350 yards or more must

be implemented.

Practice greens should be at least 10,000 sq. ft. in area to allow for adequate pin placements.

Revenue from practice areas can then be used to finance improvements or modifications around the rest of the course.

A "learning center" takes the driving range concept a step further, by giving golfers a place to work on a variety of shots.

The Man-O-War Golf Center in Lexington, Ky. has a 30-acre learning center, with a three tiered driving range, chipping area, putting green, realistic target greens and golf-swing video analysis.

Practice facilities often include a separate green to practice chipping and bunker shots.

It would be easy to implement all these improvements would be a breeze if you had a massive budget. But since your budget likely has a limit, start small. Make one improvement one year, and go from there.

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