

The USDA Agricultural Research Service Research Weather Station Network in Northern Ohio Nurseries

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Brazee *et al.* (2002) reported on the status of efforts to develop a research weather network. The network is a part of cooperative research programs of the Application Technology Research Unit (ATRU) of the USDA/Agricultural Research Service, The Ohio State University, Ohio Agricultural Research and Development Center (OARDC) and nursery growers of Lake County, Ohio. This report will summarize some further developments of the network and provide information on accessing weather data.

The Weather Stations

The permanent weather stations at Sunleaf Nursery, Madison, Ohio, and at Klyn Nursery, Perry, Ohio, equipped with adapted UT-30 systems (Campbell Scientific, Inc., Logan, Utah), are intended to serve research programs and growers in the Lake County area. Data from these

stations are available on a network web site. Individual growers may expect some variations in data from those that may exist at their own locations, particularly in growing degree-day information. These locations were selected as representative of commercial nursery locations, and of known or expected differences due to terrain and distance from Lake Erie. Local observations of selected data may be helpful in determining which station most nearly reflects a particular site.

A moveable station equipped with a Campbell Scientific CM-6 system is located in research plots at Madison. Data from this station is archived but not normally available at the web site. However, an experimental leaf wetness system is located with this station in a tree canopy. Some of this data is available at another web site on a seasonal basis.

Another permanent weather station is planned as part of a research program being developed at Willoway Nursery, Avon, Ohio. Meantime, this station is equipped with a CM-6 moveable system, with data currently available on the network web site.

Additional equipment has been installed and work is underway to connect the

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Madison UT-30 station to the Soil Climate Analysis Network (SCAN) in cooperation with the USDA/Natural Resources Conservation Service (NRCS). This installation will enable inclusion of the Madison station on a national network, as well as providing supplemental soil moisture and temperature information.

Instrumentation

Brazee *et al.* (2002) list the main climatic variables for which data are archived or transmitted into the network, namely, wind speed and azimuth (direction), air temperature, relative humidity, and solar radiation. Rain or snow data are reported as equivalent liquid precipitation.

In the year 2003, soil temperature measurement capability was added to instrumentation at the Madison station. Soil temperature is measured at 2-, 4-, and 8-inch depths, and this data is accessible on the network web site. Later, NRCS personnel installed soil-temperature and moisture-sensing units near the existing sensors, but at depths of 2, 4, 8, 20, and 40 inches. Since special processing is required, these data are not currently available on the existing web site and will eventually appear on the SCAN Network.

Campbell Scientific leaf wetness sensors have been deployed experimentally at the CM-6 site at Madison since early 2002 and provide data on surface moisture resulting from either dew or rainfall. They sense moisture by means of electrical resistance and must be specially coated with white latex paint and aged for a period of time by the user before being deployed.

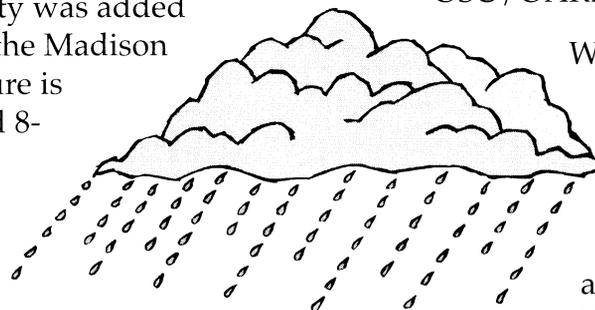
NRCS personnel have installed an auxiliary 20-ft. tower supporting a meteor-burst telemetry system to enable data transmission to the SCAN Network. Additionally, they have installed soil moisture and temperature sensing units at 2-, 4-, 8-, 20- and 40-inch depths.

Data Access

Data from the Avon CM-6 station and the Madison and Perry UT-30 stations are accessible at:

www.oardc.ohio-state.edu/usdaweather/

Either the Avon, Madison, or Perry station can be selected from among the links at the web site. The remaining links at the web site are for other locations in the OSU/OARDC Ohio network.



Wind speeds are shown in bar graph form, with wind direction given as arrows appearing at the tips of the wind-speed bars in azimuth degrees (zero to 360) clockwise from zero (north). Note that the wind azimuth arrows indicate the direction from which the wind is coming.

Occasionally, in freezing-rain conditions, the cup anemometer and even the wind vane may lock up due to icing. This gives the appearance of zero wind velocity, while the wind azimuth is indicated as north. This is a default azimuth indication, since anytime wind speed falls to zero, its azimuth becomes meaningless.

On the same page, air temperature and relative humidity are presented as red and blue “step” plots, respectively. Units of measurement are indicated for all plots, and numerical values can be read

by placing the display cursor on the plot location as desired. Data are presented at 15-minute intervals as available and are 15-minute averages for the variable of interest, with time indicated in 24-hour format.

The *Table Format* link at the top of the page gives access to data in tabular form. In the table, wind speed, and standard deviation of wind speed, are expressed in miles per hour; azimuth is listed in degrees; and relative humidity is stated in percent. All other data are given in metric units, *i.e.*, temperature in Centigrade (Celsius) degrees and solar radiation in watts per square meter.

In the table near the bottom of the page, year-to-date totals for precipitation and for growing (GDD), cooling (CDD), and heating (HDD) degree-days are given. GDD are calculated by the modified sine wave method. The *Modified Sine Wave Calculation* link accesses details on tabulated and calculated data and a further link describing the modified sine wave calculation.

The link *Phenology Calendar* accesses the web site, *Growing Degree Days and Phenology for Ohio* that lists phenology data on blooming, hatching, or emergence for a wide selection of plants and pests, as compiled by Dr. Dan Herms. The link *Detailed Summary* accesses daily data for precipitation (rain or snow on a liquid basis), GDD, and average air temperature beginning January 1 of the year as chosen by the user.

The link at the bottom of the page allows the user to access available data for a

selected date. Data for the complete day are presented in the usual form, except that an additional summary table is included, with included numbers identified in table headings. Additional data on soil temperatures at 2-, 4- and 8-inch depths are tabulated for the Madison station only.

The NRCS SCAN Network

The SCAN accessing system being installed as an adjunct to the Madison station is not available online as of this report. When activated, the system will provide soil moisture and temperature data as mentioned earlier, in addition to all other data acquired at the site. However, interested readers can access the SCAN network at:

<http://www.wcc.nrcs.usda.gov/scan/>

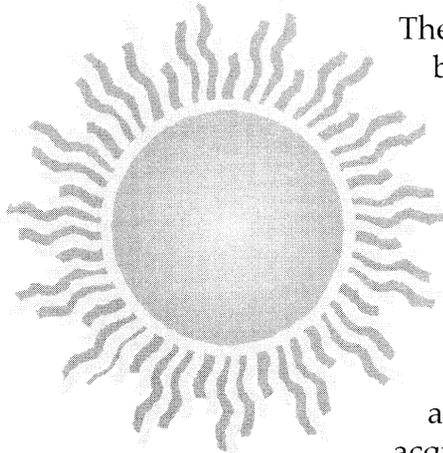
There are SCAN sites in more than 30 states and Puerto Rico.

Leaf Wetness Charts

The OSU Extension, Lake County office, has established a web site for leaf wetness charts based on data from the Madison CM-6 site at:

<http://lake.osu.edu/hort/pg1.htm>

Links are listed at this page for individual archived charts as available for the period May 3 through September 7, 2003. Each chart contains overlaid, color-coded plots for the full day of wetness data from two sensors, rainfall, temperature, and relative humidity, with a legend identifying each plot. Rainfall data appear as pulses, each



pulse indicating 0.01 inches of rainfall. Commentary appears on each chart to aid the user with interpretation.

Network Information

For more information, users may contact any of the authors.

Reference

Brazee, R. D., R. C. Derksen, C. R. Krause, K. A. Williams, D. Lohnes, M. G. Klein, M. Reding, R. Lyons, W. Hendricks, R. Zondag, R. D. Fox, and D. Herms. January 2003. The USDA/ Agricultural Research Service Research Weather Network in Lake County, Ohio — 2002 Update. *Ornamental Plants, Annual Reports and Research Reviews, 2002*. The Ohio State University/Ohio Agricultural Research and Development Center, Special Circular 189: pp. 145-148.

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