# TECH CENTER

# Degree-day method of pest control shows it can work in Pennsylvania

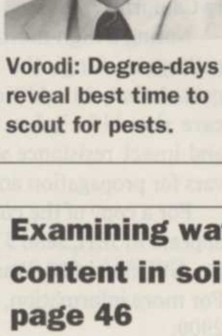
**The scouting method that relies on temperature readings can help predict when insects might become a problem.**

■ Landscapers, golf course superintendents and horticulturists in Pennsylvania are using the "growing degree-day" (GDD) method of insect scouting on ornamentals, resulting in better-timed and more efficient control product applications.

Eric Vorodi, an extension agent for Lehigh and Northampton counties in southeastern Pennsylvania, compiles information recorded by 17 horticulturists in eight counties who track degree-days every spring. Information on pest sightings is then supplied, via a weekly pest report, to ornamental professionals who pay an annual fee of $25 for the service.

*(For an earlier report on the degree-day method of insect scouting, see* LANDSCAPE MANAGEMENT*, February 1992.)*

Vorodi decided to give the GDD method a try after listening to a presentation on Integrated Pest Management (IPM) by Dr. Warren Johnson of Cornell University. Vorodi, Dave Suchanic, a reg-ional nursery agent, and Jeff Jabco, superintendent of grounds at Swarthmore College, formed the Southeastern Pa. IPM Research Group to provide education and information about Integrated Pest Management to the area's ornamental horticulture industry.



**Vorodi: Degree-days reveal best time to scout for pests.**

**DEGREE DAYS FOR SOD WEBWORMS AND WHITE GRUBS**

| Target pest | Base 50° F |
|---|---|
| Larger sod webworm (1st generation) | 1050-1950 |
| Larger sod webworm (2nd generation) | 2600-3010 |
| Bluegrass sod webworm (1st gen.) | 1250-1920 |
| Bluegrass sod webworm (2nd gen.) | 2550-3010 |
| Cranberry girdler | 1700-2750 |
| Northern masked chafer (1st adult) | 898-905 |
| Northern masked chafer (90% adults) | 1377-1579 |
| Southern masked chafer (1st adults) | 1000-1109 |
| Southern masked chafer (90% adults) | 1526-1679 |
| Japanese beetle (1st adults) | 1050-1180 |
| Japanese beetle (90% adults) | 1590-1925 |

*Source: Dr. David Shetlar, Ohio State University*

The spring activity of most temperate plants and most insects is based on the accumulation of thermal units called degree-days. Degree-days for any given 24-hour period are calculated by averaging the highest daily temperature (T max) and the lowest daily temperature (T min) and subtracting a threshold temperature (Tt).

The threshold temperature is defined as the cardinal temperature below which no morphological development occurs.

To obtain data, the scouts use an Omnidata biophenometer—a small, battery-operated microcomputer. The device measures temperature and calculates, accumulates and stores GDD information.

Each Tuesday after 4 p.m. or before 10 a.m. Wednesday mornings, the scouts record the accumulated degree days, insects observed over the past week, which host plant the insect was occupying, and the insect's stage of development (egg, larvae, nymph or adult) and any seasonal diseases such as powdery mildew or apple scab.

The scouts also use phenological indicators —for example, a plant at bud break or in bloom—to determine when a pest might be expected to appear. "If you don't have any way to measure growing degree-days, you can use the stage of plant development (as a guide)," says Vorodi.

Since timing is so important, the information is same-day faxxed to the extension office and the results mailed to 230 subscribers, including arborists, nurserymen, landscapers and golf superintendents.

The program has grown from 30 subscribers in 1991 to 230. Another 200 joined after realizing the benefits of the reports.

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"If subscribers scout on their own," says Vorodi, "this information keys them in to the best time to scout for pests; it tells you when they may be emerging.

"If someone in Allentown knows that a pest was sighted some distance to the south, then he can know when it will be time to scout. He'll know he can expect to see *this* pest on *this* plant, *this* week."

Vorodi likes the discipline built into degree-day monitoring. "It forces people to keep records, which they can have for the following year," he says. However, he further notes that the information should be used only as an estimate, since sightings can change from year to year.

The program does require more scouting time. Each cooperator now spends six hours per week scouting, up from 3.5 hours per week before they began using the degree-day method.

According to the research group, degree-days are not 100 percent reliable. They use only ambient air temperature, and do not take into account the warming effect of solar radiation on solid surfaces. Also, degree-day information is not yet available for all insect pests, and the ranges for certain pests can be functionally too broad.

But the benefits of growing degree-days—disciplined record-keeping; a more accurate assessment of possible insect populations; and less indescriminate spraying—at least to Vorodi and his associates in Pennsylvania, far outweigh the limitations.

*—Terry McIver*

# Important to monitor water in your soil

■ The movement of water in soil significantly influences plant development and demand for irrigation. The following terms are useful in understanding soil and water relationships:

**Gravitational water:** water pulled out of large pores by gravity after rain or irrigation. As the water is pulled out, it pushes out toxic gases and a new oxygen supply moves into the soil.

**Capillary water:** adheres to a soil particle the same way a film of water adheres to any object. This film of water moves, by way of "capillary attraction" from one soil particle to another. The smaller particles, such as clay, have greater, exposed capillary surfaces. As a result, water will rise higher in a one-inch tube containing clay than in a one-inch tube containing sand.

**Hydroscopic water:** a very thin film of moisture that "sticks" to each soil particle. Even in very dry soil, some hydroscopic water is present. The only way to remove all of the hydroscopic water from a soil sample is to bake the sample in an oven for a long time. Hydroscopic water is so tightly bound to the soil that roots cannot absorb it.

**Field capacity:** the maximum amount of water that a particular soil can hold; the amount of water remaining after gravitational water has been pulled out.

For a guide to estimating moisture content of soil, see the accompanying chart.

*—Source: "The Virginia Gardener"*

## A Guide for Estimating Moisture Content of Soil

| % of field capacity | Influence on plant growth | Response to physical manipulation: Loamy sand, sandy loam | Silt loam, loam | Silty clay loam |
|---|---|---|---|---|
| 100+ | Saturated soil. Too much moisture and too little air in the soil; persistence can damage plants. | Free water appears on soil when squeezed. | Same as sandy loam. | Same as sandy loam. |
| 100 | Excess moisture has drained into subsoil after rainfall or irrigation, and optimum amounts are available in rootzone for plant growth. | When squeezed, no free water appears on the surface, but it leaves a wet outline on your hand. Forms weak ball; usually breakes when bounced in hand; will not stick. | Same as sandy loam, but forms a very pliable ball that sticks readily. | Same as sandy loam, but ribbons out (can be formed into thin strand when rolled between thumb and forefinger) and has slick feeling. |
| 75 | Adequate moisture for plant growth. Lower moisture is marginal. | Tends to ball under pressure, but breaks easily when bounced in hand. | Forms a ball, somewhat plastic, that sticks slightly with pressure. | Forms a ball, ribbons out between thumb and forefinger; has slick feeling. |
| 50 | Inadequate moisture for plant growth. | Appears to dry; will not form a ball with pressure. | Somewhat crumbly, but holds together with pressure. | Somewhat pliable, balls under pressure. |
| 25 | Moisture in soil is unavailable for plant growth. | Dry, loose, falls through fingers. | Powdery, sometimes crusty, but easily broken down into a powdery condition. | Hard, cracked, difficult to break down to powdery condition. |

*Source: C.L. Craig, "Agriculture Canada," 1976*

# Water, fertilizer not crucial for some woody plants

■ Research published by the Horticultural Research Institute (HR) in its June 1992 issue of the *Journal of Environmental Horticulture* (JEH), said frequency of irrigation and fertilization had only "minor impacts" on plant growth and survival of five selected drought-tolerant woody landscape plants.

The results suggest that if the total volume of water is within the tolerances of the species, the frequency and duration (frequent shallow or infrequent deep applications) are "not critical," says researcher T.D. Payne of the University of California at Riverside, where the study was conducted.

Plant species included:

●the Carmel creeper (*Ceanothus griseus* var. *horizontalis*),

●Santa Ana (*Ceanothus griseus* var. *horizontalis* 'Santa Ana'),

●California coffeeberry (*Rhamnus californica*),

●Eve Case (*Rhamnus californica* 'Eve Case') and

●Fraser photinia (*Photinia fraseri*), the only plant in the study that was not native to California.

Noting a high mortality rate due to root pathogenic fungi, the researcher also suggested that, in addition to visual appeal, care should be taken to preserve disease and insect resistance when selecting cultivars for propagation and sale.

For a copy of the complete study as it appears in JEH, send $15 to HRI, 1250 I St., NW, Suite 500, Washington, DC 20005. For more information, phone (202) 789-2900.

*—Terry McIver*