Drought confuses some smart-irrigation controllers

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COLLEGE STATION – Confounded by Texas weather? So are most "smart" electronic irrigation controllers, according to a Texas AgriLIfe Extension Service expert.

"Over the last two years, in a testing program, we found that Texas' variable and erratic weather confuses many of the controllers being sold in the state," said Dr. Guy Fipps, AgriLife Extension irrigation engineer, College Station.

Charles Swanson checks the setup of smart irrigation controllers at a College Station test site. (Texas AgriLife Extension Service photo by Jose Lopez)

Smart controllers refer to irrigation units that use weather data to calculate and apply the correct amount of water needed by lawns and landscape plants. Ordinary "dumb" controllers rely on timers and require human intervention, which, due to human error or lack of management, often apply two to three times more water than necessary, Fipps explained.

Among the weather factors smart controllers use is evapotranspiration, commonly abbreviated as ET, which is an estimate of the total amount of water needed by plants. Smart controllers either use historical ET data or calculate it from weather sensors measuring rainfall, heat, amount of sunlight and other factors.

For more than three years at a College Station site, Fipps and Charles Swanson, AgriLife Extension landscape irrigation specialist, have been testing various brands of smart controllers sold in Texas. They have found that although the controllers are smart in theory, in actual use, some over-irrigate as often as their human counterparts who use guesstimates rather than calculations, according to Fipps.

However, the smart controllers have become smarter as manufacturers continue to tweak designs in response to such tests, he said. Still, during the third year of tests — which spanned 238 days from March 29 through Nov. 22, 2010 — many controllers still did not perform as consistently as expected.

"The 2010 results showed an increase in controller performance compared to the year-one and year-two results," he said. "However, we continued to see controllers irrigating excessively; some irrigated in excess of ET, even though 17 inches of rainfall fell during the 2010 study."

And that was before the drought worsened. During the drought of 2011, most of the controllers' performance was erratic, Fipps said.

"Three of the eight smart controllers over-compensated and applied excessive amounts of water, and the remaining five did not apply enough irrigation water for all the irrigation zones and plant materials, although two of the controllers provided adequate amounts of water for five out of the six zones," he said. "The problem is likely due to which weather factors the controller uses."

The summer of 2011 was not only hotter and drier than normal, but conditions interacted to cause plants to use from 30 percent to 50 percent more water than they would in an average year, Fipps explained. While the amount of solar radiation (total energy received from the sun) remained close to normal levels, temperatures and wind were significantly higher.

In the 2010 tests, it was too much rain that caused problems with some smart controllers, he said. The 2010 work tested eight controllers from six different manufacturers.

"In 2010, it was only the smart controllers that were equipped with tipping-bucket rain gauges that were able to accurately provide the right amounts of irrigation," Fipps said.

For the tests, Fipps and Swanson programmed each controller for a typical Texas irrigation system and

landscape that included ornamental plants, shrubs and turf. They also considered various soil types with different root-zone depths.

“Programming these controllers was no easy task as only two controllers allowed us to input all the landscape parameters that were needed,” Fipps said. “Each manufacturer was allowed to come in and provide assistance in programming to ensure the controller programming most accurately described the landscape, which most manufacturers did.”

In the 2010 test, Fipps and Swanson added a “goldilocks” protocol, which interprets performance results to whether the controllers put on too much, too little or “just the right” amount of water.

“Adequate, inadequate and excessive categories make the testing results easier to understand by consumers and irrigation contractors who are trying to determine which controller to purchase,” he said.

The full results are included in the recent report on smart controller testing and performance found on the Irrigation Technology Center website at http://itc.tamu.edu/smart.php .

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