We describe the results from testing data loggers buried in soil in this last in a series of three articles. We have compared the results obtained when HOBO (HO8) temperature sensors were placed in the ground and in 3-inch diameter PVC pipe during the past two years.\(^1\) In the first report (Hooper, 2003) instructions were presented on how to build the access tubes and insulators. A second article (Hooper and Ramsey, 2005) illustrated no difference between the results obtained from a HOBO buried in the soil and a HOBO placed in a insulated PVC pipe. The advantage of the pipe is that it allows for ready access to the HOBO, reduces the risk of loss, and reduces the time required to download and replace HOBO sensors.

In this last experiment the insulator was removed from the PVC access tube. Two HOBO (HO8) temperature data loggers (Onset Computer Corp., Pocasset, MA) were placed in the soil (50-cm depth) at close proximity for one year (March 2004–March 2005) in southwest Colorado. The first HOBO was buried directly in the soil, while the second was placed in a PVC access tube without insulating material. The HOBOs were programmed to record the temperature every 8 hours at the same time each day.

Results show that when one reading per month is taken from the data record, the average annual soil temperature for the buried HOBO was 10.3°C versus 10.11°C for the tubed HOBO. When all readings for the year are used, the average annual soil temperature for the buried HOBO is 9.93°C compared with 9.79°C for the tubed HOBO. The difference in the yearly soil temperature average between HOBOs using one measurement per month is 0.19°C. The difference in the yearly soil temperature average between HOBOs using all readings for the period was 0.14°C. Insulation does not appear to be necessary. This finding simplifies the use and construction of PVC access tubes. (see Fig. 1 for components).

**Recommendation**

When using HOBO HO8 temperature sensors in mesic or frigid soil temperature regimes, and security is not a serious issue, then the use of 3-inch-diameter PVC pipe without insulation is recommended. Installation of the 24-inch-long tubes is easily done with a 3-inch soil auger. The HOBOs are placed in a submersible case and lowered or raised in the pipe by use of a piece of stiff wire. The pipe is closed with an end cap. The use of a 24-inch pipe permits about 11 cm (4 inches) to extend out of the soil when the sensors are placed at a depth of 50 cm. Those wishing to use this procedure in either thermic or cryic soil temperature regimes are advised to repeat this experiment in their area.

**References**


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\(^1\) Proprietary names are provided for specific information. Use does not constitute endorsement by the authors or USDA.