

8.2. Growing tools

Growing tools use the data collected from sensors to calculate common variables used by growers. These variables are then graphed with other measured data. The steps below can be followed to create growing tools in DataTrac 3.

- Select “Virtual Port” and choose Growing Tool from the dropdown menu on the right.
- In the “Select Derived Product Type...” drop down menu, select the growing tool that is going to be integrated into the logger. The growing tool selected will be graphed with the other measurements in the data logger.
- Depending on the growing tool selected, chose the sensor parameter(s) from which the required growing tool is to come from.
- Click “Create Virtual Measurement” to add the growing tool to the chart and table.
- For many of these tools, there is a need to also supply additional information for the calculations to work properly. If prompted, enter any additional information (Figure 12).
- Click “Apply” to save the changes made.

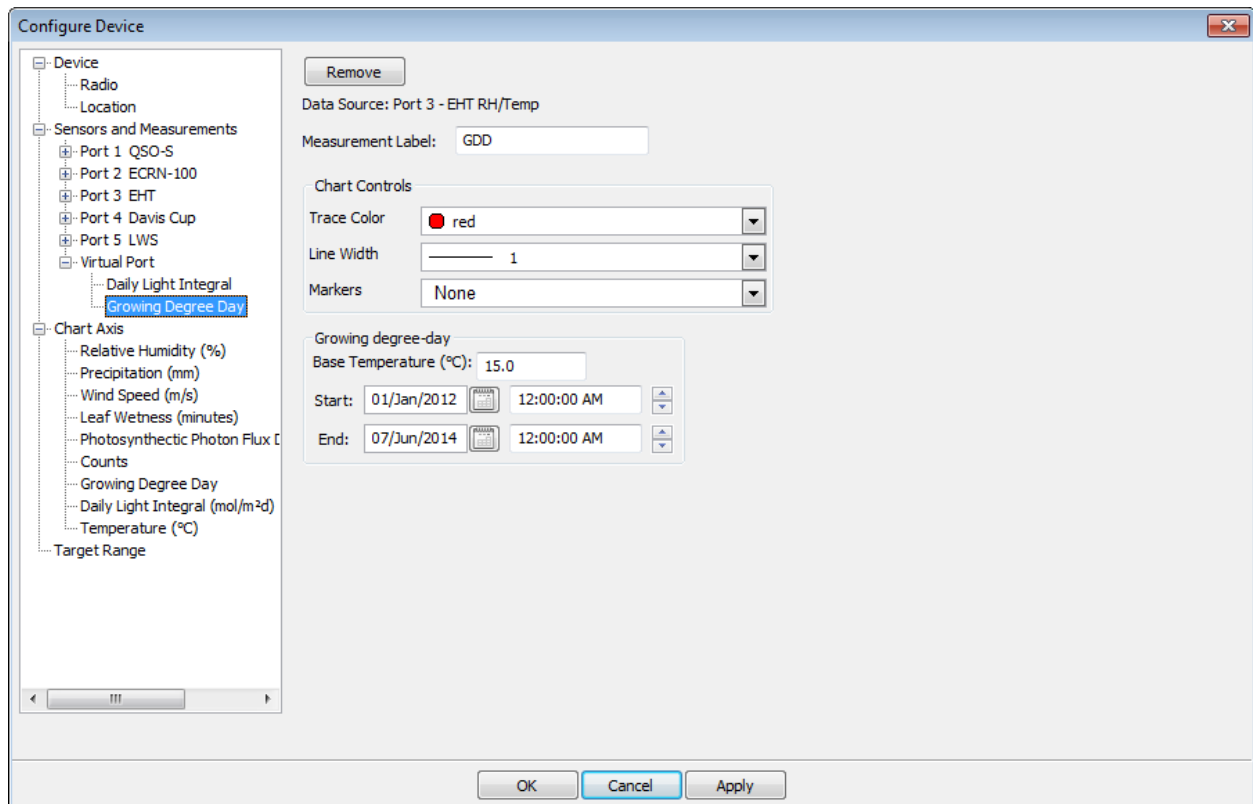


Figure 12. A Growing Degree Day (GDD) growing tool with base temperature of 15 °C.

The growing tools available in DataTrac 3 include (Decagon Devices, Inc. 2013):

Plant Available Water: uses volumetric water content data and soil type data (input by user) to estimate plant available water (amount of water above wilting point). These estimates are calculated by using a modified calculation from Saxton and Rawls (2006).

Pore Water EC: uses the volumetric water content, temperature, and bulk EC to estimate Pore Water EC using the Hilhorst (2000) equation.

Growing Degree Days: uses a measured temperature reading, a base temperature (input by user), data logger measurement interval (input by user), and a start date (input by user) to calculate accumulated growing degree days.

Reference Evapotranspiration Growing Tool: reference evapotranspiration, or ET₀, estimates the amount of water removed from the soil by a reference crop growing in a well-watered soil using the environmental measurements air temperature, relative humidity, wind speed, and total solar radiation. Decagon uses a modified FAO Penman-Monteith equation to calculate a daily evapotranspiration using calculations outlined by Rick Allen (Allen et al., 1998) in Appendices 1 and 2 of REF-ET for windows manual located at <http://www.kimberly.uidaho.edu/ref-et/>. A complete manual detailing the calculations can be found at the site.

Daily Light Integral: uses measured PAR to calculate an accumulated daily light integral. The time period resets at midnight daily.

Vapor Pressure Deficit: uses the TEMP/RH sensors to calculate the difference between saturation vapor pressure and the vapor pressure of the air.

VWC Delta: uses any soil moisture sensor data to calculate the difference in water content between measurement intervals.

Chill Hours: uses a temperature measurement (from any sensor measuring temperature) to calculate the amount of time (in hours) that the temperature is below a certain base temperature.

Groundwater Depth: uses the CTD sensor to calculate depth to groundwater using the equation "Installation depth" - "Sensor-measured depth" = "Groundwater depth".