**Fruit Growth Models for DAS**

**Background**: The fruit growth models are all based on the data taken by Tory Schmidt and the tree fruit team over time. They monitored fruit growth at a large number of locations throughout the state by measuring and recording each fruit separately once a week or more. These data were paired with weather data either from AWN or Darksky or Daymet (the analyses were all run separately depending on the weather source, but we ended up using AWN data; the others also worked well, just had to pick one of them).

The data were analyzed by looking at each fruit and comparing the size compared to the full-size fruit. Data checkers looked for problems in the data (loss of fruit, fruit shrinking from week to week, too long an interval between observations, etc.). We regressed the proportion of the final fruit size over time versus degree-days (DD) and DD2 (simple quadratic equation). We did this for each fruit as well as the average fruit growth at a site each week. For the final analysis, we used the average fruit growth.

**Thresholds:** LT 42°F, UT 77.64, vertical cutoff.

**Cultivars:**

The initial data had 3 cultivars: Red Delicious, Gala, Cripps Pink and the second set of data had four cultivars: Cosmic Crisp (2 sites only), Fuji, Golden Delicious, and Honeycrisp. The first set of data came from the years 2010-2014, the second came from 2017 and 2018; a third-year data for the second four cultivars will be taken in 2019.

**Equations**:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Cultivar** | **Constant** | **DD** | **DD2** | **Comments** |
| Cosmic Crisp | -0.7292291 | 0.0011782 | -2.01e-07 | Tentative – few reps currently |
| Fuji | -0.52435 | 0.0010334 | -1.76e-07 |  |
| Golden Delicious | -0.602239 | 0.0011319 | -1.97e-07 |  |
| Honeycrisp | -0.5854134 | 0.001121 | -1.92e-07 |  |
| Red Delicious | -0.3673088 | 0.0008857 | -1.42e-07 |  |
| Cripps Pink | -0.257021 | 0.0007148 | -1.01e-07 |  |
| Gala | -0.3709137 | 0.0008554 | -1.10e-.07 |  |

**DAS implementation:**

Use the current template, but change the thresholds and the equations. **NOTE: All of these equations predict the PROPORTION of final fruit size. Multiply the resulting equation x 100 to give the percentage values.**