LaRC

Northwest US Agriculture II

Chill an Hour with the Apples of Washington State

>> Alyssa: Apples. Their sweet crunchy crispness satisfies us on a hot day. Coated with caramel, they are a favorite autumn treat. Baked in a pie with cinnamon, nutmeg, and sugar, they elicit feelings of comfort, family, and home. But so much more goes into apple production than just picking out our favorite variety in the fruit section.

>> Alyssa: With crop cultivation, the growing season is generally considered the most important time in the plants’ life. However, time between growing seasons is extremely important as well.

>> Alyssa: For apple trees, they require between 400 – 1000 hours at temperatures between 1.4° – 12.4° C. This time, denoted in “chill hours,” can be calculated with the Utah Model developed by Richardson et al. (1974) where weights are applied to temperature ranges and then the hours summed.

>> Alyssa: These chill hours are particularly important to apple cultivation because they allow the trees to rest then break dormancy and bloom homogenously in the spring, which is economically ideal.

>> Alyssa: With climate fluctuations beginning to affect the region, there is a real threat to the number of accumulated chill hours that orchards may experience in years to come.

>> Alyssa: Increased winter temperatures could lead to decreased chill hours.

>> Alyssa: Orchard managers want to know what might be coming their way, so NASA DEVELOP partnered with the USDA – Agriculture Research Service to cultivate this project and deliver its results to orchard managers in Washington State.

>> Alyssa: Located in the northwestern-most corner of the contiguous United States, Washington is the leading state in apple production, yielding more than half of the nation’s apples. The majority of the apple orchards lay to the east of the Cascade Mountains where the temperate climate provides warm dry summers and cool wet winters on which apple trees thrive.

>> Alyssa: To calculate the current accumulated chill hours in this region, the DEVELOP team at NASA Langley Research Center used a combination of data sources.

>> Alyssa: Hourly temperature data collected from NOAA weather stations for 2003 – 2013 were used to establish a diurnal temperature curve.

>> Alyssa: Land Surface Temperature data measured by the Moderate-Resolution Imaging Spectroradiometer (MODIS) onboard the NASA Earth observing satellites Aqua and Terra were used as a proxy for air temperature data.

>> Alyssa: The diurnal temperature curve was applied to the MODIS data, providing the inputs for the Utah Model to calculate accumulated chill hours.

>> Alyssa: Additionally, forecasted air temperature ranges from the Coupled Model Intercomparison Project phase 5 (CMIP5) were used to forecast accumulated chill hours for the region in 2045 and 2065.

>> Alyssa: With this new information, orchard managers may make decisions about how to proceed with their apple production.

>> Alyssa: With small to moderate declines in chill hours, apple growers may be able to alter their practices to adapt to the warmer conditions.

>> Alyssa: This could include using more water for irrigation to cool the apples and trees or changing varieties of apples cultivated at that location.

>> Alyssa: If ideal apple growing conditions shift to locations more northward, the orchard managers may decide to move all together.

>> Alyssa: Whatever apple growers decide, they will have more time to make informed decisions with the help of the maps produced by the NASA DEVELOP team. The team members were:

>> Lydia: I’m Lydia Cuker and I like to bake with Granny Smiths.

>> Laura: I’m Laura Lykens… and I like Galas.

>> Alyssa: Hi, I’m Alyssa Walzak and I prefer sliced apples as a snack.

>> Tim: I’m Tim Stelter and I like Fuji apples.