ViviendasLeón

Farming Performance Dashboard

2017 — 2020

How do I use this report?

The report consists of data visualizations in the shape of scorecards, bar charts, maps and time series. Use the table of contents on the left of the screen to navigate through pages. Hovering the mouse over the charts will provide additional information about the category or point selected. Clicking on some images will open a new tab leading to the image source.

Definitions

Median is the value separating the higher half from the lower half of a data sample, also thought of as the "middle value".

Correlation coefficient measures the strength and direction of the relationship between two variables. A value closer to -1 or 1 is considered a strong correlation while a value closer to 0 is considered a weak correlation.

An **inverse relationship** denotes the increase of one variable when a second variable decreases, and vice versa.
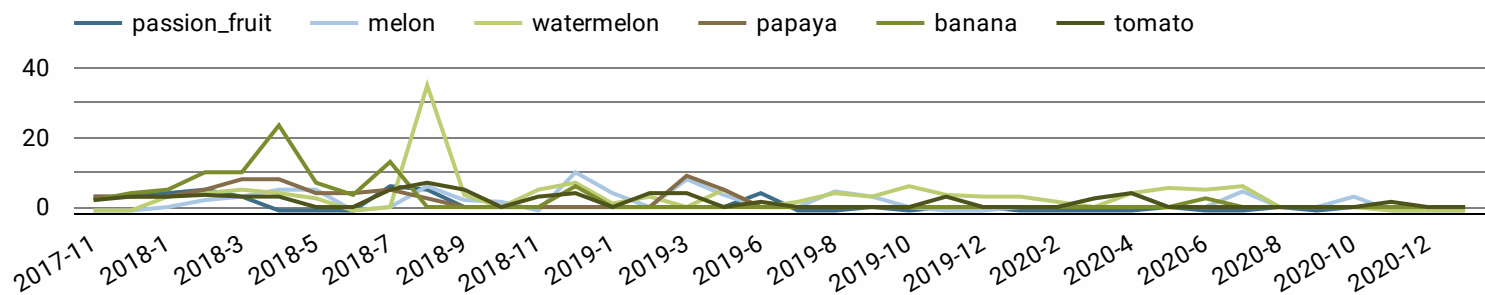
Executive Summary

Farming data from this folder was combined with geospatial data, weather trends and farming research to analyze the performance of crops grown by ViviendasLeón beneficiaries. Top insights include:
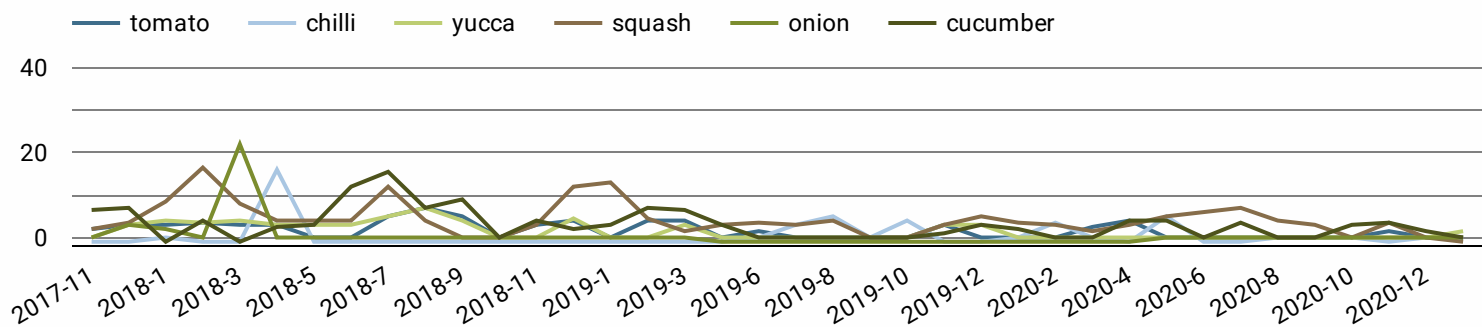
• Crop performance has been consistently low (under 5%) over time with the exception of disease spikes for fruits and vegetables in mid 2018.
• The most productive fruits have been Guayaba and Granadilla.
• The most productive vegetables have been Cebolla and Camote.
• The most productive legume/seed crop has been Pipian (though there was only data for two categories).
• The average farm has a lower percent disease for fruit crops than for vegetables, legumes and seeds.
• Ace and Ajo y Cebo are the organic recommendations that have demonstrated consistent reductions in disease.
• The geographical pattern of disease is relatively erratic, but there tends to be a higher concentration within the central regions of the land ViviendasLeón covers.
• Recordings of higher fruit illness seem to coincide with higher temperatures in wind and heat index.
• Greater moisture in the atmosphere coincided with lowered illness in fruits.
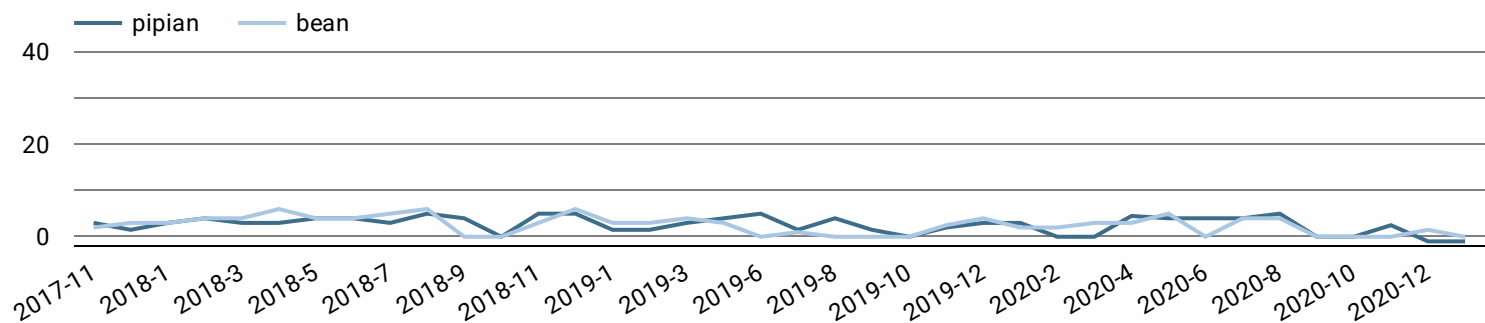
Median Percent Disease Over Time

Fruits: Sandia and Platano have large spikes in median percent disease in summer and fall 2018. Otherwise, fruits are in consistently healthy conditions with a median percent disease below 5%.

passion_fruit — melon — watermelon — papaya — banana — tomato

(Chart: Median percent disease over time for fruits, y-axis 0 to 40, x-axis 2017-11 to 2020-12)

Vegetables: Conditions have been improving, clustering below 5%. In mid 2018, multiple vegetables had high percent diseases, with Ayote having a resurgence in disease around February 2019.

tomato — chilli — yucca — squash — onion — cucumber

(Chart: Median percent disease over time for vegetables, y-axis 0 to 40, x-axis 2017-11 to 2020-12)

Legumes and seeds: Conditions are consistently good, being below 5% median disease. This can also be reflective of the lack of variety in legumes and seeds.

pipian — bean

(Chart: Median percent disease over time for legumes and seeds, y-axis 0 to 40, x-axis 2017-11 to 2020-12)

Note 1: Grasses are not graphed as their median percent disease is consistently around zero.
Note 2: For each type of produce, only produce that are grown in more than 10 families are plotted.
Note 3: For a particular month, the auditors may not visit farms that have all the listed fruits, vegetables, or legumes and seeds. For example, in November, 2017, no farms with melon are visited. Hence, there are no records of the percent disease for melons in November 2017. For the purpose of data visualizations, these missing values are replaced by a -1.

Average Disease Spread By Crop

These charts show the average percent disease for each crop. They can be used to determine which crops are the easiest to grow, and vice versa.
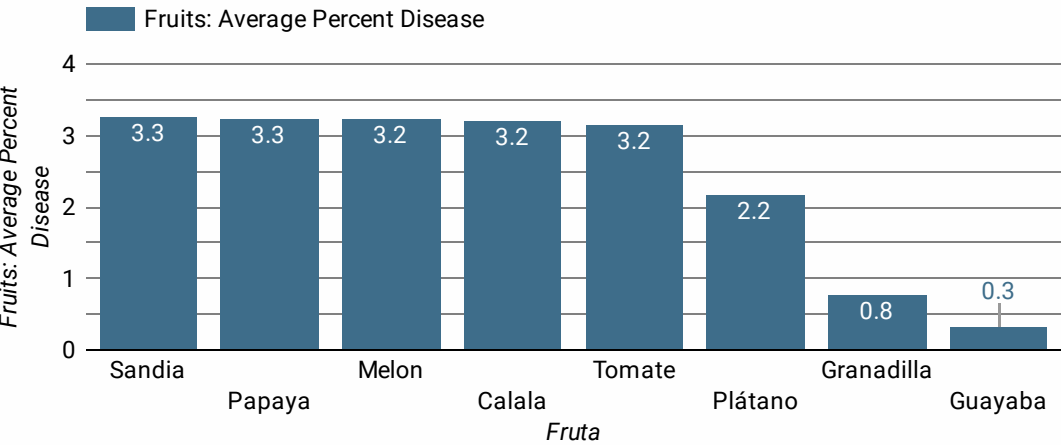
Fruits: This chart shows the average percent disease of each fruit. The chart indicates that fruits seem to be a very consistent crops, because the average percent disease is often around 3%. Sandia, Papaya, Melon, Calala and Tomate are the highest at 3.3% and 3.2%, and a few others have lower percentages such as Granadilla or Guayaba.

Vegetables: This chart shows the average percent disease of each vegetable. According to the chart, Ayote and Verenjena are some of the hardest vegetable crops to grow, while Camote and Cebolla are significantly easier.
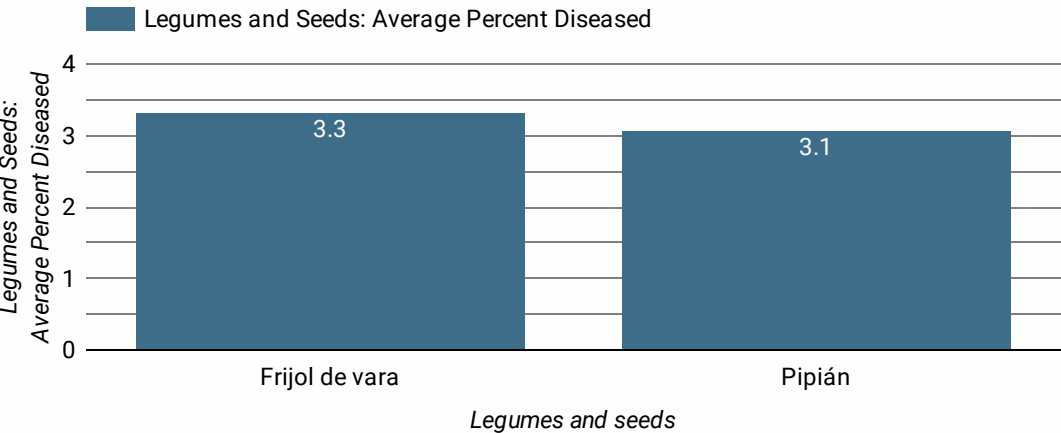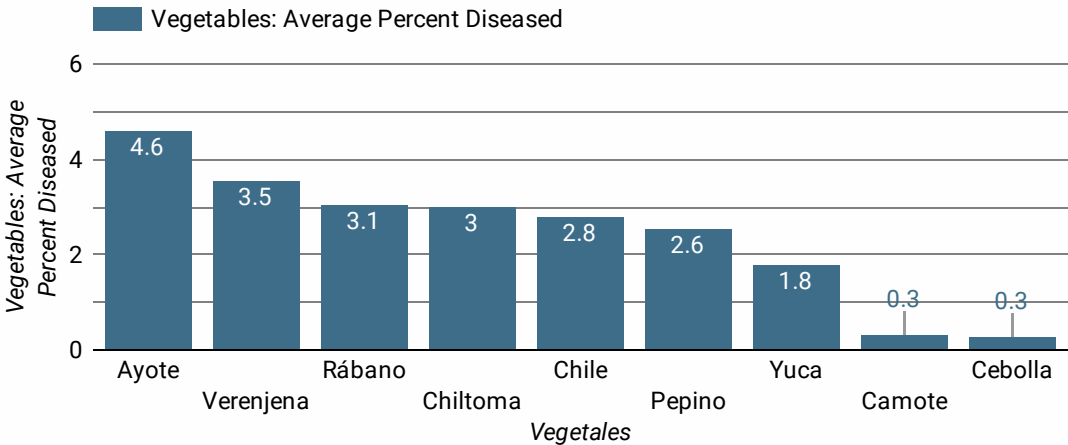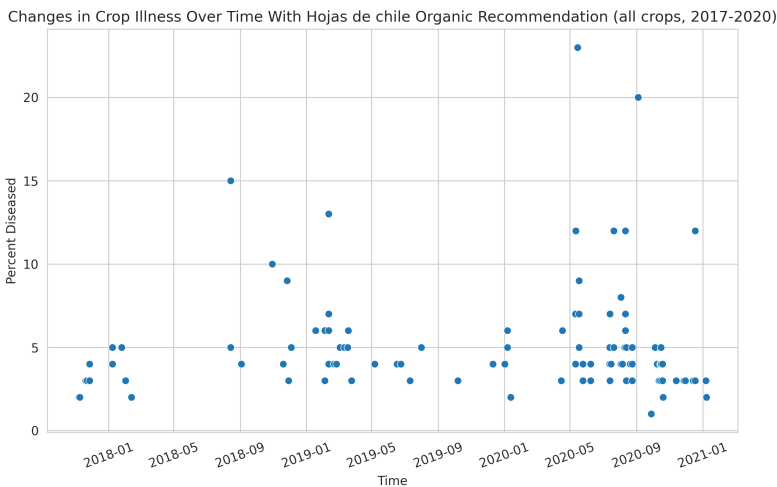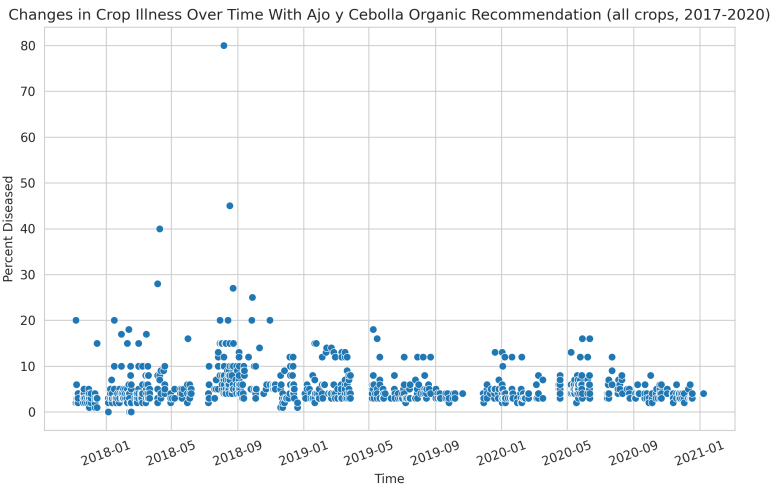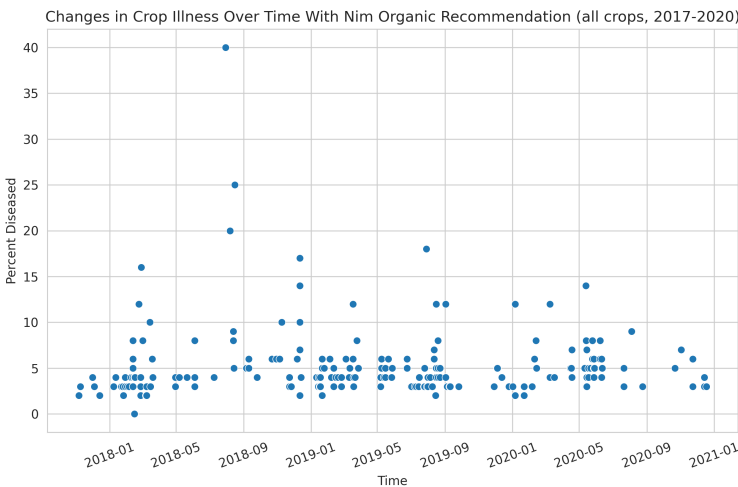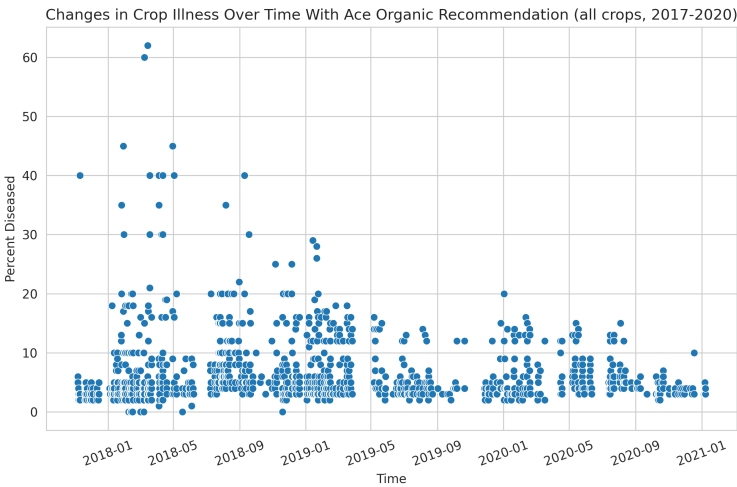

Legumes/Seeds: This chart shows the average percent disease of each legume and seeds crop. The two legumes and seeds crops that there was significant data on, Frijol de vara and Pipián have similar percent disease at 3.3% and 3.1% respectively.

# Effects of Organic and Chemical Recommendations

The four graphs show the changes in disease spread over time of crops with the four most popular organic recommendations applied to them. Assuming that recommendations are in use, Ace and Ajo y Cebo are correlated with percent diseased below 20 percent (and, from September 2020 to January 2021, below 10 percent) and sizeable improvements in the health of crops that had high rates of disease. Ace in particular has demonstrated consistent reductions in percent diseased rates.

The correlations of Nim and Hojas de Chile with percent diseased are difficult to assess due to a small amount of data. However, both appear to be associated with infection rates below 20 percent. Empirical studies have highlighted the effectiveness of Ajo y Cebolla (garlic and onion) and Nim (likely neem oil) as pesticides, and the data so far seems to support those results. While data from chemical recommendations were also analyzed there is not enough data on them to form any concrete conclusions. However, the single most popular chemical recommendation, Sipermetrina, was associated with disease rates below 20 percent.

Changes in Crop Illness Over Time With Ace Organic Recommendation (all crops, 2017-2020)

Changes in Crop Illness Over Time With Nim Organic Recommendation (all crops, 2017-2020)

Changes in Crop Illness Over Time With Ajo y Cebolla Organic Recommendation (all crops, 2017-2020)

Changes in Crop Illness Over Time With Hojas de chile Organic Recommendation (all crops, 2017-2020)

Disease Spread by Produce and Family

These charts show each family's average percent diseased for each crop type. They can be used to analyze how each family is doing at growing each crop type on average. They are useful because they can reveal the potential weaknesses and strengths in each individual family's farm. Additional work would need to be done to figure out why a certain farm is succeeding at growing one crop and yet failing at growing another. The charts also seem to indicate that the average farm has a lower percent disease for fruit crops than the other two categories.
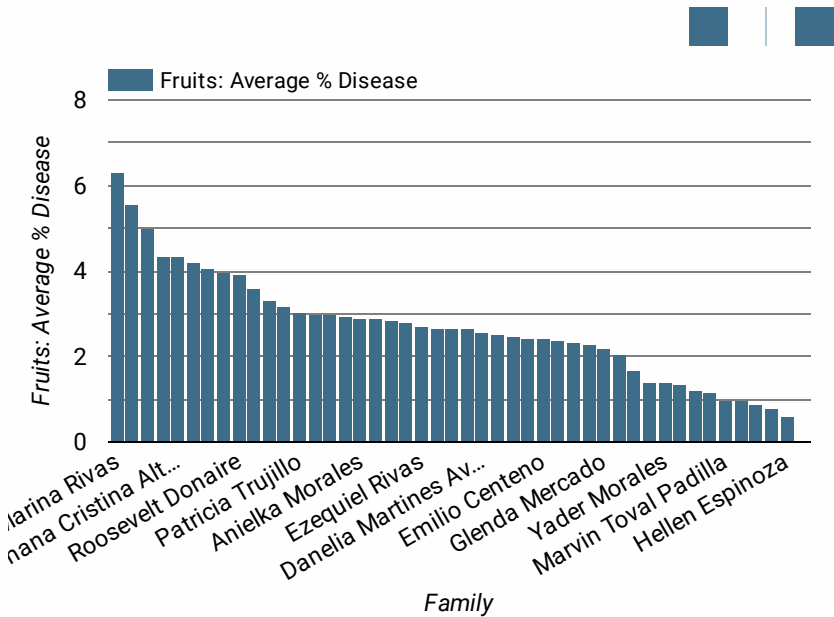
Fruits: This chart shows the average percent of fruit crops that are diseased for each family. Luz Marina Rivas has the highest average percent diseased at 6.3%, and Nerling Hernandez has the lowest at 0%.
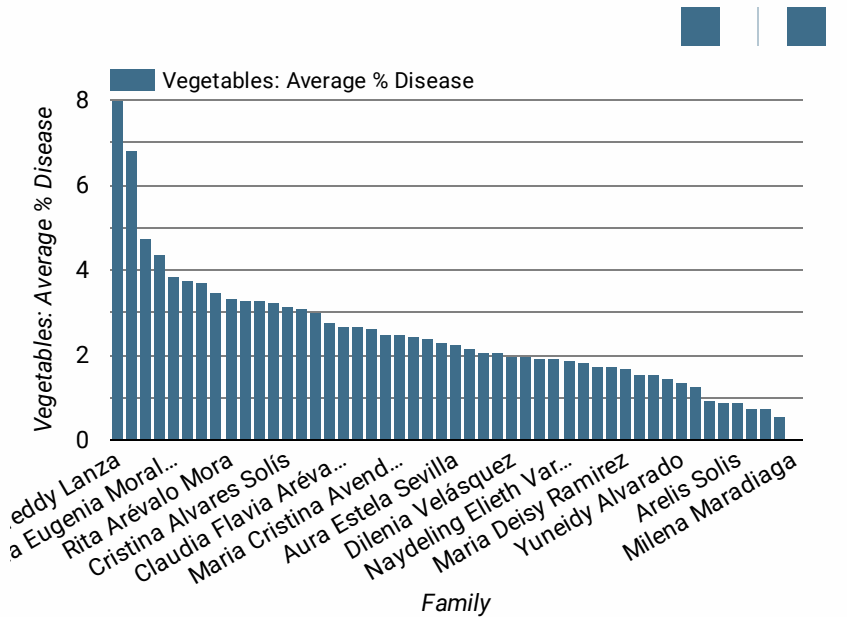
Vegetables: This chart shows the average percent of vegetable crops that are diseased for each family. Freddy Lanza has the highest average percent diseased at 8%, and Milena Maradiaga has the lowest percent diseased at 0%.


Legumes/Seeds: This chart shows the average percent of legumes and seeds that are diseased for each family. Maria Deisy Ramirez has the highest percent diseased at 11.7%, and Claudia Espinoza has the lowest percent diseased at 0%.
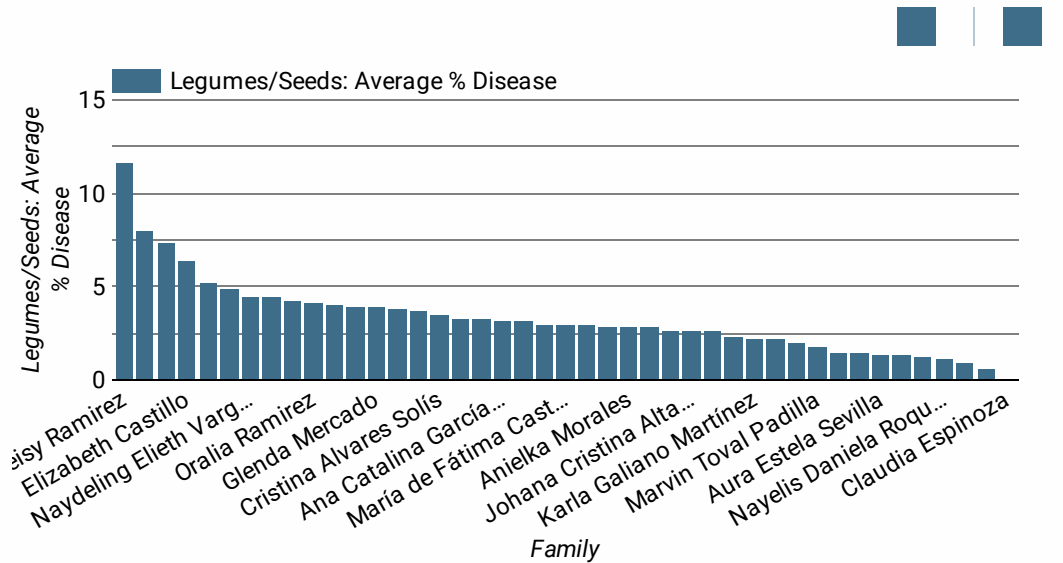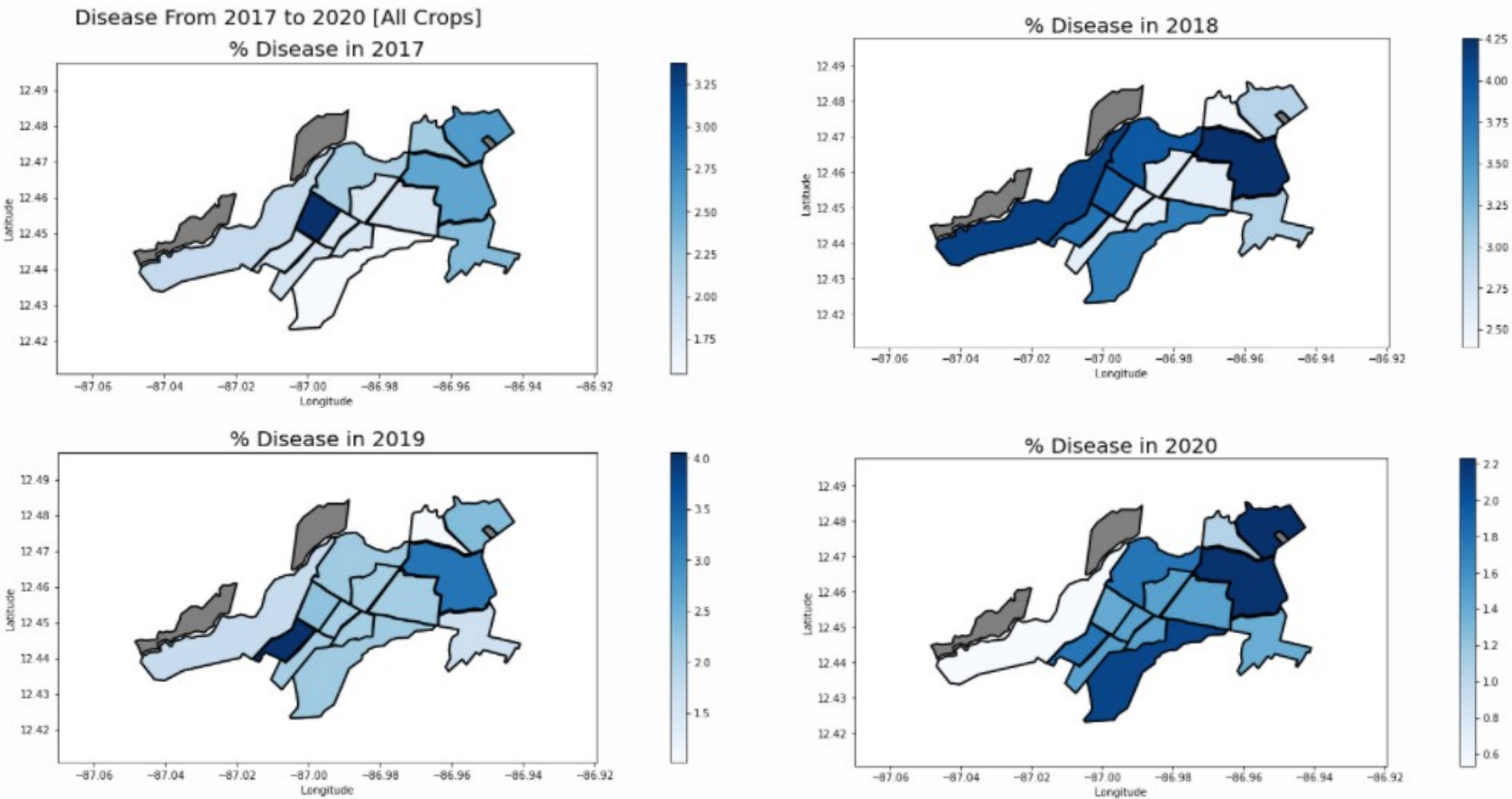
Geographical Spread of Disease

These maps show the spread of disease within specific crops on average per year over the span of 2017 to 2020. Darker shaded blue regions are correlated with a higher percentage of illness in crops and lighter shaded blue to white mean little to no recorded disease.

Grey areas are regions that did not have data to plot. The borders are reflective to the map created by the ViviendasLeón. The pattern of disease is relatively erratic, but there tends to be a higher concentration within the center regions of the map.
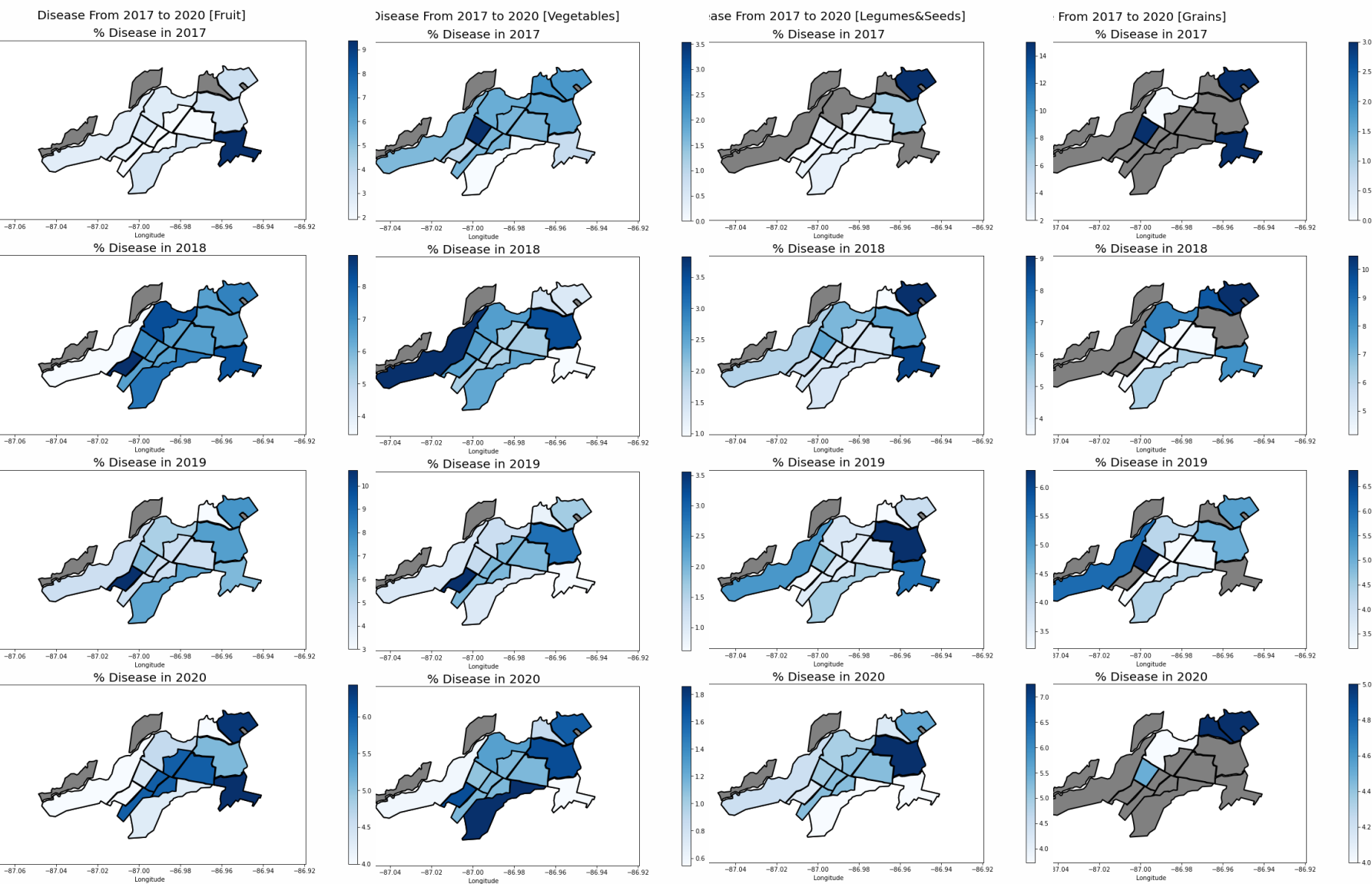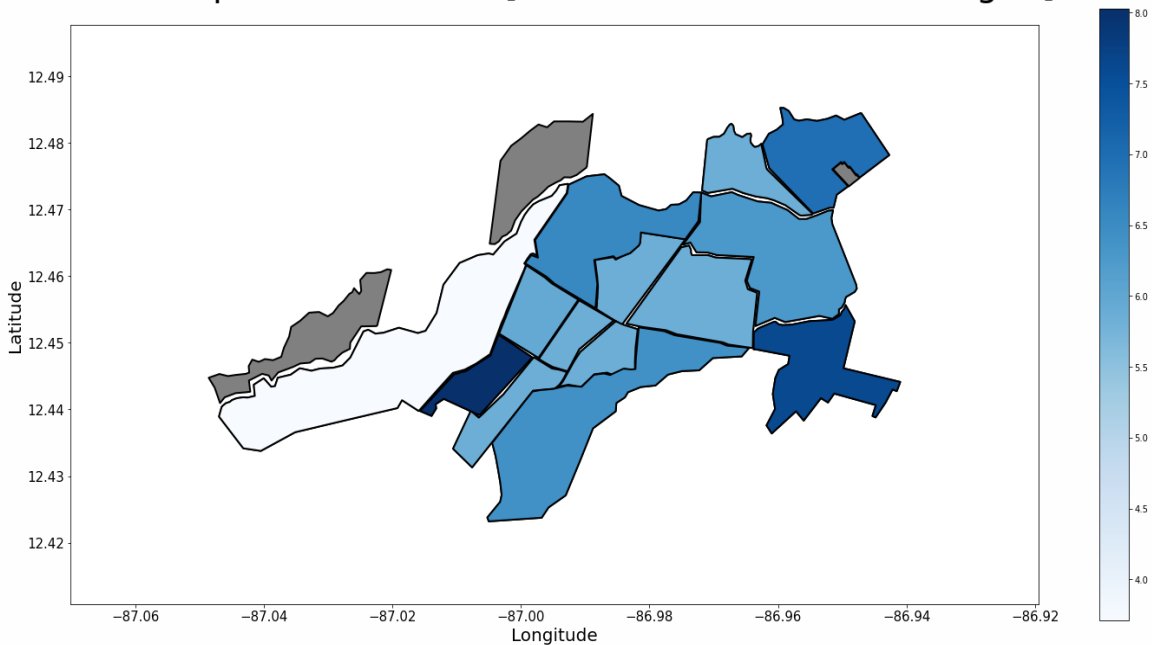

These graphs were made under the assumption that "Troilo" in the set data covers all of the following regions: 'Hacienda al Calvario, Troilo', 'Hacienda de Nahualapa, Troilo', 'Nueva Esperanza, Troilo', 'Peruario, Troilo', Nueva Vida, Troilo', 'Santa Rosa, Troilo'.

Map of 2018 to 2020 showing the average progression and spread of disease amongst all crop types in the region by year.

Disease From 2017 to 2020 [All Crops]
% Disease in 2017

% Disease in 2018

% Disease in 2019

% Disease in 2020

Chloropleth of Disease [All Years All Disease Averaged]

Weather Impact on Fruit

Heat Index and Wind Chill:
Heat Index is a combination of humidity and heat for a nuanced measurement in Celsius of experienced temperature. Wind Chill combines wind speed with temperature to measure in Celsius the temperature effect of wind. Heat Index and Wind Chill increase during the hotter seasons. Recordings of higher fruit illness seem to coincide with higher temperatures in wind and heat index, as seen in the trend lines. This is more pronounced in the relationship between fruit illness and wind chill.
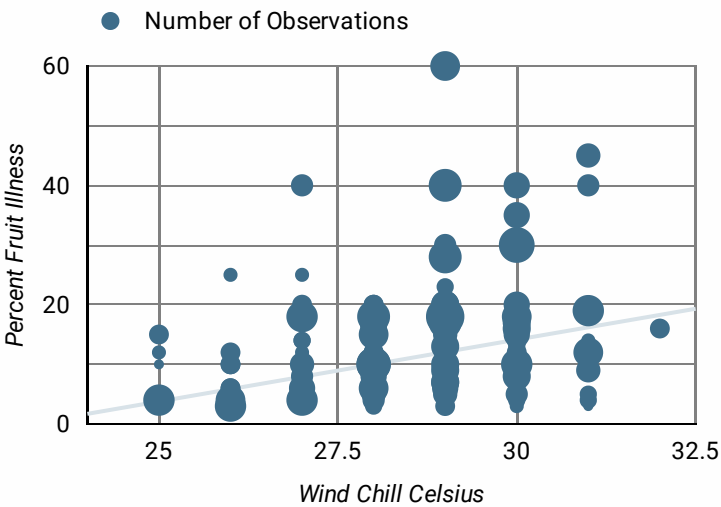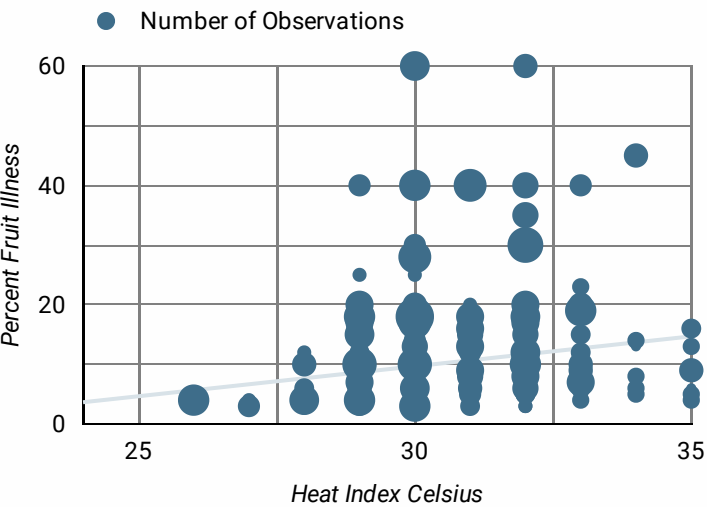

Dew Point: Higher dew point allow for higher amounts of moisture in the air. An inverse relationship can be observed between the annual fluctuations of median dew point and median fruit illness. Greater moisture in the atmosphere coincided with lowered illness in fruits. Drops in dew points or lessened moisture coincided with more illness. Overlaying all factors, Dew Point, Wind Chill, Heat Index to the right we can see how these trends span across the year. The weather Dew Point is most reflective, inversely, of the median fruit illness recorded.
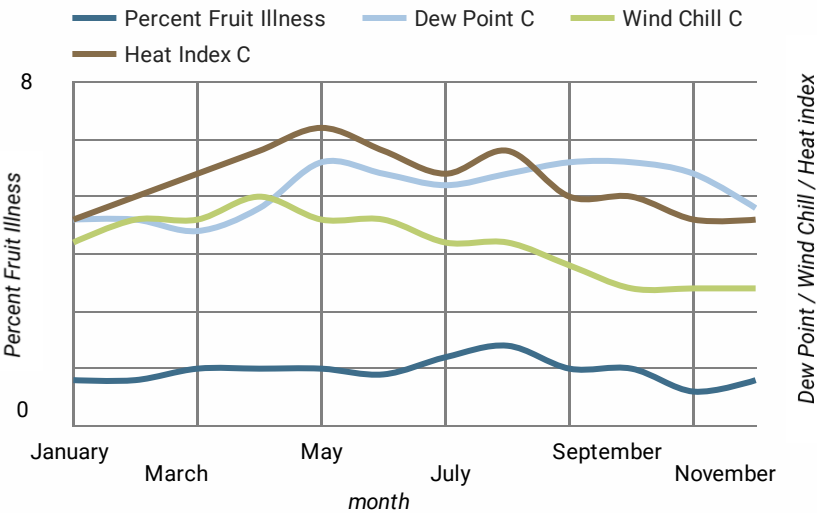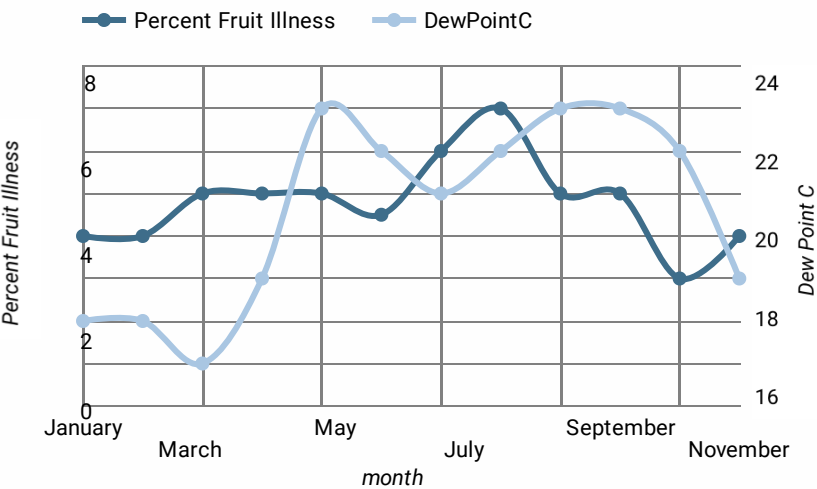
Weather Impact on Vegetables, Legumes and Seeds

Legumes and Sun Hours: Sun Hours represent the number of hours in a day where sunlight reaches a specific threshold of 1000 watts per square meter. During times with higher number of sun hours, legumes were seen with higher percentages of illness. From November 2017 to January 2021 peaks in illnesses occurred during periods of higher sun hours. Higher legume illnesses were observed alongside higher numbers of Sun Hours.
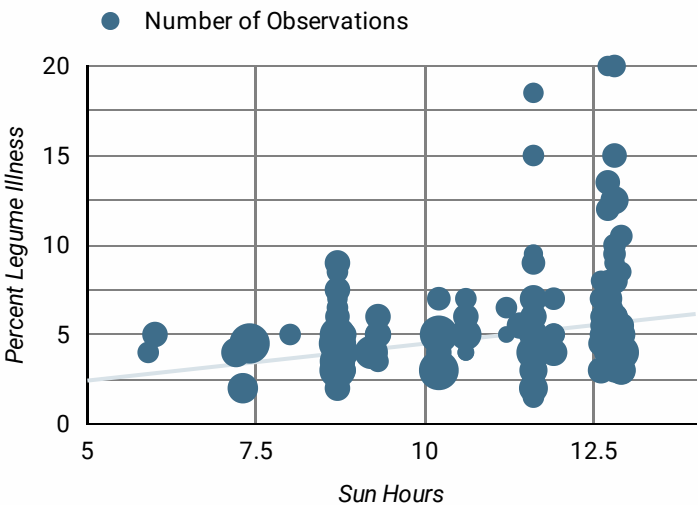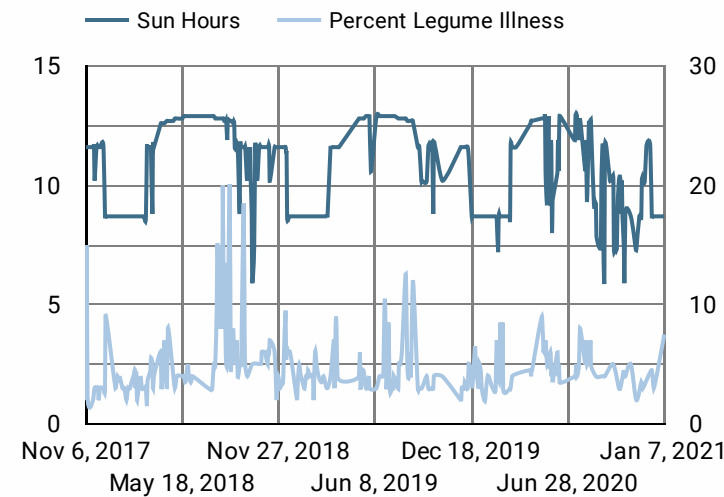
Vegetables and Sun Hours, Heat Index: Among the crops, vegetables proved to be least likely to have increases in illness tied to factors in the weather. Shown here, Sun Hours and Heat Index C were not observed to have any strong association with a decrease in vegetable health.
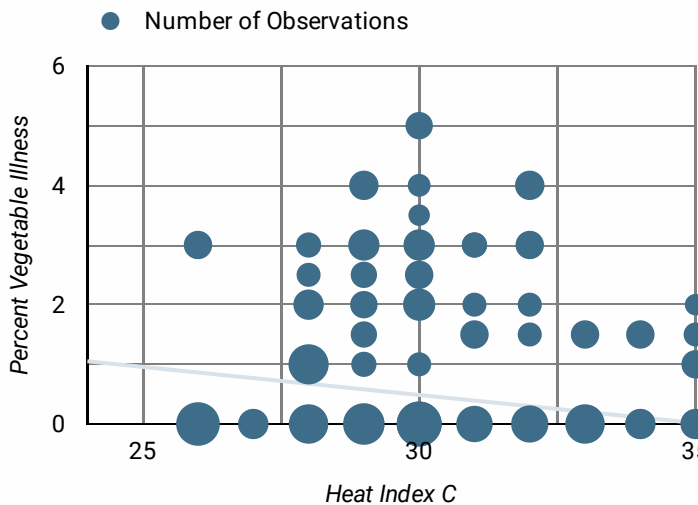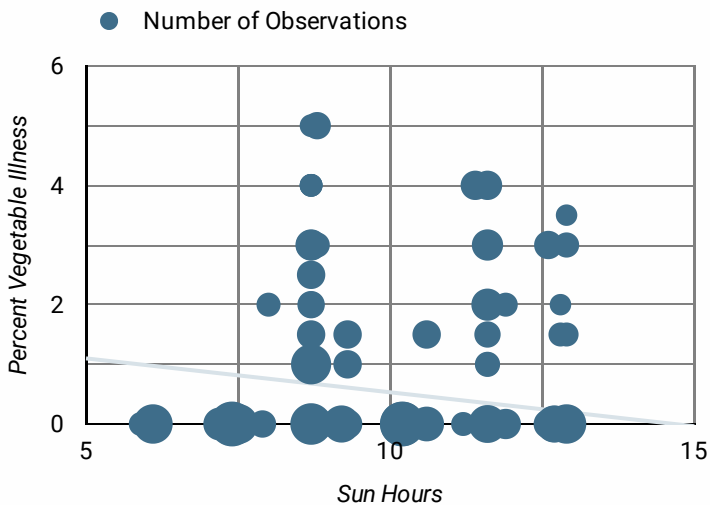
Note: Due to a smaller sample size of grains no definitive connections can be drawn at this time.