CALIFORNIA SCIENCE & ENGINEERING FAIR
2019 PROJECT SUMMARY

Name(s)	Project Number
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Project Title

Predicting Implications of Olive Quick Decline Syndrome in San Diego County Olive Trees

Abstract

Objectives

Last year I tested olive trees in San Diego North County for a pathogenic disease, Olive Quick Decline Syndrome, which infects the trees and has implications for global olive oil production. I discovered a strong correlation between OQDS and the presence of the sharpshooter insect that transmits the disease. The purpose of my project this year was to develop a growth formula for the sharpshooter population to predict the impact of OQDS on olive trees countywide over time. I hypothesized that a formula could be developed based on an estimate of the San Diego North County olive tree population and an analysis of the change in magnitude of OQDS infections over a one-year period.

Methods

I first estimated the number of olive trees using satellite images in Google Maps. For five different areas in San Diego North County, I identified and marked locations of 345 individual trees that I predicted were olive trees by visually inspecting the satellite images for tree color, density and structure of foliage, patterns or symmetry of groupings. I validated this method through field inspections of all 345 trees to confirm whether the trees were correctly or incorrectly identified and to count additional, previously unidentified olive trees at each site. I then assessed and recorded the magnitude of OQDS infection in 100 sample olive trees. I created a growth formula for the sharpshooter population based on the number of sharpshooters I caught last year.

Results

My results revealed an estimated 26,576 olive trees in a 99 square mile test area (268.5 olive trees per square mile). I estimated approximately 186,600 sharpshooters in the test zone. This indicates a surge in sharpshooter activity, with an average of 7.02 sharpshooters per tree this year compared to 1.38 average per tree last year. Using this data, I created the formula: $y(\text{sharpshooter population}) = 36798*5.07^{[x(\text{years after } 2018)]}$. According to this formula the magnitude of infection, could be 100% in just two years time.

Conclusions

Sharpshooters carrying Xyllela fastidosa infect and kill not only olive trees but affect over 300 common plant species. These species include cherry, elm, mulberry, oak, orange and almond trees, as well as vineyards. Due to the potential environmental repercussions, further OQDS research is imperative.

Summary Statement

The purpose of my project was to assess olive tree damage and develop a growth formula for the sharpshooter population in San Diego County.

Help Received