Observation and genetic testing of virus infected V. vinifera vines at the

Located at: The Washington State University Irrigated Agriculture and Research Extension; Prosser, Washington
By: Corydon Funk; Summer Semester 2017

Introduction:
- This past summer, I was involved in the identification and study of viruses within V. vinifera grape vines
- The lab was located in Prosser, WA at the WSU IAREC
- Dr. Rayapati's program has involved the identification and prevention of grape vine diseases common to the plant
- The viruses are common to both Washington state and/or California
- Working with local growers, the program revolves around building relationships in the pursuit of prevention methods to keep clean and healthy plants
- The lab hopes to bring knowledge to the field and allow them adequate time to prepare for, identify, or halt the spread of V. vinifera viruses.
- Overall my duties focused on the transition of field measurements and sampling to the lab
- This was done using shoot measurements, leaf samples, and modern gel electrophoresis with PCR analysis

Responsibilities Day-to-Day
- Preventing contamination was a first and foremost responsibility, which means care to wear proper footwear in the field to avoid spreading nematodes
- From day one I was introduced to the genetic testing performed around the lab
- These tests required live leaf samples from the field (Fig 1-2.)
- Preparing samples in the lab required an understanding of PCR analysis, and DNA/RNA replication
- Testing involved using Gel Electrophoresis to determine if a vine was infected or non-infected (Fig 3.)
- At the end of the gel preparation, pictures were taken (Fig 4.) of the results to define the results of the test
- As that was expanded, I learned how to collect the samples used for testing ensuring minimal chances for contamination
- Eventually, a co-worker and I were initiated on measuring shoot growth weekly to compare symptomatic versus asymptomatic vines (Fig 1-2.)
- I entered these measurement values into electronic records, which I could keep and represent with graphs
- Other field trips regarding marked plants for symptoms, as well as sampling these newly marked plants for confirmation
- Often these collections and measurements repeated short drives
- The field vehicle would also need maintenance, so I would use it made it to the proper hands for gas or oil changes
- Early on, I’d assist in plant maintenance in the greenhouse such as watering and observations
- Usually, I’d have weekly meetings with Dr. Rayapati to ensure I was progressing in my understanding of my duties, and also knowledge in my field
- Plenty of times I would cooperate with different co-workers and colleagues to solve or address a problem or question as a result of these meetings
- As time went on, we began berry biochemical measurements
- I used a pH meter to determine the Brix degrees (sugar content) of the grapes
- I used a leaf area measurement device which used displaced light to give the area of a leaf in centimeters squared
- I learned about three prominent grape viruses: Grapevine Leafroll, Tobacco Ringspot Virus, and Red Blotch Disease
- I used a spectrometer to determine the Brix degrees (sugar content) of the grapes
- I gained some training in how to treat, avoid, and discover pesticide usage in the field
- One of the first examples were matrices I worked with regarding leafroll infected plants
- Occasionally we would read scientific articles related to the topics we were studying and observing
- I learned to observe and track the spread of a virus throughout and untreated field with these matrices
- I learned alternative gel practices, which would only be used once but retained the basics of normal gels
- I also learned about the different insect vectors for different viruses
- I learned some steam to play an important role in vine health and resistances occasionally
- I used a leaf area measurement device which used displaced light to give the area of a leaf in centimeters squared
- Occasionally, I would practice my pruning, leaving on the proper amount of buds and vines to prevent too much vigor
- Additionally, I used training skills for small vineyard blocks we were preparing for the following year
- Growers would sometimes meet with us to discuss what has been happening in relation to the vines or mesoclimate of that area
- Occasionally, I was called upon to mark plants from a list within a field for symptomatic and asymptomatic plants
- Once, we had to travel to older fields and determined if infected plants had died from previous years
- I was also available for driving students longer distances to other fields
- Miscellaneous greenhouse travels happened a few times early into the internship
- The greenhouse consisted mostly of checking pipes to see if they were being watered properly
- Additionally, we would assist in moving dirt or plants to the greenhouse itself
- Finally, we’d sometimes use liquid nitrogen to freeze berries and leaves
- These frozen berries and leaves would be analyzed different from regular samples
- The freezing process also doubled as a preservation technique for long drives

Occasional Duties/Experiences
- Overall I’m glad I finally had a professional work experience related to my major, unlike previous summer semesters
- Plenty of these techniques I did for the first time in class, but now I’ve seen their practical applications
- It wasn’t my first time pruning, training, preparing gel electrophoresis, nor my first field study, however it reinforced my understanding of all
- I’ve often felt open to a research pathway after my graduation, and I’ve really enjoyed my time in academia
- Otherwise, I’ve still had time dedicated to talking with viticulturists and scientists to expand my ideas of different concepts
- Finally, I’ve made even more connections in the industry that I can add as supporters for my future career
- I learned and expanded my understanding of basic and in-depth viticultural concepts

Summary
- I learned the proper technique to perform gel electrophoresis
- I learned proper field and lab safety
- I acquired the ability to critically think about why a result happens, not simply witnessing the result
- I learned to use my previous experience effectively
- I expanded my ability to work well with others and communicate effectively
- I was educated on proper sanitary management of both lab and field equipment
- I attended seminars on a wide array of virus related topics
- I learned about three prominent grape viruses: Grapevine Leafroll, Tobacco Ringspot Virus, and Red Blotch Disease

Learning OUTCOMES
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