CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY

Name(s)
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Project Number
S1722

Project Title
LNSV vs. TBSV: Effect of Virus Competition and Dominance in Different Host Types

Abstract

Objectives/Goals
The goal of this experiment is to find out which virus, LNSV or TBSV, is dominant in different plant species, and to study if the symptom severity correlates to the amt of virus. Finding the dominant virus will help researchers predict what the next major destructive virus will be, so that they can prepare for it in advance.

Methods/Materials
I used Nicotiana clevelandii, Lettuce, Tomato, and Spinach. 1 group was infected with just TBSV. The 2nd group was infected with LNSV. A 3rd group was infected with both viruses. The fourth group was the control. It was not infected. Lambsquarters (indicator plant) was infected with the LNSV and TBSV single infections, to make sure I inoculated the plants with equal amts of virus.
I extracted the nucleic acid from .1g tissue sample. Then I used RT-PCR, & gel electrophoresis to find the virus concentrations in each plant. To compare the symptoms I developed a symptom severity scale from 0(healthy) -5(dead).

Results
LNSV was dominant in the Spinach, and both viruses were equally dominant in the Nicotiana clevelandii. Spinach showed more LNSV in the single and co-infections. Nicotiana clevelandii had equal amts of both viruses in the single and co-infections. On the symptom severity scale, in Spinach and Clevelandii, TBSV was worse than LNSV or the co-infection.

Conclusions/Discussion
I concluded that it was not necessary that 1 virus(LNSV or TBSV)be dominant over the other: they could be equal. The virus with a higher quantity in individual infections was also had a higher quantity in the co-infection. On the symptom severity scale TBSV was worse than LNSV or the co-infection in Spinach and Nicotiana clevelandii. I concluded that the severity of the symptoms in TBSV and LNSV does not always correlate with the amt of the virus.
My symptom severity scale results did not match the RT-PCR. This could be because the tests were not done on the same day. I would like to test how virus amts and symptom severity change over time by conducting RT-PCR & symptom tests daily.
In Nicotiana clevelandii, TBSV had a symptom severity of ~5. LNSV and the co-infections received ratings of ~4. As I only tested 4 plants, additional data may suggest that all 3 conditions are equal.
I also noticed an additive effect in the Lettuce. I would like to conduct an RT-PCR. To further this experiment, I could study what viruses are more severe in a host, and what these viruses have in common.

Summary Statement
This experiment looks at which virus (TBSV or LNSV) is more dominant in different host plants.

Help Received
My mom drove me to the USDA. Dr. William M. Wintermantel and Ms. Laura Hladky (Research Plant pathologists at USDA-ARS) guided me in this experiment.