CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)
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Project Number
S1995

Project Title
The Effect of Flavonoids on the Growth and Inhibition of the Tobacco Mosaic Virus

Abstract

Objectives/Goals
To test which flavonoid is most effective at inhibiting the Tobacco Mosaic Virus: Quercetin, Fisetin, or Rutin.

Methods/Materials
Materials: #Nicotiana Glutinosa tobacco plants, #p100 micropipette, #p20 micropipette, #pipette tips, #Celite, #tobacco mosaic virus, #gloves, #Quercetin, #Rutin, #Fisetin, #hand lens, #beakers.
Procedure: 1.Labeled plants that were to be control, TMV then flavonoid, flavonoid then TMV, flavonoid used, etc. using a black Sharpie to mark pot. 2.Used a black sharpie to premark each replicate (or half leaf) that was to be inoculated.
For control plants: 1.Inverted vial (containing virus) and flicked at least three times to displace Celite/Virus evenly. 2.Measured 25uL TMV using p100 micropipette. 3.Dispensed the 25uL of virus onto designated half leaf and used one gloved finger to apply virus. (Applied by rubbing gloved finger 8 times in a forward and back motion, using enough pressure to wound (and not destroy) the epithelial cells of the tobacco plant. 4.Repeated this process per replicate (or half leaf) for all designated plants.
For TMV then Flavonoid plants: 1.Repeated above procedure to inoculate plants with virus, being careful to apply the same amount of pressure as previously done. 2.Changed gloves (to prevent contamination of virus to flavonoid). 3.Measured 25 uL of designated flavonoid and applied using various concentrations:
Flavonoid: Amount of Flavonoid:
Rutin 100 ppb dilution*, 500 ppb dilution, 1000 ppb dilution
Fisetin 100 ppb dilution, 500 ppb dilution, 1000 ppb dilution
Quercetin 100 ppb dilution, 500 ppb dilution, 1000 ppb dilution
4.Dispensed flavonoid onto designated half leaf and used gloved finger to gently apply virus (repeating same technique as was used for virus application).

Results
Average inhibition in Rutin- treated plants: 74.71% inhibition.
Average inhibition in Fisetin- treated plants: 72.44% inhibition.
Average inhibition in Quercetin- treated plants: 68.41% inhibition.

Conclusions/Discussion
Rutin was the most effective inhibitor of the Tobacco Mosaic Virus, at approximately 74.71% inhibition. The 100 ppb solution was the most effective at inhibition, and that there is no correlation between the order of inoculation and inhibition. Possible sources of error: cold weather, lack of humidity, or an error

Summary Statement
I tested which flavonoid inhibited the TMV most efficiently: Rutin, Fisetin, or Quercetin.

Help Received
Mother gave time/gas, Dr.Mathews gave plants and TMV, Dr.Cauchon gave advice, and Dr.Tannaci gave flavonoids.