



The use of silicone surfactant in Japanese angelica (*Aralia elata*) treatments

By: Matthew Kaplan

Grade:11

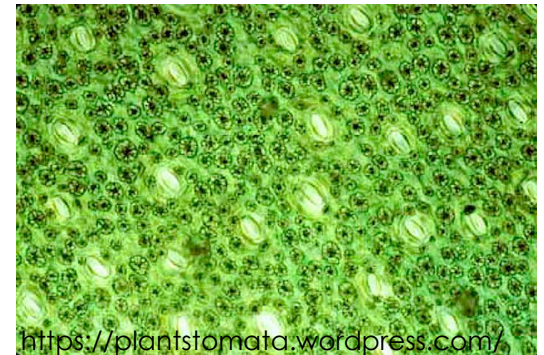
White Plains High School



http://www.digood.com/search/more_products/silicone-spray/2.html

Introduction

- Silwet® L-77 is a surfactant.
 - opens up the stomata of the cell, allowing more respiration and nutrient production.
 - are typically used to increase agricultural output.
- Silwet® can be used in conjunction with other materials.
 - effects of herbicides, fertilizers and pesticides can be magnified with its use.
- 2 types of treatment :
 - basal bark treatment.
 - foliar treatment.



<https://plantstomata.wordpress.com/category/morphology/distribution/>

Introduction

- ◉ Japanese angelica tree (*Aralia elata*)
 - ◉ introduced to the U.S. in 1830.
 - ◉ yields small fruits which birds will eat.
 - ◉ has incredible regenerative properties.
 - ◉ grows near the forest's edge.
 - ◉ grows in clusters.
- ◉ The Teatown Reservation has a powerline habitat that acts as a forest's edge. Angelica is rampant in that area.



http://plants.glenecho.com/11100002/Plant/43/Japanese_Angelica_Tree



<http://www.spiralcage.com/rootless/?p=4285>

Why is it bad?

- ◉ Japanese angelica trees are detrimental to the environment because their dense canopy obstructs light from reaching the forest floor.
 - ◉ prevents other plants to grow under it.
 - ◉ diminished biodiversity in the area where the JAT grows.
- ◉ One of the benefits of having a powerline is a presence of different kinds of flora + fauna.



Methodology

- Study tested the efficacy of using Silwet® in food dye solutions.
 - red/blue food dye was used.
 - both types of treatments were tested.
 - control was water + food dye.
- Solutions were different for both experiments.
 - ex. groups for foliar- 0.5% Silwet®.
 - ex. groups for B.B. treatment- 2% Silwet®.
 - red/blue dye in solutions remained consistent.

Methodology

● Foliar Treatment-

- administered 10 μ l of red dye solutions on leaves.
- after 10 minutes, leaves were washed over a funnel with ethanol. remaining substance was collected in a glass container.
- substances were tested for absorbency using a colorimeter.

● BB Treatment-

- bark of tree was lathered with the blue dye solutions.
- 1 hour- chiseled off the bark of tree to observe infiltration in xylem.
- 24 hours- observed chiseled bark for seepage and other irregularities.



Basal Bark Treatment

- The basal bark treatment showed little to no infiltration in the xylem around trees treated with the control solution 24 hours after application.
- Trees treated with the experimental solution showed infiltration after just 1 hour.
- 24 hours after application, spreading was seen along the veins of experimental plants.

Basal Bark Treatment




Experiment

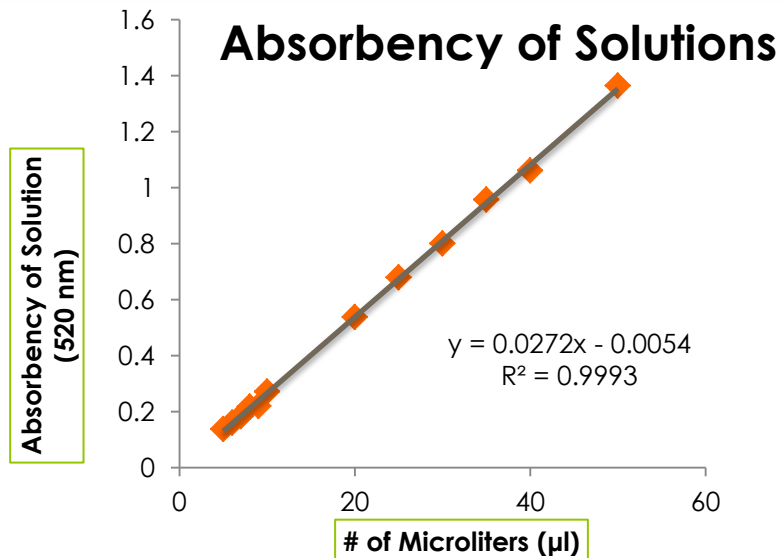
Control

	After 1 Hour	After 24 Hours
BB(E) 1	Y	Spread to veins in xylem of tree
BB(E) 2	Y	Seeped in and around pores
BB(E) 3	Y	Seeped in and around pores
BB(E) 4	Y	More spreading than all experiment subjects
BB(E) 5	Y	Ants were on open area of bark, otherwise blue in pores.
BB (C) 1	N	Slightly Blue around edges, mostly green
BB (C) 2	N	Green
BB (C) 3	N	Green
BB (C) 4	N	Green
BB (C) 5	N	Green

Foliar Treatment

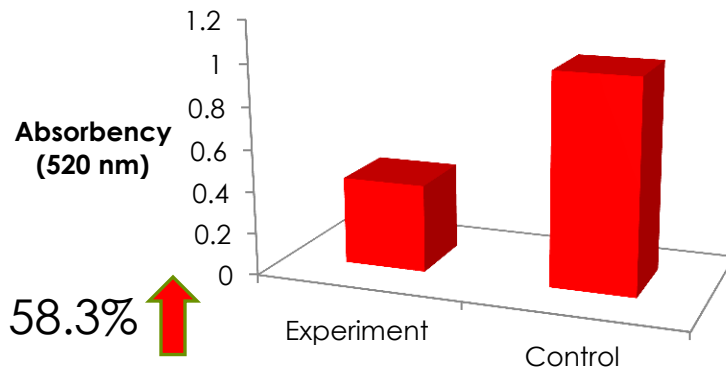
- The results for the foliar treatment showed that the leaf absorbed more red dye when exposed to the Silwet[®] solution.
 - using a colorimeter, the solutions showed how much dye was not absorbed by the leaf.
 - Creating specific ratios of solutions and then testing their absorbency.
- 
- Calculate approximately how much red dye was absorbed by the plant.

Foliar Treatment



Absorbency of Test Samples

F-E-1	0.509
F-E-2	0.166
F-E-3	0.513
F-E-4	0.305
F-E-5	0.602
F-C-1	0.959
F-C-2	1.012
F-C-3	1.002
F-C-4	0.979
F-C-5	1.075



Avg. Experiment	Avg. Control
0.419	1.0054

Conclusion/Discussion

- Inclusion of Silwet® in solutions can help transport foreign materials into a tree.
 - both basal bark and foliar treatments are amplified with the use of Silwet® L-77.
- Further research should use herbicides.
 - test ground infiltration.
 - test surrounding plants when using foliar treatment.
 - use of different invasive species.
 - find out what the Silwet® is exploiting in basal bark treatments

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- Special thanks to Chris Hannon
- All of the other students at TESA!





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