

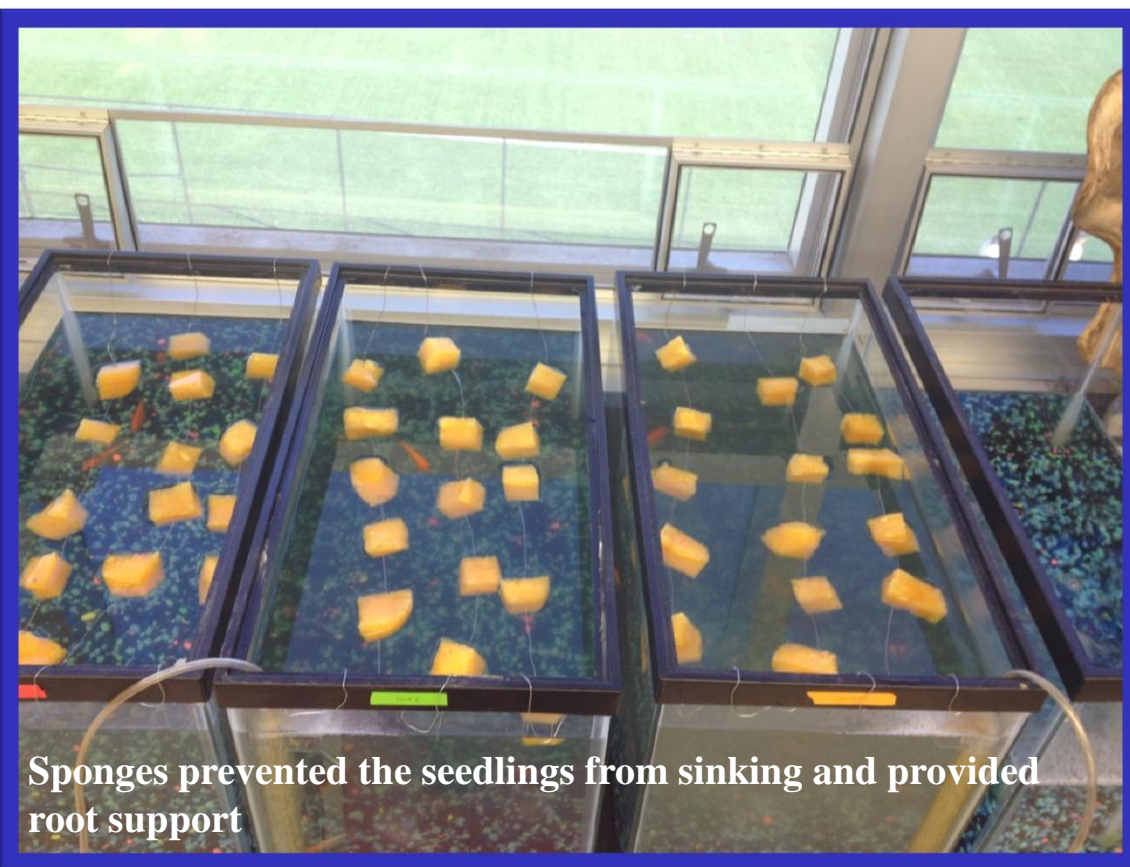


# Germination response of *Arabidopsis* to concentration of Nitrates in an Aquaponic-Hydroponic system

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## Abstract:

*Arabidopsis thaliana* (ecotype Columbia) was planted on sponges in 4 tanks with continuous aeration through airstones. Different amounts of fish under the same growing conditions for 5 weeks. An equal food-fish ratio was given to all tanks except the control which was a hydroponic setup with Murashige and Skoog solution, a plant growth medium, at 1/5 strength. The growth solution was changed once per week and fish water was partially changed every two weeks. pH, temperature, ammonia, nitrite, nitrate and plant number were recorded once per week. A slow growth was observed in all tanks and the control treatment died on the 3<sup>rd</sup> week.



## Hypothesis

If production of ammonia by fish in an aquaponic culture of *Arabidopsis thaliana* is directly related to the concentration of nitrates in the water, there will be a higher amount of germinating plants as the number of fish increases.



## Treatment

Tank 1	Tank 2	Tank 3	Control
2 fish	3 fish	4 fish	Murashige and Skoog
95 seeds	95 seeds	95 seeds	45 seeds



## Results

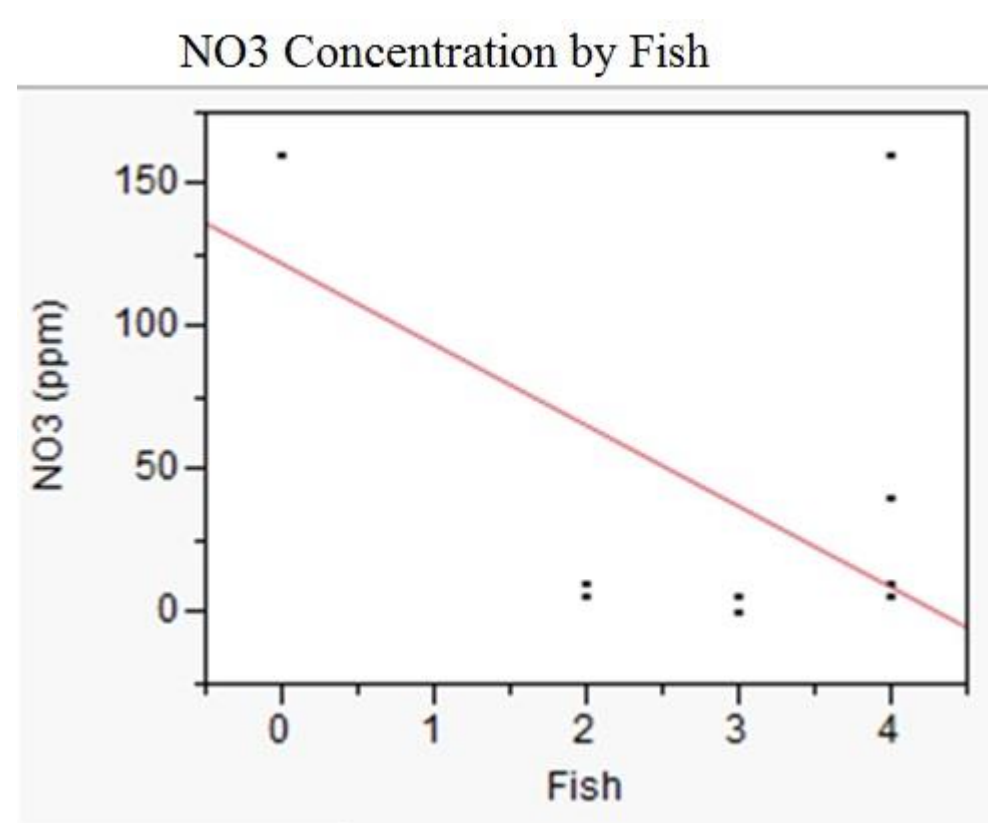


Figure 1: prob>F .0029\*

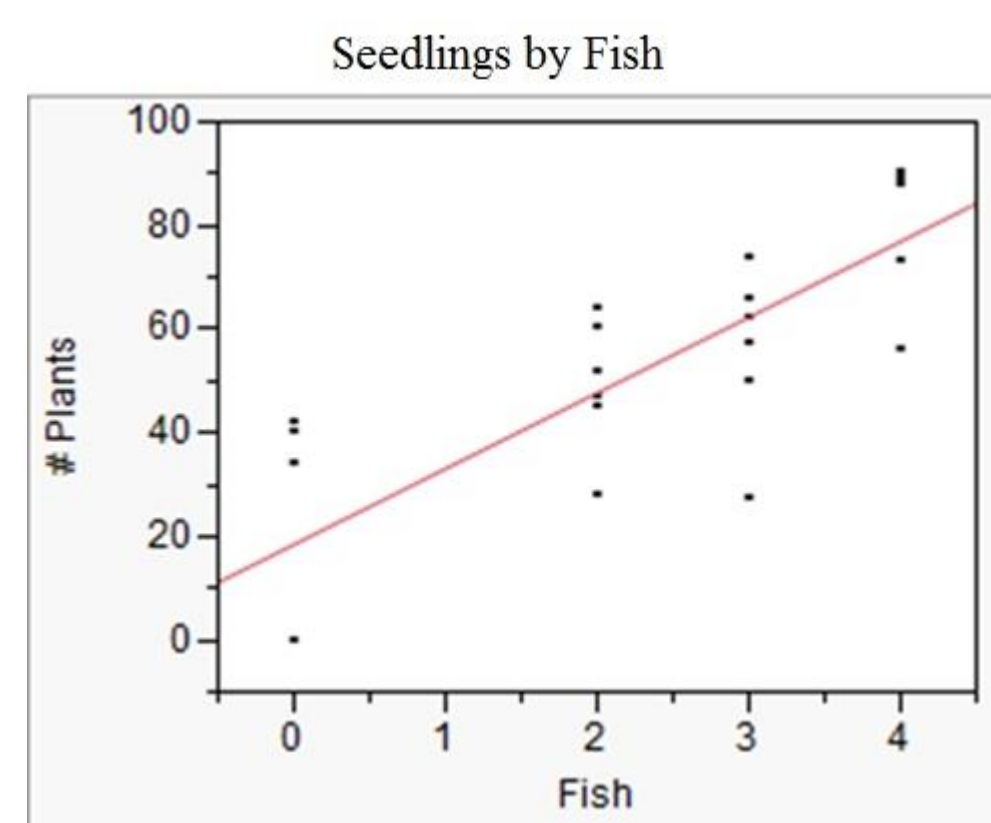


Figure 3: prob> F .0001\*

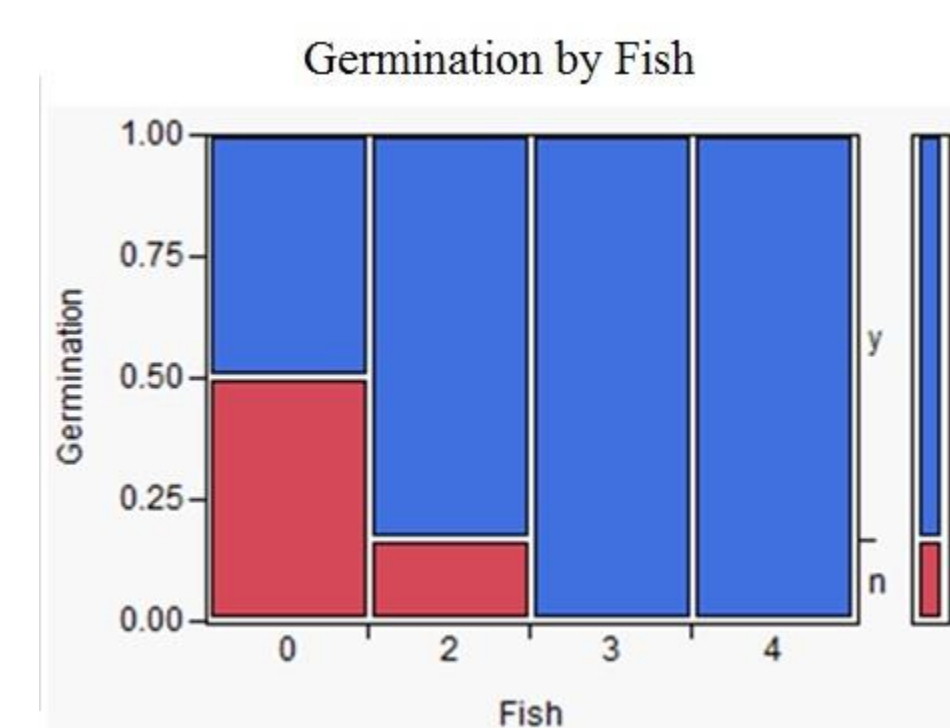


Figure 2: prob>chisq .0481\*



## The Link

The fish waste contains high levels of ammonia which nitrifying bacteria convert to nitrite and nitrate. The plants are able to absorb the non-toxic nitrate (NO<sub>3</sub><sup>-</sup>) as nutrient for growth and simultaneously reduce the nitrate levels in the tanks for the fish to survive.

## Conclusion

1. High nitrogen concentration on the control treatment killed all the plants.
2. There was a higher amounts of nitrates in the tanks with more fish.
3. There was a significant germination number in the tanks with more fish.

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