



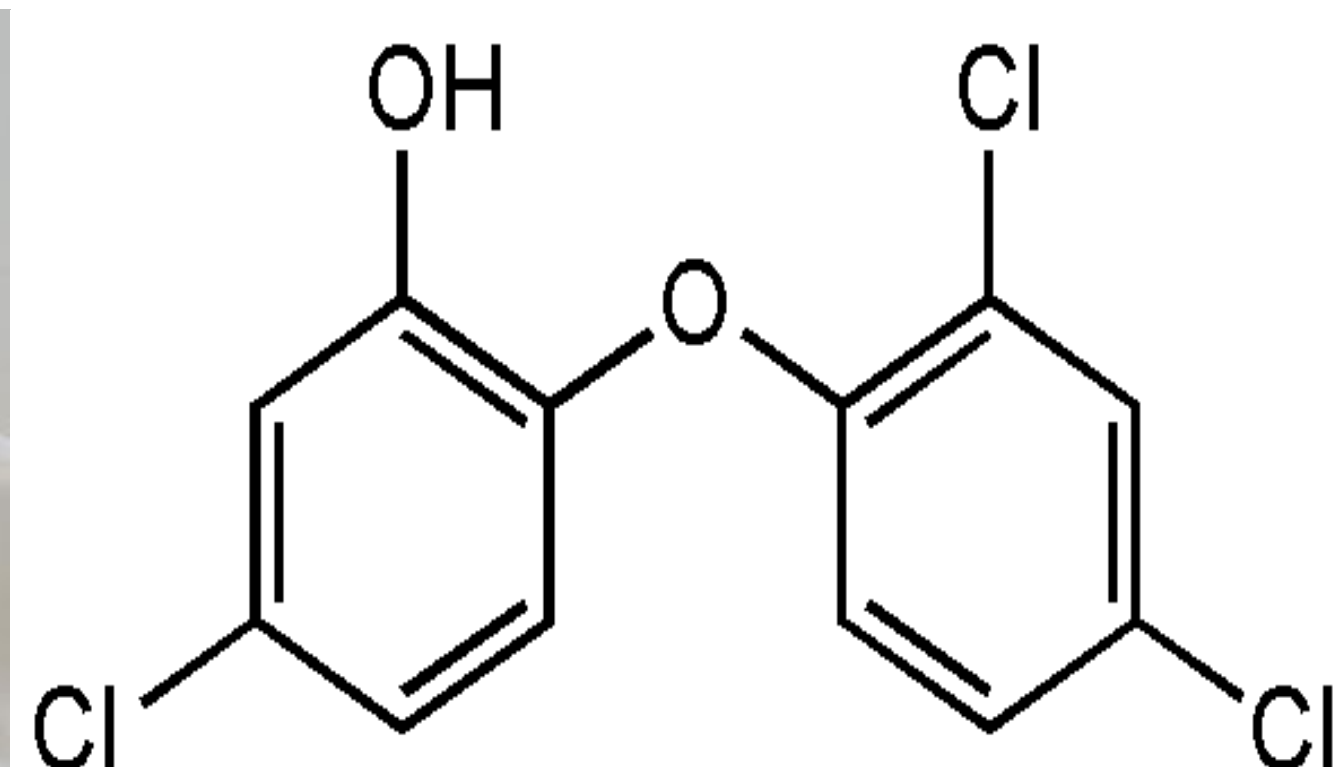
Does Triclosan Effect Legume Bean Pod, Nodule, and Biomass Formation?

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What Is Triclosan ?

Triclosan (TCS) is a synthetic broad-spectrum antimicrobial agent that has been used in consumer products for over 40 years. The Environmental Protection Agency classified TCS as a pesticide in 1969.



Why Be Concerned?

With unregulated sales to consumers it has become a common contaminant (Ying 2007). Wastewater treatment plants only remove a portion of the TCS due to its limited biodegradability (Miege 2009, Ternes 2004).

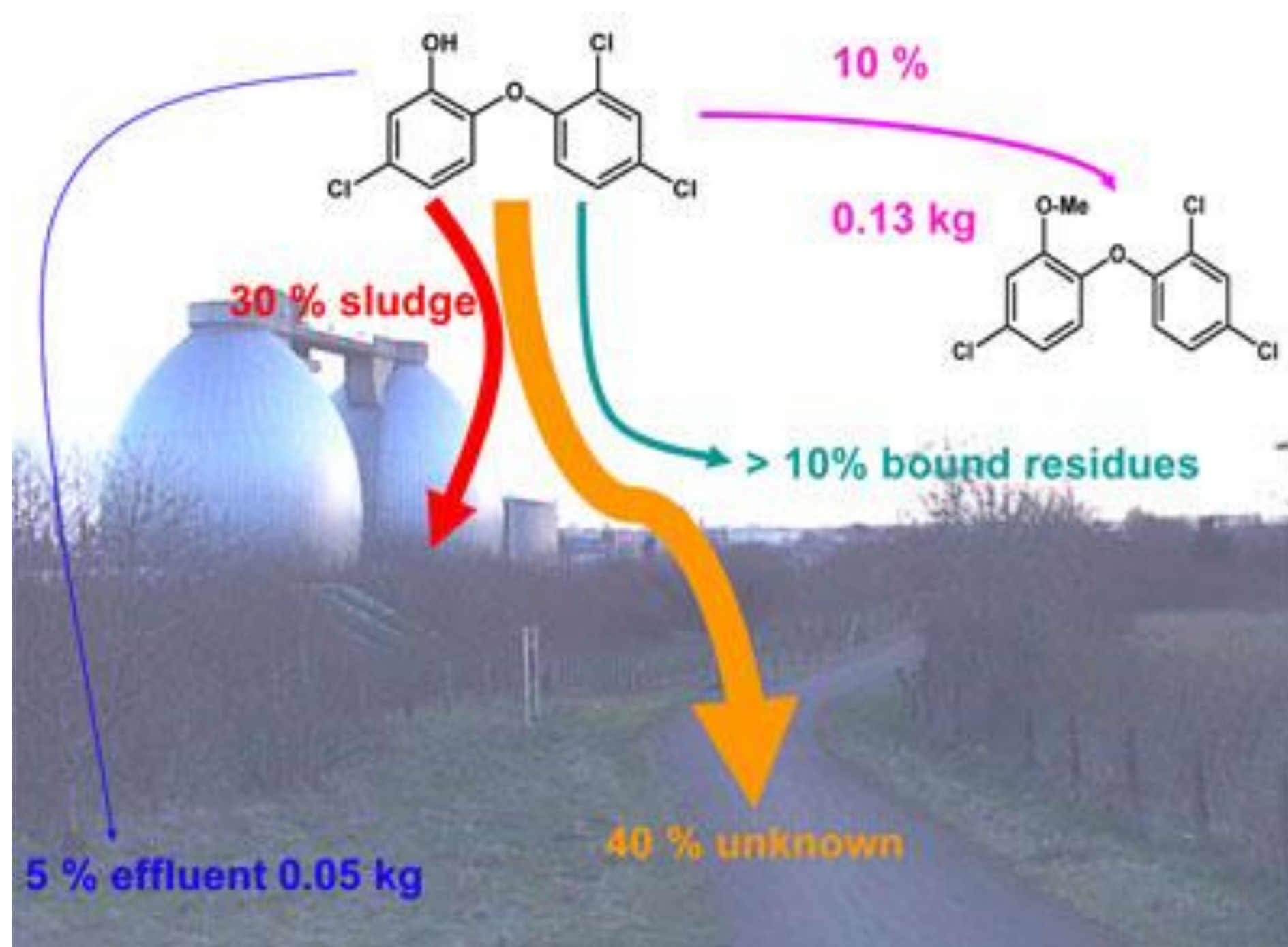


Figure 1: This figure displays the route of TCS transport and the direct percentages that correlate with the route. Also, the chemical in the top right corner displays that 10% of TCS is biodegraded to the methyl TCS product.

The Focus of the Research

This study investigates the effect of TCS on soy bean (*Glycine max*) nodule formation, biomass production, and reproductive fitness (pods produced). The concentrations studied were similar to those found in natural ecosystems (U.S. EPA et al., 2009).



Figure 2: Growth at 28 days. 1×10^{-2} ratio, 1×10^{-3} ratio, 2.62×10^{-4} ratio, Control

Materials & Methods

- 12 hour light cycle (3x 400 watt HPS lamps)
- 1 control and 3 treatments
 - 2.62×10^{-4} ratio of TCS in soap/soil
 - 1×10^{-3} ratio of TCS chemical/soil
 - 1×10^{-2} ratio of TCS chemical/soil

References

Miege, Cecile, et al. "Fate of pharmaceuticals and personal care products in wastewater treatment plants-Concept of a database and first results." *Journal of Environmental Pollution* 157 (2009): 1721-26. Print.
 U.S. Environmental Protection Agency. "Targeted National Sewage Sludge Survey Statistical Analysis Report." Washington, DC, 2009. Print.
 Ternes, Thomas A., et al. "Scrutinizing Pharmaceuticals and Personal Care Products in Wastewater Treatment." *Journal of Environmental Science Technology* 38 (2004): 392A-99A. Print.
 Ying, Guang-Guo, et al. "Triclosan in wastewater and biosolids from Australian wastewater treatment plants." *Journal of Environment International* 33 (2007): 199-205. Print.

Results and Discussion

The TCS treatments significantly diminished nodule number, pod number, and biomass (see graphs), with the highest concentrations of TCS having the most severe effect. The slight reduction in trait values in the soap + TCS treatment versus the control was not significant.

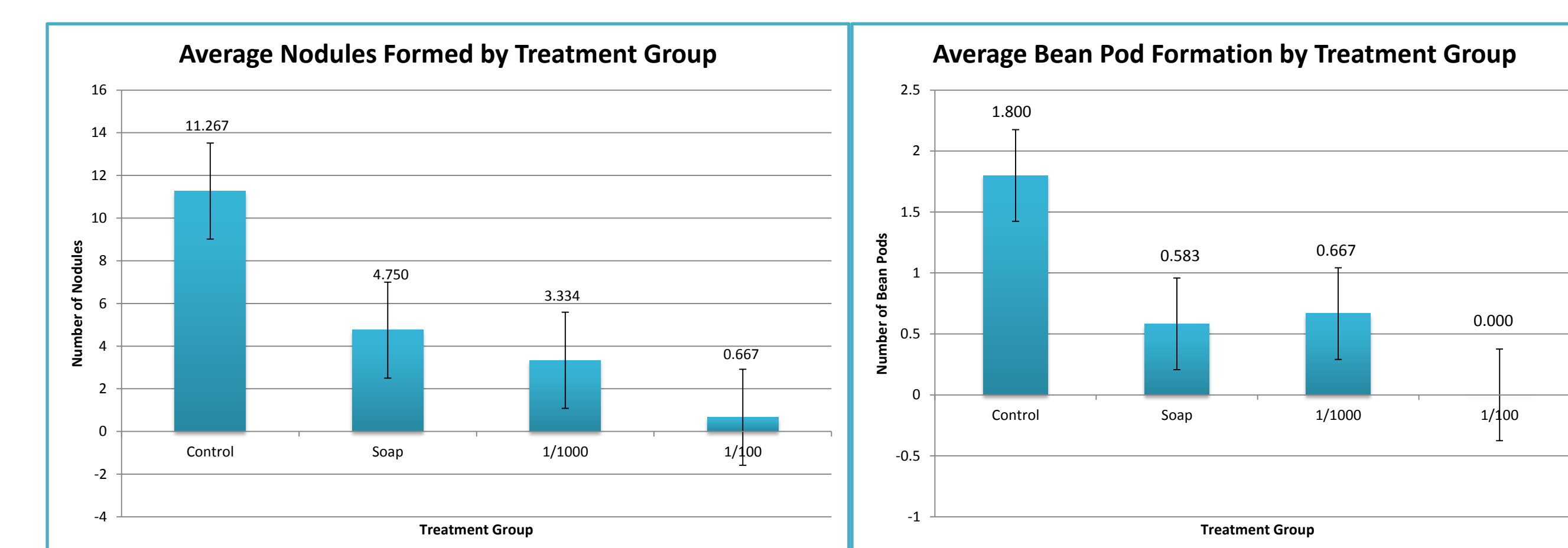


Figure 3: The significance is displayed by the error bars. Treatments with overlapping error bars are not significantly different at the P = 0.05 level from each other.

This shows that TCS at concentrations similar to those found in natural ecosystems can have significant and severe effects on plant growth and reproductive fitness. The reduction in nodulation suggests that the *Rhizobium* bacteria are affected by the TCS treatments, although a direct effect of TCS on root growth cannot be dismissed.

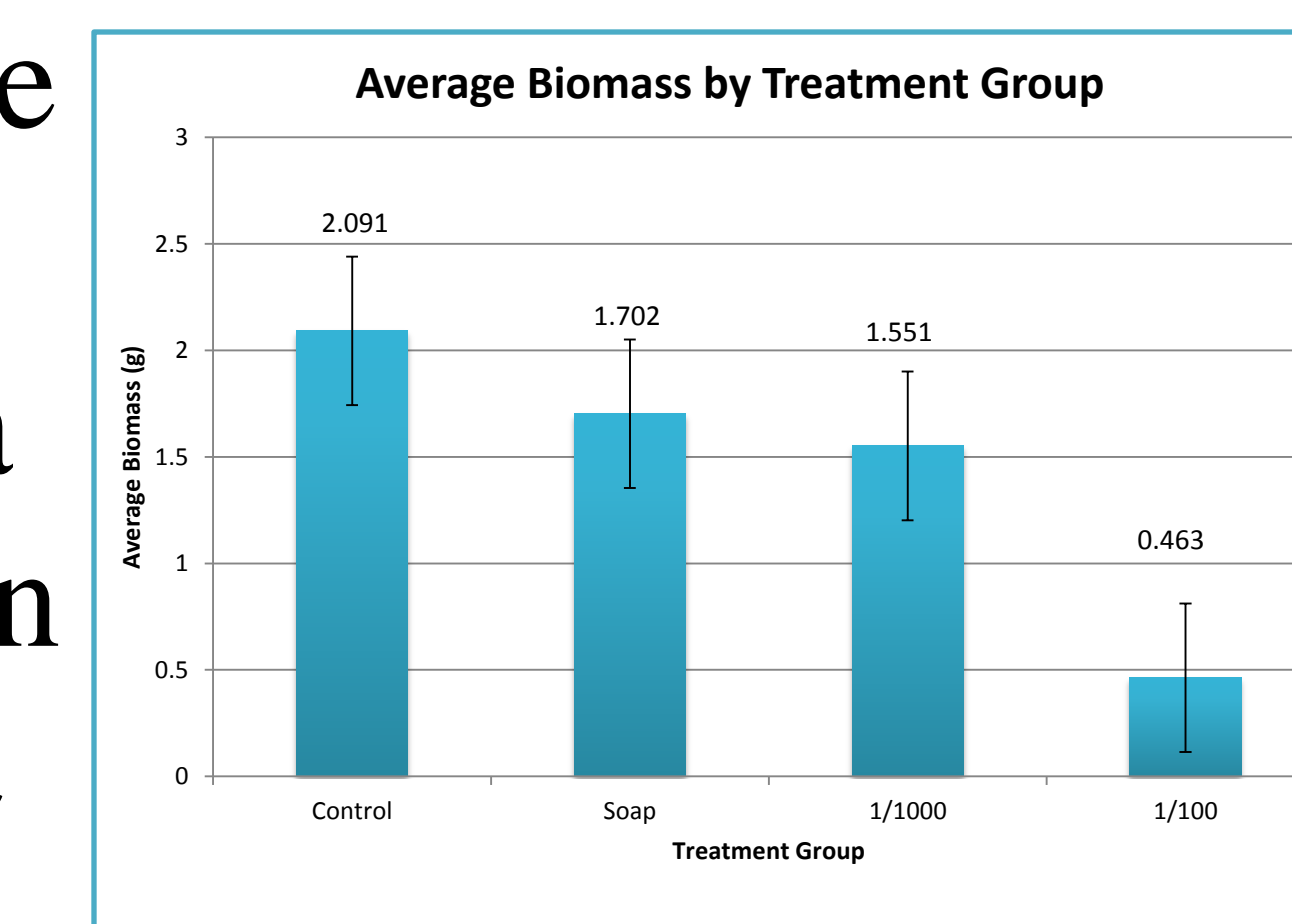


Figure 4: Error bars display the significance.