Buffering the Bloom - The Effect of Nutrient Management Practices on Pond Eutrophication

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Fertilization of food crops is necessary to improve yields within the short growing season of the Red River Valley of North Dakota. Does nutrient management assist in the stability of pond ecosystems as measured in algae populations? Will nutrient management decrease duration and algae growth in water bodies? I hypothesize increased nutrient management provided by buffer strips will decrease time to peak algal bloom, decrease duration of algal bloom, and reduce dried biomass of algal populations. Ankistrodesmus and Chlorella were tested using 2.0x dilution series with pond water, simulated run-off from bare field and simulated run-off from field with buffer zone. Dissolved oxygen was monitored daily as a measure of the growth and decline of the photosynthetic algae. Parabolic curves were fit using regression analysis. Both algae average days to peak oxygen for the grass buffer was 6.77 days while the control and bare soil were 6.37 and 8.55 days respectively. Average dried biomass of Ankistrodesmus/Chlorella with buffer was 0.072 grams/0.089 grams while the control was 0.071 grams/0.070 grams and the bare soil was 0.251/0.252 grams. One way ANOVA testing indicates differences in dried biomass was statistically significant at the 0.05 level between the grass buffer and the bare soil at 0.05 level. Ankistrodesmus algae and Chlorella algae population growth were both buffered in serial dilutions of grass buffer run-off indicating fewer nutrients reaching the aquatic ecosystem -minimizing cultural eutrophication caused by agricultural fertilization.

Awards Won:

Drexel University: Full tuition scholarship $250,000

Arizona State University: Arizona State University Intel ISEF Scholarship