The Effects of Soil pH on Pontederia Cordata at Lake Waco Wetlands

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Abstract

The objective of this experiment was to find out how pH affected Pontederia cordata (Pickerelweed) growth. Pickerelweed plants were uprooted and taken from Lake Waco Wetlands and then transferred into six mesocosms.(Fig. 2) The pH was adjusted to three different levels, a specific pH per mesocosm. The three different pH levels measured at a pH of 6, 7 and 8. The pH was measured and adjusted each week to maintain the mesocosm's controlled environment. Along with measuring the pH level weekly, the average number of leaves and leaf lengths were noted. Each week, measurements were graphed, in which it was seen that certain pH environments were more favorable for optimum growth. This showed an important relationship between pH and Pontederia cordata growth that would require further testing for accuracy.

Figure 1. Uprooting Pickerelweed

Figure 2. Mesocosms

Introduction

Wetlands are important because they cleanse our water and control and migrate floods. Pontederia cordata (pickerelweed) help sustain the wetlands so their optimal pH growth would be important to understand. Lie has stated that, " it has been said that on transferring plants from a neutral culture solution to an acidic solution of pH of 4.5 at different periods of time...nodulation is reduced when the exposure to low pH takes place." In other words, the Pickerelweed will not have healthy growth in an acidic environment. The hypothesis was that the Pontederia cordata would grow best in the neutral pH. The experiment was designed to test Pickerelweed growth at different pH levels.

Materials and Methods

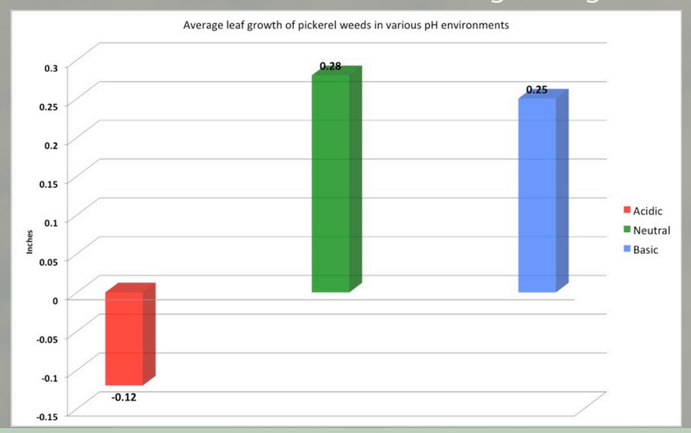
- Six 20 L mesocosms. We filled the containers with 10 L of soil that we dug up at the wetland and the other half of the container was filled with water from the Lake Waco Wetland.
- We collected whole Pontederia cordata plant from the Lake Waco Wetlands and transplanted them into the mesocosms. (Fig. 1) Each mesocosm had 5 plants. The plants had to sit in the mesocosms to adjust to their new environment.
- We added in the acidifier which had a sulfur component and lime to make the mesocosms more basic or acidic. We had to add these to the soil and let them sit in order for the pH to become balanced.
- The soil pH in each mesocosm was set to a pH of 6, 7 and 8. There was a replicate for each pH value.
- Each week plants were measured for soil samples, pH values, and the water was maintained. (Fig. 3 & 4)

Figure 3. measuring and maintaining plant growth

Figure 4. maintaining soil pH

Results

The pickerelweed was affected differently in each of the mesocosms. The neutral and basic mesocosms growth rate were similar so either could be optimal growth. The acidic mesocosm varied from the others because the pickerelweed shriveled it showed negative growth.



Conclusions and Discussion

After three weeks of tests the hypothesis was proven correct; the optimal pH for Pontederia cordata growth is the neutral pH environment of 7. Although a neutral pH yields the best average growth, tests also demonstrated that an alkaline environment with a pH of 8 could also be a suitable point for Pontederia cordata growth with the average growth being nearly identical to that of plants in a neutral pH environment.

The relationship between the pH and the average growth of the Pontederia cordata was very apparent even with a simple visual inspection. The pickerelweeds in the acidic environment were shriveled and appeared to be dying due to the high acidity. The soil itself was very clunky and unsuitable for proper distribution of nutrients for the plants anchoring in it (Lie t. 2005). In contrast, the plants living in environments with a neutral pH of 7 and alkaline pH of 8 promoted a positive trend in growth with an average increase of .28 and .25 inches respectively. This could be explained by a the positive environment that promotes the intake of soluble nutrients as opposed to the acidic environment that promotes the formation of insoluble compounds with aluminum and iron (Campbell 2010). This tested range could be applied when new colonies of Pontederia cordata are being planted in different areas of the Lake Waco Wetlands in which pH could vary.

Literature Cited

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