Phosphorus availability in soils along the riparian buffer of the Mad River in Vermont

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Introduction

Phosphorus is a macronutrient needed by plant to grow. Because phosphorus is one of the main ingredients of fertilizer, it is present in the water and watersheds and affects the water quality. Particle size distributions plays an essential role in the movement of nutrients in the soil.

As the particle size changes it can increase or decrease the surface area. The increase in surface area has an important implication in nutrient management because it provides many places for soil particles to retain and supply nutrients (such as calcium, potassium, magnesium, phosphate) and water for plant uptake (University of Hawai'i, 2014). Based on these observations, we expect to find a higher concentration of total phosphorus and plant-available phosphorus in the soils with finer texture. The relationship between soil texture and nutrient availability is crucial to study because it can give us an idea of how phosphorus is moving toward the river and successively to the Lake Champlain. The P concentration of riparian soils is an important factor to consider when evaluating potential P loading from overland flows and streambank erosion (E.O. Young, et al. 2012).

Objective of this experiment

- Compare the concentration of total phosphorus and plant-available phosphorus in the different soil texture present in the Mad River buffer

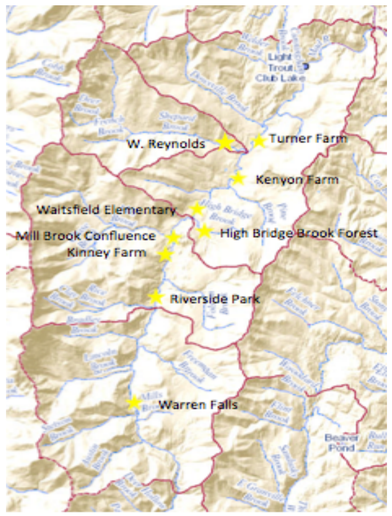
Methods

Field Methods

After acquiring permission from the owners, the locations were visited and a transit was created. Measuring 1 meter away from the erosion bank is how the transit was made. The samples were taken at four different depths using an agar. The depths were: 0-15cm, 15-30cm, 30-60cm and 60-90cm.

Laboratory Methods

Sample were dried and sieved though a 2mm screen. Particle Size Distribution analysis was done to determine the soil texture of the samples (sand, clay and silt content). Plant-available phosphorus was determined with a Modified Morgan extractable phosphorus (MM-P) and Total Phosphorus (TP) was determined with a Inductively Coupled Plasma after microwave digestion.



Site Locations in Mad River, Vermot

Results

9 transects were sampled in the 9 fields.
A total of 72 samples were taken.

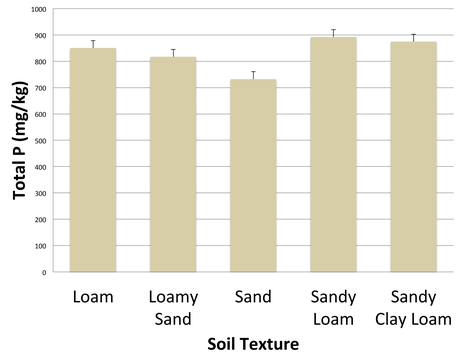


Figure 1. Average Total Phosphorus for the different soil textures

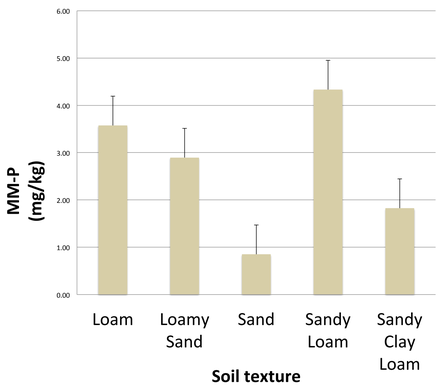
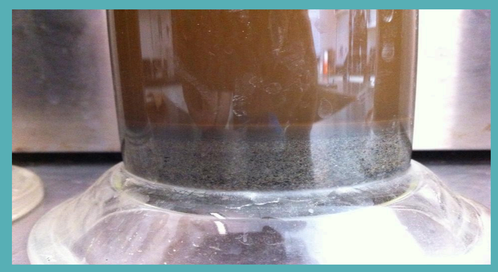


Figure 2. Average Plant-Available Phosphorus for the different soil textures



Conclusions

- Most of the phosphorus (MM-P and Total P) was found in the Sandy Loam texture.
- As expected, the least amount of phosphorus (MM-P and Total P) was found in the Sand texture, this because of the reduced surface area.

Literature cited

E.O. Young, D.S. Ross, C. Alves, and T. Villars. (2012). *Soil and landscape influences on native riparian phosphorus availability in three Lake Champlain Basin stream corridors.* Journal of soil and water conservation Vol. 67, No. 1 p. 3

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