Dhruv Param, Future Leader Academy, Fredon, NJ
Nandini Menon, Advisor/Mentor - New Jersey Institute of Nature
Dr. Steve Komar, Rutgers University Extension Consultant, New Brunswick, NJ
Reviewed by Dr.Mansoor Amiji, Professor, Northeastern University, Boston, MA
Reviewed by Dr.Barbara Schmidt, Metuchen, NJ
New Jersey Institute of Nature

## Background

Farm lands and agricultural practices have a vital role in mitigating the harmful effects of Climate Change. The presence of organic content in soil effects soil structure, water quality and the nutrients in both media. Pasture management includes maintaining the soil nutrients to enable healthy plant growth, Pastures with an average pH of 6.6 is ideal for nutrient utilization to promote pasture growth and production (Mickel, 1994).

## Purpose of the Study

The purpose of this study is to understand the effect of equine activity on nitrogen levels in the soil and water.

## Variables

- Soil samples from three paddocks were chosen.
- Paddock 5 - Nearest paddock to the lake; not as much horse manure
- Paddock 6 - In between Paddock 5 and 8; more horse manure than Paddock 5
- Paddock 8 - Farthest paddock from the pond

## Measures

Two samples from each paddock were taken, and mixed together. Next the soil was filtered to remove organic matter, stones such that a fine soil mix remained. 50 ml of the soil was mixed with 250 ml of distilled wate. The solution was stirred for 5 minutes. The soil solution was stored for 1 hour .

**Rapitest Soil test**

- The test uses a patented 4 chamber device called color comparators - one each for pH, Nitrogen, Phosphorus and Potash. The test involves comparing the color of the water tested to a color chart.

- **Water Quality test:** Water test strips that tested 16 items - Total alkalinity, pH, hardiness, Cyanuric acid, total chlorine, free chlorine, Bromine, Nitrate, Nitrite, Iron, Chromium, Lead, Copper, Mercury, Fluoride, and Carbonate root.
- **Testing conditions:** Ambient temperature
- **Plant Etymology**
- Plants in the paddock are identified using the Picture This app.
- **Plant Etymology in paddocks tested** Plants found in the paddocks include white clovers, plantains, and St. Augustine grass.

- **pH scale** - 7.5 Alkaline; 7.0 - neutral; 6.5 - slight acidic; 6.0 - acidic; 5.5 - acidic; 5.0 - very acidic; 4.5 - very acidic.
- **N Test -** N4- surplus; N3 - sufficient; N2- adequate; N1 - Deficient; No - Depleted.
- **P Test -** P4 - surplus; P3 - sufficient; P2 - adequate; P1 - deficient; P0 - depleted
- **K Test -** K4 - surplus; K3 - sufficient; K2 - adequate; K1 - deficient; K0 - depleted

## Experimental Method

EXPERIMENTAL METHOD

**SOIL**

Phase 1 - Soil samples were taken from specific paddocks and pictures of the plant species in the area of soil samples.

Phase 2 - Soil samples were again taken from specific paddocks and pictures of the plant species in the area of soil samples after rainfall.

**WATER**

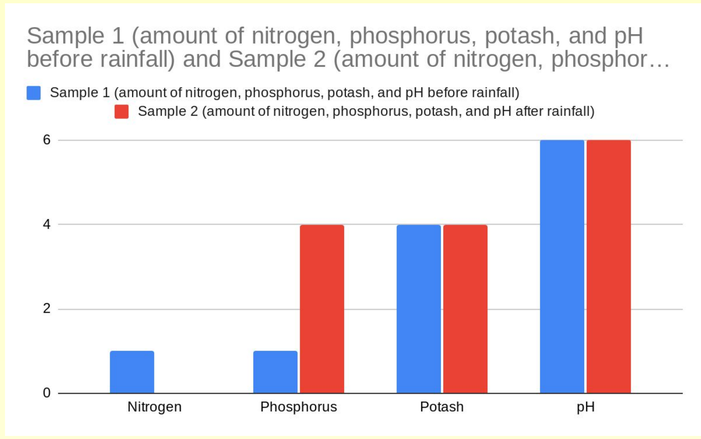
Water samples were taken from the edge of the pond and the center of the small and big pond.

## Results

**Sample 1 and 2**

In the graph below, it shows the amounts of nitrogen, phosphorus, potash, and pH of each two samples taken from paddock 5 before and after rainfall.

(The N test is for nitrogen, the P Test is for phosphorus, and the K test is for potash. For example, a P1 would be represented as a 1 on the y-axis.)




## Discussion

At the beginning of the experiment, it was hypothesized that traces of nitrogen and phosphorus would be closest near nitrogen-fixing plants or manure from horses. This hypothesis was influenced mostly by prior learning about nitrogen-fixing plants.

## References

1. Ms. Nandhini Menon
2. Rutgers.edu

## Conclusion

In conclusion, the nitrogen from sample 1 was completely depleted, the phosphorus was deficient, and the potash was found in abundance. In the second sample, however, there was a slight amount of nitrogen, a spike in phosphorus, and the amount of potash remained the same. What can be concluded from these results is that wherever the second sample was taken, it had either more nitrogen-fixing plants or horse manure in its surrounding area.

## Recommendations

In order to make the soil quality better, it is recommended to put nitrogen-fixing plants, such as Rizobia, spread out across the land. Break down horse manure when excreted; don't leave it as it is.