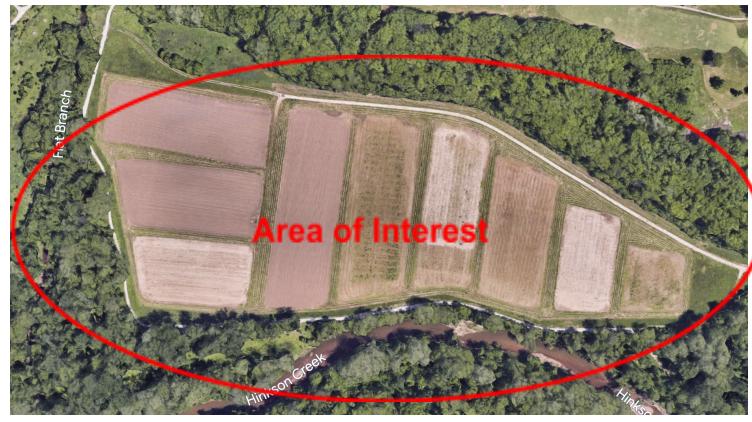


> SITE CHARACTERIZATION OF ROLLINS FARM

- Bulk Density = 1.43 g/cm³
- Organic Matter = 2.20%
- Frequently flooded by Hinkson Creek
- Restrictive layer at 80 inches
- 0-3% slope in fields of interest
- Classified as Haymond silt loam



Lower Farm and Hinkson Creek

> NUTRIENT MANAGEMENT PLAN BASED ON CORN GROWING REQUIREMENTS

This is intended for application to the lower cropping areas only

- Urea will be applied in liquid form to the soil in the fall or late spring before planting the seed
- Based on a 2% mineralization rate and 65% N use efficiency, there will need to be an application of approximately 350 lbs/ acre of land intended for corn (calculations pgs 1,2,3)
- Based on a 2% mineralization rate, 15% use efficiency, and 30mg P/ kg dry soil the soil will have enough phosphorus present for the corn to grow without the application of fertilizer (calculations pgs 4,5)
- During a drought season, there will be a total overapplication of Urea. The entire 350lbs/acre would not be needed (calculations pg 3)

> CONSERVATION MANAGEMENT PLAN

Since the area is a natural flood plain it is important to reduce the amount of runoff and erosion that will occur. Nitrate has been identified as a major source of freshwater contamination because it is mobilized by the presence of water (Nouri et al., 2022). Most leaching occurs after fall crops are harvested (SARE, 2022). The water from the field drains into the creek that runs beside the fields. Ensuring as little damage to the natural ecosystems present near the field is the top priority. Another concern is the cost of the fertilizer application. A very high rate of 350 lbs/acre was calculated. The current price of Urea fertilizer is \$27.00 for a fifty-pound bag or \$189/acre on this farm (Master Landscape Design, 2023). This is expensive and reducing the cost would be of economic interest to the farm.

- GOALS:



Flooded Corn Field 2021

- Prevent nitrate from leaching into Hinkson Creek
- Prevent erosion
- Reduce the overall cost of N fertilizer applications required
- **SOLUTIONS:**
 - Implement a cover crop system to prevent runoff and erosion
 - Introduce a crop rotation that includes a nitrogen-fixing plant species to reduce the cost of fertilizer each year

I plan to introduce cereal rye as a cover crop. This will reduce the leaching of nitrate by 60% and prevent erosion (SARE, 2022). As we learned in class keeping roots in the ground is one of the most important aspects of preventing erosion. It causes the soil to aggregate thus decreasing the likelihood of topsoil being carried off by rainfall. Planting cereal rye directly after the harvest of the corn will create these aggregates while also scavenging for the nitrate residual. This crop will also not need to be fertilized with N or P for our desired results. It will then be killed via rolling/crimping. The biomass left over will decompose and release its scavenged nutrients back into the soil (SARE, 2022). Another way that I plan to increase the available nitrogen in the soil is by introducing a crop rotation. According to the University of Missouri Extension website, soybeans can fix anywhere from 30-50 pounds of nitrogen per acre. This will drastically reduce the amount of nitrogen fertilizer needed the following year. Overall, both of these new additions will drastically improve the economic and environmental health of the farm and Hinksons Creek.

> INTEGRATED NUTRIENT MANAGEMENT-CONSERVATION PLAN

- **CONSIDERATIONS:**
 - Calculate the amount of P fertilizer required for the soybeans
 - Look at the amount of N fertilizer now needed along with the new cost per acre

When looking into the considerations for extra phosphorus fertilizer required for the addition of soybeans there would be no need to add anything to the soil for two rotations of corn and soy since the existing levels are so large in the soil (calculations pg 6). The addition of the scavenging cereal rye and N-fixing soybeans would reduce the amount of nitrogen fertilizer to 189 lbs urea/acre (calculations pg 6). Cutting the cost by 54% for the fertilizer requirements of the corn crop. “N is now,” so this is a vital component to ensuring the crops receive their optimum nutrients at the correct time in the season. Overall, this is a drastic saving that will also help reduce the amount of nitrate running into the creek and ensure that the nitrogen is where it needs to be at the right time.

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