

## Subsurface Tile Drain Sampling Projects - Middlebury Location

PI: Jeff Carter, UVM Extension Agronomist

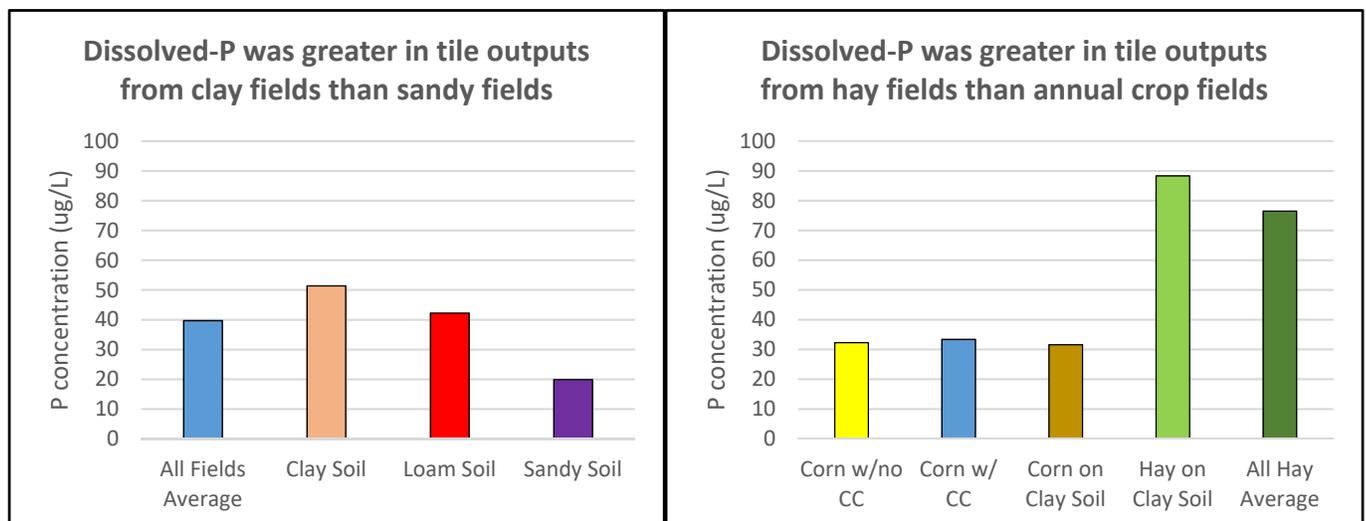
Staff: Nathaniel Severy and Kristin Williams, Agronomy Outreach Professionals

### Overview of UVM Extension Sampling

- 10 locations spread out through Addison County, VT and vary in soil type, crop rotation, nutrient management, and farm management. All sites are systematically tiled with all tiles buried at least 3 feet below the surface using plastic corrugated piping. Samples taken bi-weekly.
- This project is part of a larger effort with UVM Extension in St Albans and VACD with approximately 40 different outlets that are being monitored and sampled.
- If the outlet is not running or flow is too low to accurately sample, we still record weather and soil conditions. Our sampling route takes approximately 5 hours to complete roundtrip. Samples are driven up to UVM to be analyzed within several days of being taken.
- Sample for Total Phosphorus, Dissolved Phosphorus, Nitrates, Turbidity, and instantaneous flow.
- With 1 year of sampling, we have collected 408 samples from 136 sampling times.

### Initial Findings - 2018

- Majority of values hover in the 20-40 ug/L (ppb) range during non-storm or thawing events.
- High values: highest reading was recorded on November 6 on a 5 yr-old hay field with clay soil and aerway incorporated manure applications in summer with available soil test P of 3 (low) and reserve P of 22.
- Low values: Lowest reading was recorded on February 15 on 40 yr-old continuous corn with sand soil, spring manure and disk incorporation of manure, fall cover crop, and light rate of fall manure to help the cover crop establishment with Soil Test P of 56 (Very High) and Reserve P of 197. This field was used for 2018 application of Phos-Cap materials to reduce water soluble P.
- Nitrates: appears to be a clear connection to soil type and N (which we knew). Sand always has highest values while clay is always extremely low values.
- Clay sites most likely have highest TP and DP values because of particle size and shrink-swell. It is possible that disruption with tillage of preferential flowpath (macropores and cracks) reduces TP and DP concentrations during high flow events compared to long term hay fields where macropores remain intact.



### Other Tile Drainage Research in Addison County area

- UVM Dr. Don Ross and Dr. Joshua Faulkner

Two tile outlets draining a newly tiled clay field have been monitored since April 20, 2018. These outlets split the field in half, and allow for a 'paired-watershed' approach. Each outlet drains about 28 acres, and fields do not contain any surface inlets to the tile systems. Virtually no flow occurred during July-October because of the dry conditions. Tiles are still flowing as of 2/10/2019. The highest flow to date was from the heavy rains just after Thanksgiving. Analysis of total P is in progress. Soluble P in the spring 2018 samples fluctuated between 30-40 ug/L. Monitoring will continue to establish a baseline before comparing agronomic treatments. Stations for monitoring the surface runoff from a portion of each of the paired fields will be installed this summer to allow a full comparison of how field and nutrient management practices affect both subsurface and surface loss of P.



- Stone Environmental

3 sites (that I know of) in Addison county- Ferrisburg (same site that we sample), Panton, and Bridport. They continuously monitor flow with a flow meter and automatic sampling that aggregates samples within a sampling period. This is a follow-up project to the one they conducted in St. Albans bay watershed.