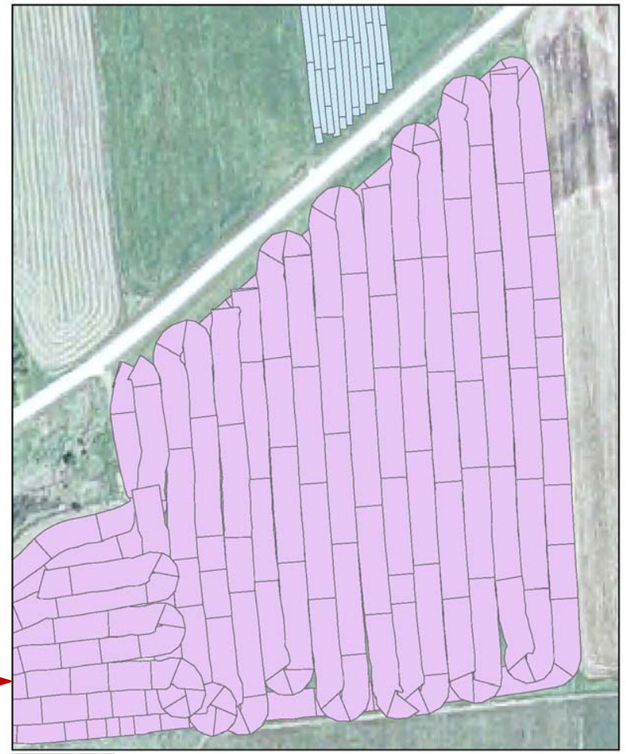
As planned on GIS in the office

Actual coverage of aeration tillage as downloaded from on-tractor GPS (FM750)

The farmer at the Addison site, Doug Gould, used the FM-750 GPS steering guidance unit that we provided to track aeration tillage activities in the field. As a result, he has purchased his own GPS guidance system to use while aerating or during fertilizer application to improve field efficiency of machinery operations.

Fertilizer application coverage as downloaded from on-tractor GPS (FM750). Application width is set on the GPS unit



AERATION TILLAGE & PRECISION AG FIELD DAY

AUGUST 2, 2016 * Doug Gould Farm

By Rico Balzano, UVM Extension Agronomy Outreach Professional

In the Champlain Valley of Vermont, Vergennes and Covington clay soils used for grass hay production are subject to soil compaction over time as equipment travels over the crop for multiple passes for maintenance and harvest operations. The Champlain Valley Crop, Soil, & Pasture Team received a Northeast SARE grant to investigate the potential benefits of regular and consistent aerator use on permanent hay fields to help alleviate compaction and maintain consistent yields over time. Three field sites were selected in Bridport and Addison to impose repeated aeration tillage treatments using a Gen-Till aerator, a single-axle Aerway, or a double-axle Aerway aerator tillage implement. Data was collected in 2014, 2015 and for the first cut of 2016 at the Addison site; and 2014 and for the first cut of 2015 at the Bridport site.

Treatments at the Addison site were no aeration, aerated one year (2014), and aerated two years (2014-15). The 2015 growing season was unusually wet in June with over 8.5" of rain. The aeration appears to have negatively affected yield in the saturated conditions of that growing season (see chart 2). The negative affect on yield carried over to 2016 (see chart 1). It is well known that clay soil is susceptible to compaction under saturated conditions, and these results are a prime example of that.

Chart.1: Two year Aeration results on first cut yields

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Aeration tillage at the Addison site was done with a Gen-till aeration toolbar three times in 2015. Total aeration treatments have been implemented eight times from fall 2013 through fall 2015 (2013-1x, 2014-4x, 2015-3x). Dry matter (DM) hay yields in 2014 at the Addison site were increased 37% and 40% at the Addison site by using aeration tillage. In 2015 there was only a 1% overall increase in the harvested yields between aerated and non-aerated plots. 2015 was very wet in June with over 8.5" of rain which compounded the low fertility regime used by the farmer leading to overall reduced yields. Increasing fertilization rates to meet UVM recommendations (150 lb/ac N) may have produced improved yield results (see charts 2,3).

Grass hay yields at the Bridport site were not significantly affected in 2014 following aerator tillage, but then resulted in 2015 first cut hay dry matter yield increases of 28% for single-axle and 11% for double-axle Aerway tillage treatments (see chart 4). Grass hay yield at the Addison site increased 38% by using aeration tillage in 2014 and was not significantly different in 2015.

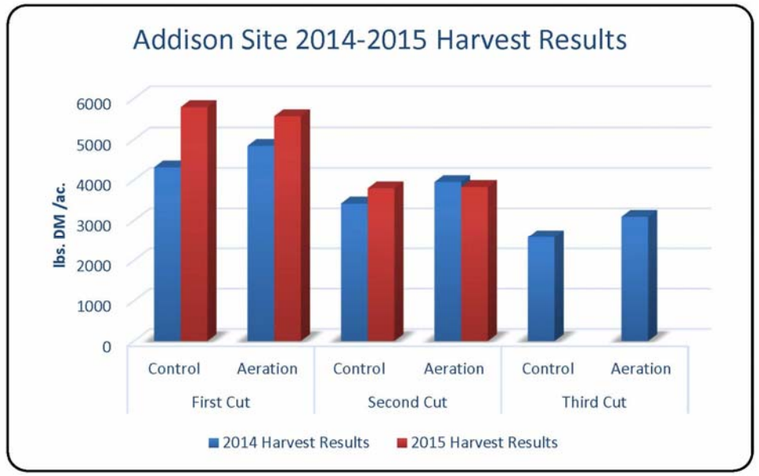


Chart 2: 2014-2015 Full season Addison site results

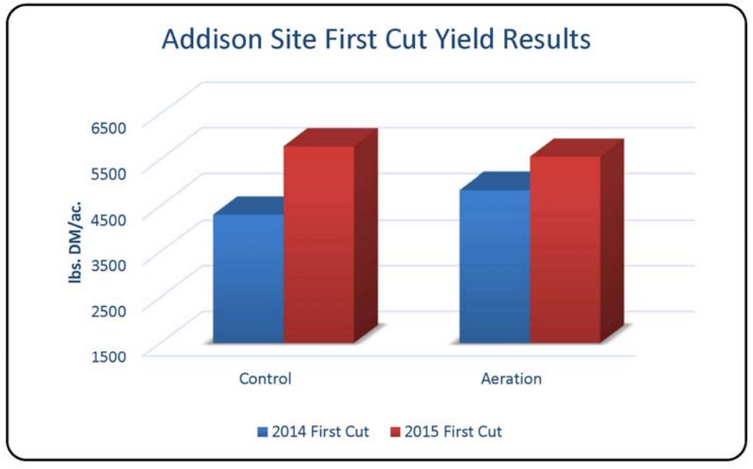


Chart 3: 2014-2015 Addison site results

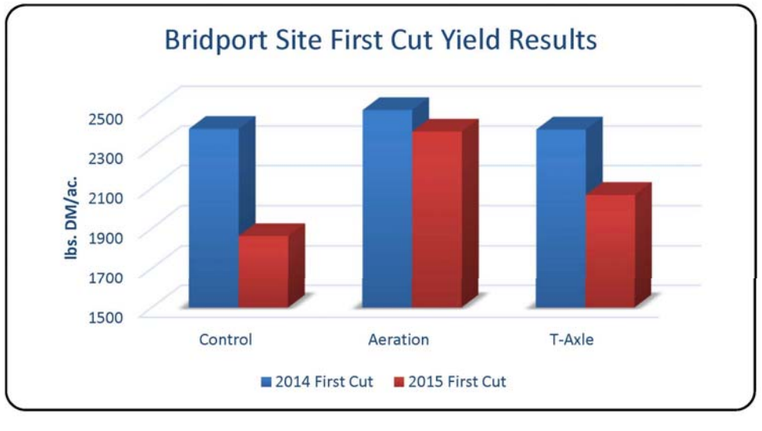
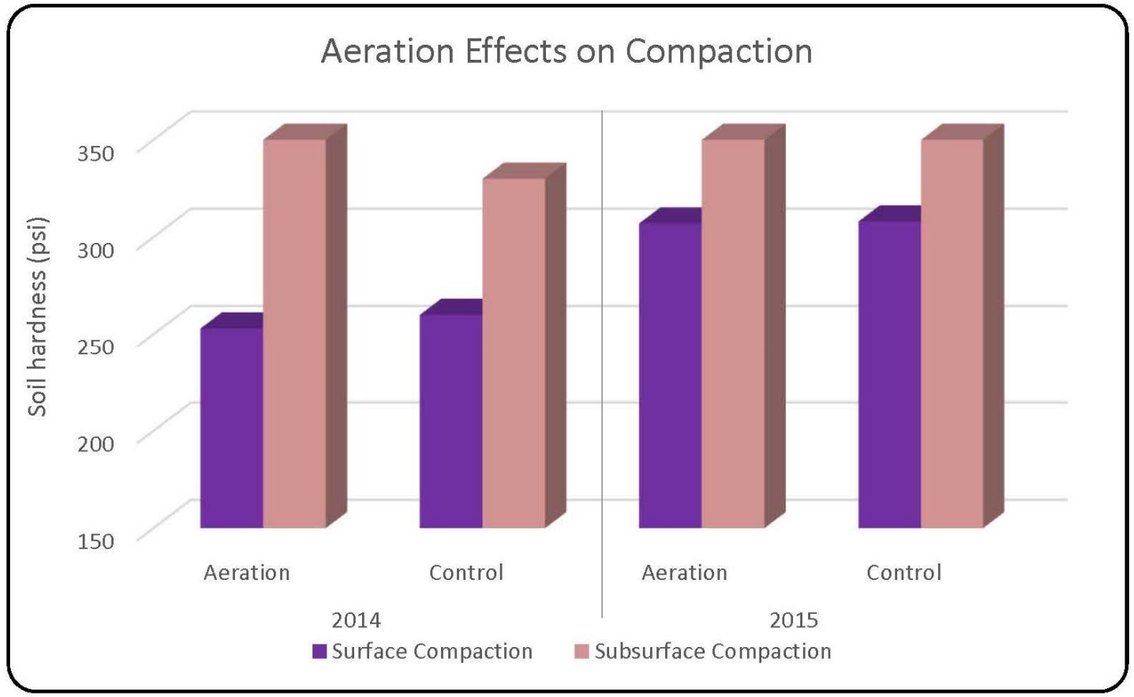


Chart 4: 2014-2015 Bridport site results



Soil samples were collected from each treatment block in November 2015 and sent to Cornell Soil Health Test lab for analysis. Soil compaction in the treatment areas was measured using a manual soil penetrometer to record the maximum pressure (psi) required to penetrate the soil from 0 to 6 inch depth and 6 to 18 in. depth as part of the Cornell Soil Health Test field procedures.

Surface compaction was not significantly different as a result of the aeration treatments. Subsurface compaction showed a slight increase under aeration, however aeration tillage is not expected to change soil compaction at that depth.

Tandem axel aerator at Bridport site.

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