Enhancing Forages with Nutrient Dense Sprays
2014 Trials

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The purpose of the Nutrient Dense Spray trial is to evaluate the efficacy of amending forages with foliar sprays. Twenty fourteen was the third year of the trial. The nutrient spray program was developed by Advancing Eco-Agriculture and consisted of five foliar sprays recommended for the farms participating in this study. In 2014, a sixth foliar spray, ‘Sea Shield’ was added to the study. The recommended spray program included applications of Rejuvenate in the early spring and late fall, and a combination of PhotoMag, Phosp horus, Potassium, MicroPak, and Sea Shield applied in the spring and after each cut of hay or graze (Table 1). This study was conducted based on farmer interest in enhancing nutrient density of forages through foliar sprays and was funded by the Lattner Foundation. Any reference to commercial products, trade names or brand names is for information only, and no endorsement or approval is intended.

Table 1. Information on Advancing Eco-Agriculture nutrient dense sprays.

<table>
<thead>
<tr>
<th>Spray</th>
<th>What is it?</th>
<th>What does it do?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rejuvenate</td>
<td>humic substance, carbohydrates, sea minerals</td>
<td>stimulates soil microbial life</td>
</tr>
<tr>
<td>PhotoMag</td>
<td>magnesium, sulfur, boron, cobalt, sea minerals</td>
<td>promotes chlorophyll and sugar production</td>
</tr>
<tr>
<td>Phosphorus</td>
<td>mined phosphate ore</td>
<td>improves photosynthesis and plant root vigor</td>
</tr>
<tr>
<td>Potassium</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MicroPak</td>
<td>boron, zinc, manganese, copper, cobalt, molybdenum, sulfur</td>
<td>enhances sugar translocation, root strength, and plant immunity</td>
</tr>
<tr>
<td>Sea Shield</td>
<td>crab and shrimp shell concentrate</td>
<td>enhance plant health and immune response</td>
</tr>
</tbody>
</table>

In 2014, forages were amended with nutrient dense sprays at two locations: Shelburne Farms in Shelburne, VT and Butterworks Farm in Westfield, VT. Both hayfields had been in native grass/legume mixture for numerous years. The nutrient recommendations from Advancing Eco-Agriculture are listed in Table 2. In order to understand what may cause a response, if any, we compared the recommended spray regime (‘All’) to individual components, as well as a control of water. The experimental design was a randomized complete block with four replications.

Table 2. Timing and amount of Nutrient Dense Sprays used.

<table>
<thead>
<tr>
<th>Timing</th>
<th>Recommendations (per acre)</th>
</tr>
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<tbody>
<tr>
<td>Early Spring</td>
<td>3 tons compost, 20 lb. Borate (10%), and 5 lbs. Zinc sulfate, 2 gal. Rejuvenate, 1 gal. Sea Shield</td>
</tr>
<tr>
<td>After Each Cut</td>
<td>1 gal. PhotoMag, 1 gal. Phosphorus, 1 quart Potassium, 2 quarts MicroPak, 2 quarts Sea Shield</td>
</tr>
<tr>
<td>Fall, post harvest</td>
<td>6 quarts Rejuvenate, 2-3 tons compost</td>
</tr>
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Six by ten foot plots were established in existing hay fields in 2012. The same plots were used in 2013 and 2014. Harvest and spray dates for each location are listed in Table 3. Plots were harvested with a BCS sickle bar mower (Portland, OR), raked by hand, gathered and weighed on a platform scale. A subsample was dried at 40°C and weighed to determine dry matter. Oven dry samples were coarsely ground with a Wiley mill (Thomas Scientific, Swedesboro, NJ), finely ground with a UDY cyclone mill with a 1 mm screen (Seedburo, Des Plaines, IL) and
analyzed with an NIRS (Near Infrared Reflectance Spectroscopy) DS2500 Feed and Forage analyzer (FOSS, Eden Prairie, MN) at the University of Vermont Cereal Testing Lab (Burlington, VT). Results were analyzed with an analysis of variance in SAS (Cary, NC).

Table 3. Harvest and spray dates at each location.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Butterworks Farm</th>
<th>Shelburne Farms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spray Spring Treatments</td>
<td>8-May</td>
<td>7 &amp; 9-May</td>
</tr>
<tr>
<td>1&lt;sup&gt;st&lt;/sup&gt; Cut</td>
<td>6-Jun</td>
<td>27-May</td>
</tr>
<tr>
<td>Spray All Treatments</td>
<td>17-Jun</td>
<td>4-Jun</td>
</tr>
<tr>
<td>2&lt;sup&gt;nd&lt;/sup&gt; Cut</td>
<td>3-Jul</td>
<td>30-Jun</td>
</tr>
<tr>
<td>Spray All Treatments</td>
<td>14-Jul</td>
<td>8-Jul</td>
</tr>
<tr>
<td>3&lt;sup&gt;rd&lt;/sup&gt; Cut</td>
<td>6-Aug</td>
<td>6-Aug</td>
</tr>
<tr>
<td>4&lt;sup&gt;th&lt;/sup&gt; Cut</td>
<td>24-Sep</td>
<td>None</td>
</tr>
</tbody>
</table>

Forage samples were dried, ground and analyzed for quality characteristics including crude protein (CP), acid detergent fiber (ADF), neutral detergent fiber (NDF) and various other nutrients. The Nonstructural Carbohydrates (NSC) were calculated from forage analysis data. Mixtures of true proteins, composed of amino acids and non-protein nitrogen make up the crude protein (CP) content of forages. The bulky characteristics of forage come from fiber. Forage feeding values are negatively associated with fiber since the less digestible portions of the plant are contained in the fiber fraction. The detergent fiber analysis system separates forages into two parts: cell contents, which include sugars, starches, proteins, non-protein nitrogen, fats and other highly digestible compounds; and the less digestible components found in the fiber fraction. The total fiber content of forage is contained in the neutral detergent fiber (NDF). Chemically, this fraction includes cellulose, hemicellulose and lignin. Recently, forage testing laboratories have begun to evaluate forages for NDF digestibility. Evaluation of forages and other feedstuffs for NDF digestibility is being conducted to aid prediction of feed energy content and animal performance. Research has demonstrated that lactating dairy cows will eat more dry matter and produce more milk when fed forages with optimum NDF digestibility. Forages with increased NDF digestibility (NDFD) will result in higher energy values, and perhaps more importantly, increased forage intakes. Forage NDF digestibility can range from 20 – 80%. The NSC or non-fiber carbohydrates (NFC) include starch, sugars and pectins.

Variations in yield and quality can occur because of variations in genetics, soil, weather and other growing conditions. Statistical analysis makes it possible to determine whether a difference among varieties is real, or whether it might have occurred due to other variations in the field. At the bottom of each table, a LSD value is presented for each variable (i.e. yield). Least Significant differences (LSD’s) at the 10% level of probability are shown. Where the difference between two treatments within a column is equal to or greater than the LSD value at the bottom of the column, you can be sure in 9 out of 10 chances that there is a real difference between the two varieties. Treatments that were not significantly lower in performance than the highest value in a particular column are indicated with an asterisk. In the example below, A is significantly different from C but not from B. The difference between A and B is equal to 1.5 which is less than the LSD value of 2.0. This means that these varieties did not differ in yield. The difference between A and C is equal to 3.0 which is greater than the LSD value of 2.0. This means that the yields of these varieties were significantly different from one another. The asterisk indicates that B was not significantly lower than the top yielding variety.
RESULTS AND DISCUSSION

Seasonal precipitation and temperature recorded at weather stations in close proximity to Westfield and Shelburne, VT are reported in Table 4. The temperature in Westfield was below the 30-year average for the growing season, while precipitation was above average. There were a total of 4694 GDDs (growing degree days), which is 222 GDDs below the average. In Shelburne, monthly temperatures were above the 30-year average for every month of the growing season except April. There were a total of 5567 GDDs, 226 GDDs above average. Warmer temperatures in Shelburne contributed to the earlier harvests of hay. There was over 3 inches of precipitation above the 30-year normal for April through July. However, August and September were dry, almost 4 inches below than the 30-year normal.

Table 4. Seasonal weather data collected near Westfield and Shelburne, VT, 2014.

<table>
<thead>
<tr>
<th>Westfield*</th>
<th>April</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>August</th>
<th>Sept</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Temperature (F)</td>
<td>39.4</td>
<td>53.6</td>
<td>62.9</td>
<td>67.2</td>
<td>64.6</td>
<td>57.4</td>
</tr>
<tr>
<td>Departure from Normal</td>
<td>-3.2</td>
<td>-1.2</td>
<td>-0.9</td>
<td>-0.8</td>
<td>-1.5</td>
<td>-0.9</td>
</tr>
<tr>
<td>Precipitation (inches)</td>
<td>3.04</td>
<td>5.39</td>
<td>4.45</td>
<td>5.85</td>
<td>4.83</td>
<td>2.73</td>
</tr>
<tr>
<td>Departure from Normal</td>
<td>0.23</td>
<td>1.72</td>
<td>0.49</td>
<td>1.52</td>
<td>0.22</td>
<td>-0.65</td>
</tr>
<tr>
<td>Growing Degree Days (base 32)</td>
<td>222</td>
<td>670</td>
<td>927</td>
<td>1091</td>
<td>1012</td>
<td>762</td>
</tr>
<tr>
<td>Departure from Normal</td>
<td>-101</td>
<td>-40</td>
<td>-27</td>
<td>19</td>
<td>-45</td>
<td>-28</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Shelburne*</th>
<th>April</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>August</th>
<th>Sept</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Temperature (F)</td>
<td>44.6</td>
<td>58.9</td>
<td>68.2</td>
<td>71.5</td>
<td>69.0</td>
<td>62.0</td>
</tr>
<tr>
<td>Departure from Normal</td>
<td>-0.20</td>
<td>2.60</td>
<td>2.40</td>
<td>0.90</td>
<td>0.20</td>
<td>1.50</td>
</tr>
<tr>
<td>Precipitation (inches)</td>
<td>3.66</td>
<td>3.94</td>
<td>4.35</td>
<td>5.54</td>
<td>2.05</td>
<td>1.63</td>
</tr>
<tr>
<td>Departure from Normal</td>
<td>0.84</td>
<td>0.49</td>
<td>0.66</td>
<td>1.38</td>
<td>-1.86</td>
<td>-2.01</td>
</tr>
<tr>
<td>Growing Degree Days (base 32)</td>
<td>378</td>
<td>834</td>
<td>1085</td>
<td>1223</td>
<td>1145</td>
<td>902</td>
</tr>
<tr>
<td>Departure from Normal</td>
<td>-5</td>
<td>81</td>
<td>71</td>
<td>26</td>
<td>6</td>
<td>45</td>
</tr>
</tbody>
</table>

*Data compiled from Northeast Regional Climate Center data from weather stations in Newport, VT and Burlington, VT. Historical averages for 30 years of NOAA data (1981-2010).

Results from Butterworks Farm in Westfield, VT

At Butterworks Farm in Westfield, VT, there was no statistical difference in yield among the nutrient dense sprays for first, second, third, or fourth cut forage harvest (Tables 5-8). First cut yields averaged 2323 lbs. acre⁻¹. Second cut yields were much lower than in the past, averaging just under 500 lbs acre⁻¹. This was likely because second cut was utilized as grazed feed instead of hay. Third and fourth cut averaged 909 and 1359 lbs acre respectively (Figure 1). Crude protein generally increased with each cut, averaging 16.0% for 1st cut, 19.2% for 2nd cut, 19.3% for 3rd cut, and down a bit to 18.2% for fourth cut. The only statistical difference in any parameter measured was in fourth cut starch levels (Table 8). Sea Shield and Micropak had higher starch levels than the other treatments. Overall, there were no differences in yield or quality of the hay harvests at Butterworks Farm from the nutrient dense sprays.
Table 5. First cut hay yield and quality, Westfield, VT, 6-Jun 2014.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>DM %</th>
<th>DM yield lbs. acre⁻¹</th>
<th>CP %</th>
<th>Starch %</th>
<th>ADF %</th>
<th>NDF %</th>
<th>NFC %</th>
<th>NDFD %</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>16.5</td>
<td>2187</td>
<td>15.7</td>
<td>2.2</td>
<td>31.3</td>
<td>53.2</td>
<td>27.1</td>
<td>54.8</td>
</tr>
<tr>
<td>Control</td>
<td>15.9</td>
<td>2083</td>
<td>16.3</td>
<td>2.1</td>
<td>29.9</td>
<td>51.2</td>
<td>28.0</td>
<td>54.0</td>
</tr>
<tr>
<td>MicroPak</td>
<td>17.4</td>
<td>2199</td>
<td>15.6</td>
<td>2.4</td>
<td>30.6</td>
<td>52.8</td>
<td>27.5</td>
<td>53.1</td>
</tr>
<tr>
<td>Phosphorus</td>
<td>16.9</td>
<td>2210</td>
<td>15.9</td>
<td>2.2</td>
<td>30.3</td>
<td>52.1</td>
<td>27.7</td>
<td>55.6</td>
</tr>
<tr>
<td>PhotoMag</td>
<td>17.0</td>
<td>2034</td>
<td>16.7</td>
<td>2.1</td>
<td>30.1</td>
<td>51.6</td>
<td>27.8</td>
<td>55.1</td>
</tr>
<tr>
<td>Potassium</td>
<td>16.7</td>
<td>2368</td>
<td>16.1</td>
<td>2.1</td>
<td>30.5</td>
<td>52.2</td>
<td>27.4</td>
<td>56.2</td>
</tr>
<tr>
<td>Rejuvenate</td>
<td>15.8</td>
<td>2671</td>
<td>15.6</td>
<td>2.0</td>
<td>31.3</td>
<td>53.5</td>
<td>27.1</td>
<td>55.2</td>
</tr>
<tr>
<td>Sea Shield</td>
<td>16.6</td>
<td>2832</td>
<td>16.0</td>
<td>2.2</td>
<td>30.5</td>
<td>51.7</td>
<td>27.0</td>
<td>54.9</td>
</tr>
<tr>
<td>Trial Mean</td>
<td>16.6</td>
<td>2323</td>
<td>16.0</td>
<td>2.2</td>
<td>30.6</td>
<td>52.3</td>
<td>27.5</td>
<td>54.9</td>
</tr>
<tr>
<td>LSD (p&lt;0.10)</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
</tbody>
</table>

NS - None of the varieties were significantly different from one another.


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<th>Starch %</th>
<th>ADF %</th>
<th>NDF %</th>
<th>NFC %</th>
<th>NDFD %</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>23.6</td>
<td>324</td>
<td>19.0</td>
<td>3.3</td>
<td>25.8</td>
<td>42.3</td>
<td>31.6</td>
<td>58.7</td>
</tr>
<tr>
<td>Control</td>
<td>22.9</td>
<td>491</td>
<td>19.4</td>
<td>3.2</td>
<td>24.5</td>
<td>40.5</td>
<td>32.7</td>
<td>58.6</td>
</tr>
<tr>
<td>MicroPak</td>
<td>24.0</td>
<td>539</td>
<td>19.5</td>
<td>3.2</td>
<td>25.5</td>
<td>41.3</td>
<td>32.4</td>
<td>57.4</td>
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<tr>
<td>Phosphorus</td>
<td>23.1</td>
<td>581</td>
<td>19.0</td>
<td>3.1</td>
<td>26.1</td>
<td>42.6</td>
<td>31.4</td>
<td>57.6</td>
</tr>
<tr>
<td>PhotoMag</td>
<td>23.9</td>
<td>544</td>
<td>19.4</td>
<td>3.1</td>
<td>25.9</td>
<td>41.7</td>
<td>32.1</td>
<td>58.5</td>
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<tr>
<td>Potassium</td>
<td>22.7</td>
<td>422</td>
<td>20.0</td>
<td>2.9</td>
<td>25.3</td>
<td>40.9</td>
<td>32.0</td>
<td>59.0</td>
</tr>
<tr>
<td>Rejuvenate</td>
<td>23.1</td>
<td>580</td>
<td>19.2</td>
<td>3.0</td>
<td>25.7</td>
<td>42.8</td>
<td>31.2</td>
<td>58.9</td>
</tr>
<tr>
<td>Sea Shield</td>
<td>23.4</td>
<td>382</td>
<td>18.5</td>
<td>3.2</td>
<td>25.7</td>
<td>43.0</td>
<td>31.6</td>
<td>59.7</td>
</tr>
<tr>
<td>Trial Mean</td>
<td>23.3</td>
<td>483</td>
<td>19.2</td>
<td>3.1</td>
<td>25.6</td>
<td>41.9</td>
<td>31.9</td>
<td>58.6</td>
</tr>
<tr>
<td>LSD (p&lt;0.10)</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
</tbody>
</table>

NS - None of the varieties were significantly different from one another.

Table 7. Third cut hay yield and quality, Westfield, VT, 6-Aug 2014.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>DM %</th>
<th>DM yield lbs. acre⁻¹</th>
<th>CP %</th>
<th>Starch %</th>
<th>ADF %</th>
<th>NDF %</th>
<th>NFC %</th>
<th>NDFD %</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>25.9</td>
<td>860</td>
<td>19.3</td>
<td>2.1</td>
<td>26.8</td>
<td>45.3</td>
<td>29.6</td>
<td>57.6</td>
</tr>
<tr>
<td>Control</td>
<td>25.6</td>
<td>1008</td>
<td>20.1</td>
<td>2.9</td>
<td>24.7</td>
<td>40.6</td>
<td>31.5</td>
<td>54.8</td>
</tr>
<tr>
<td>MicroPak</td>
<td>27.4</td>
<td>775</td>
<td>19.5</td>
<td>2.7</td>
<td>26.4</td>
<td>44.1</td>
<td>29.7</td>
<td>56.2</td>
</tr>
<tr>
<td>Phosphorus</td>
<td>23.3</td>
<td>815</td>
<td>19.3</td>
<td>2.4</td>
<td>26.3</td>
<td>45.2</td>
<td>30.1</td>
<td>56.1</td>
</tr>
<tr>
<td>PhotoMag</td>
<td>23.5</td>
<td>892</td>
<td>18.0</td>
<td>2.8</td>
<td>27.5</td>
<td>45.8</td>
<td>29.2</td>
<td>57.9</td>
</tr>
<tr>
<td>Potassium</td>
<td>22.7</td>
<td>1033</td>
<td>19.6</td>
<td>2.2</td>
<td>26.8</td>
<td>45.3</td>
<td>28.9</td>
<td>54.6</td>
</tr>
<tr>
<td>Rejuvenate</td>
<td>24.7</td>
<td>988</td>
<td>20.3</td>
<td>2.6</td>
<td>25.9</td>
<td>42.8</td>
<td>30.4</td>
<td>55.7</td>
</tr>
<tr>
<td>Sea Shield</td>
<td>24.6</td>
<td>903</td>
<td>18.2</td>
<td>2.6</td>
<td>26.5</td>
<td>46.4</td>
<td>29.6</td>
<td>58.1</td>
</tr>
<tr>
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<td>24.7</td>
<td>909</td>
<td>19.3</td>
<td>2.6</td>
<td>26.4</td>
<td>44.4</td>
<td>29.9</td>
<td>56.4</td>
</tr>
<tr>
<td>LSD (p&lt;0.10)</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
</tbody>
</table>

NS - None of the varieties were significantly different from one another.
Table 8. Fourth cut hay yield and quality, Westfield, VT, 24-Sep 2014.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>DM %</th>
<th>DM yield lbs. acre⁻¹</th>
<th>CP %</th>
<th>Starch %</th>
<th>ADF %</th>
<th>NDF %</th>
<th>NFC %</th>
<th>NDFD %</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>29.9</td>
<td>1327</td>
<td>18.2</td>
<td>2.9</td>
<td>26.7</td>
<td>45.8</td>
<td>29.5</td>
<td>56.1</td>
</tr>
<tr>
<td>Control</td>
<td>28.3</td>
<td>1384</td>
<td>17.9</td>
<td>3.4</td>
<td>26.4</td>
<td>44.2</td>
<td>31.4</td>
<td>54.5</td>
</tr>
<tr>
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<td>30.0</td>
<td>1717</td>
<td>17.0</td>
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<td>28.9</td>
<td>48.0</td>
<td>29.3</td>
<td>52.3</td>
</tr>
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<td>1459</td>
<td>18.9</td>
<td>3.0</td>
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<td>44.2</td>
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<td>55.3</td>
</tr>
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<td>1154</td>
<td>18.4</td>
<td>3.3</td>
<td>27.0</td>
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<td>29.6</td>
<td>54.6</td>
</tr>
<tr>
<td>Potassium</td>
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<td>1432</td>
<td>18.5</td>
<td>3.3</td>
<td>25.9</td>
<td>43.7</td>
<td>31.2</td>
<td>55.3</td>
</tr>
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<td>2.9</td>
<td>26.4</td>
<td>43.6</td>
<td>31.0</td>
<td>54.4</td>
</tr>
<tr>
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<td>29.0</td>
<td>1092</td>
<td>17.6</td>
<td>4.2*</td>
<td>27.1</td>
<td>45.9</td>
<td>30.6</td>
<td>53.7</td>
</tr>
<tr>
<td>Trial Mean</td>
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<td>1359</td>
<td>18.2</td>
<td>3.4</td>
<td>26.9</td>
<td>45.1</td>
<td>30.4</td>
<td>54.5</td>
</tr>
<tr>
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<td>NS</td>
<td>NS</td>
<td>0.79</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
</tbody>
</table>

*Varieties with an asterisk indicate that it was not significantly different than the top performer in column (in **bold**).

NS - None of the varieties were significantly different from one another.

**Figure 1.** Dry matter yields of hay and grazing, Westfield, VT, 2014.

**Results from Shelburne Farms in Shelburne, VT**

Similarly, at Shelburne Farms, there were no significant differences for yield or quality for first, second or third cut hay from the nutrient dense sprays (Tables 9-11). The only exceptions to this were first cut NDF and NFC; the Control and Potassium treatments had the lowest neutral detergent fiber (NDF) and the Control had the highest NFC, (Table 9). Dry
matter yields were highest for first cut, averaging 2270 lbs acre$^{-1}$ (Figure 2). Second and third cut yields averaged 1505 and 1827 lbs acre$^{-1}$, respectively. Average crude protein levels were highest for second cut, averaging 18.1%.


<table>
<thead>
<tr>
<th>Treatment</th>
<th>DM %</th>
<th>DM yield lbs. acre$^{-1}$</th>
<th>CP %</th>
<th>Starch %</th>
<th>ADF %</th>
<th>NDF %</th>
<th>NFC %</th>
<th>NDFD %</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
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<td>2379</td>
<td>12.3</td>
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<td>30.8</td>
<td>63.1</td>
<td>23.2</td>
<td>38.2</td>
</tr>
<tr>
<td>Control</td>
<td>15.9</td>
<td>2279</td>
<td>13.4</td>
<td>3.8</td>
<td>31.5</td>
<td>55.6*</td>
<td>27.2*</td>
<td>36.7</td>
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<td>13.2</td>
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<td>29.9</td>
<td>60.6</td>
<td>24.5</td>
<td>37.3</td>
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<td>2183</td>
<td>12.6</td>
<td>1.9</td>
<td>29.9</td>
<td>60.8</td>
<td>25.0</td>
<td>37.3</td>
</tr>
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<td>13.6</td>
<td>1.3</td>
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<td>61.8</td>
<td>24.0</td>
<td>36.9</td>
</tr>
<tr>
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<td>15.3</td>
<td>2228</td>
<td>14.0</td>
<td>1.6</td>
<td>29.1</td>
<td>58.8*</td>
<td>25.4</td>
<td>36.7</td>
</tr>
<tr>
<td>Rejuvenate</td>
<td>15.2</td>
<td>2177</td>
<td>12.1</td>
<td>1.7</td>
<td>30.6</td>
<td>63.3</td>
<td>23.4</td>
<td>39.2</td>
</tr>
<tr>
<td>Sea Shield</td>
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<td>2318</td>
<td>13.3</td>
<td>1.7</td>
<td>29.6</td>
<td>61.0</td>
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<td>15.6</td>
<td>2270</td>
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<tr>
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<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>3.97</td>
<td>1.70</td>
<td>NS</td>
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</tbody>
</table>

*Varieties with an asterisk indicate that it was not significantly different than the top performer in column (in bold). NS - None of the varieties were significantly different from one another.

Table 10. Second cut hay yield and quality, Shelburne, VT, 30-Jul 2014.

<table>
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<tr>
<th>Treatment</th>
<th>DM %</th>
<th>DM yield lbs. acre$^{-1}$</th>
<th>CP %</th>
<th>Starch %</th>
<th>ADF %</th>
<th>NDF %</th>
<th>NFC %</th>
<th>NDFD %</th>
</tr>
</thead>
<tbody>
<tr>
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<td>1420</td>
<td>18.7</td>
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<td>49.1</td>
<td>24.9</td>
<td>57.7</td>
</tr>
<tr>
<td>Control</td>
<td>22.1</td>
<td>1528</td>
<td>17.7</td>
<td>0.7</td>
<td>31.2</td>
<td>52.3</td>
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<td>57.2</td>
</tr>
<tr>
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<td>1377</td>
<td>18.5</td>
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<td>30.9</td>
<td>49.8</td>
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<td>1.2</td>
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<td>17.7</td>
<td>1.2</td>
<td>31.5</td>
<td>51.9</td>
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</tr>
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<td>1.2</td>
<td>31.0</td>
<td>51.0</td>
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<td>56.1</td>
</tr>
<tr>
<td>Trial Mean</td>
<td></td>
<td>21.7</td>
<td>18.1</td>
<td>1.2</td>
<td>31.0</td>
<td>50.7</td>
<td>24.1</td>
<td>57.3</td>
</tr>
<tr>
<td>LSD (p&lt;0.10)</td>
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<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
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</table>

NS - None of the varieties were significantly different from one another.

Table 11. Third cut hay yield and quality, Shelburne, VT, 6-Aug 2014.

<table>
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<tr>
<th>Treatment</th>
<th>DM yield lbs. acre$^{-1}$</th>
<th>CP %</th>
<th>Starch %</th>
<th>ADF %</th>
<th>NDF %</th>
<th>NFC %</th>
<th>NDFD %</th>
</tr>
</thead>
<tbody>
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<td>31.9</td>
<td>53.8</td>
<td>22.4</td>
<td>55.6</td>
</tr>
<tr>
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<td>16.7</td>
<td>0.2</td>
<td>31.6</td>
<td>54.6</td>
<td>22.0</td>
<td>56.2</td>
</tr>
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</tr>
<tr>
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<td>33.0</td>
<td>56.4</td>
<td>20.9</td>
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<tr>
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<td>0.6</td>
<td>31.8</td>
<td>52.8</td>
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</tr>
<tr>
<td>Trial Mean</td>
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<td>0.5</td>
<td>32.0</td>
<td>54.1</td>
<td>22.4</td>
</tr>
<tr>
<td>LSD (p&lt;0.10)</td>
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<td>NS</td>
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NS - None of the varieties were significantly different from one another.
ACKNOWLEDGEMENTS

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