The question of soil aeration relieving soil surface compaction arose when this project started and was one that we wanted to explore further. In spring 2011 and 2012 each replication and subplot was tested using a soil penetrometer to measure soil tension. The generally accepted practice is that when soil compaction reaches 300 psi according to a penetrometer, plant roots will have to expend more energy in order to push through the soil.

The following chart shows at what depth the 300 psi is reached in the soil at each location. Per Sid Bosworth, Phd., in 2011 there was a statistical difference at a 10% probability between the control, one and two passes compared to three passes. There was no difference in the 2012 readings. The following should be taken into consideration when looking at the charts: Samples each year were taken in April, the summer of 2011 was fairly wet and many farms were driving on fields that were too wet in order to harvest their crops, the winter of 2011-2012 was mild with very little snow fall and mild temperatures leading to little frost action, and the spring of 2012 was wet. Soil moisture can affect penetrometer readings. In 2011, 4-5 penetrometer readings were taken while in 2012, that number was increased to 10 as it was suggested that our sampling set was too small and that we may be taking readings within aerator holes.

Tinmouth site

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Passes with Aerator | Control | One | Two | Three  |
|  |  Average Depth in Inches |
| Rep 1, 2011 | 5.25 | 6.5 | 7.3 | 9 |
| Rep 1, 2012 | 5.8 | 6.6 | 7.9 | 8.9 |
| Rep 2, 2011 | 4 | 3.8 | 4.5 | 5.75 |
| Rep 2, 2012 | 9.3 | 7.4 | 7.3 | 6.6 |
| Rep 3, 2011 | 3.5 | 3.8 | 0\* | 4.5 |
| Rep 3, 2012 | 6.4 | 5.7 | 7.4 | 7.3 |

\* There were visible tire tracks over this plot from the farm driving on the plot so no samples were taken

West Have Site:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Passes with Aerator | Control | One | Two | Three  |
|  |  Average Depth in Inches |
| Rep 1, 2011 | 4.75 | 4.50 | 6.25 | 7.00 |
| Rep 1, 2012 | 12.3 | 11.8 | 10.3 | 12.7 |
| Rep 2, 2011 | 5.5 | 5 | 5.5 | 8 |
| Rep 2, 2012 | 11.2 | 12.7 | 13.7 | 11.3 |
| Rep 3, 2011 | 4.75 | 7.25 | 5.75 | 7.25 |
| Rep 3, 2012 | 11.5 | 13.5 | 11 | 13.5 |

Clarendon Site:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Passes with Aerator | Control | One | Two | Three  |
|  |  Average Depth in Inches |
| Rep 1, 2011 | 6.4 | 6 | 5.6 | 7 |
| Rep 1, 2012 | 7.8 | 6.7 | 7.1 | 8 |
| Rep 2, 2011 | 5.4 | 6.4 | 6.6 | 7.2 |
| Rep 2, 2012 | 4.9 | 5.5 | 5.5 | 6.5 |
| Rep 3, 2011 | 5 | 6.4 | 7 | 9.8 |
| Rep 3, 2012 | 7.9 | 6.8 | 6.3 | 7.3 |

\* It should be noted that this site was under water for ~10 days after Tropical Storm Irene in 2011

East Wallingford Site:

|  |  |  |  |
| --- | --- | --- | --- |
| Passes with Aerator | Control | One | Two |
|  |  Average Depth in Inches |
| Rep 1, 2011 | 5.8 | 4.6 | 6.8 |
| Rep 1, 2012 | 12 | 10.3 | 11.3 |
| Rep 2, 2011 | 6.6 | 6.8 | 5.8 |
| Rep 2, 2012 | 5.7 | 7.1 | 6.9 |
| Rep 3, 2011 | 6.8 | 7 | 6.6 |
| Rep 3, 2012 | 8.1 | 10.5 | 8.3 |
| Rep 4, 2011 | 4.6 | 5.8 | 7.8 |
| Rep 4, 2012 | 10.1 | 10.3 | 10.3 |