Additional Results

For the Apple Orchard Portion of the Project

*"Assessing biofumigant cover crops: practicality, effectiveness, impact on soil health"*

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**Data Management Services in support of the Ministry's project entitled** *"Assessing biofumigant cover crops: practicality, effectiveness, impact on soil health"*

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# Apple tree cross-sectional area (TCSA)

At the hub apple orchard site young trees were interplanted between the original young trees which were planted in spring 2011. The interplanted trees were not included in the analysis. A buffer was implemented at each end of each plot at Hub and Satellite2 resulting in 10-11 and 8 trees, respectively, in the middle of each plot being used in the presented data. There were not enough trees at Satellite1 to have a buffer. Trees that were either dead or replanted were considered as missing data points. Fall 2012 tree cross-sectional area (TCSA) data showed significant differences between treatments at all three sites (Table 1). At the Hub site the fumigated treatment had significantly higher TCSA than control, Oriental mustard and Pearl millet with a TCSA of 381.0 $mm^2$. At Satellite1 Pearl millet had the numerically largest TCSA (155.2 $mm^2$) and was significantly different from the control. There is no fumigated treatment at Satellite2. At Satellite2 Oriental mustard had the numerically highest TCSA (297.9 $mm^2$) and was significantly different than the control and Pearl millet.

Table 1: Apple tree cross-sectional area ($mm^2$), fall 2012

| Treatment | | Hub Norfolk | Satellite 1 Simcoe | Satellite 2 Harrow |
|---|---|---|---|---|
| | | | $mm^2$ | |
| | | | *Fall 2012* | |
| Control | | 281.7 a | 124.7 a | 245.2 a |
| Oriental mustard | | 269.1 a | 128.9 ab | 297.9 b |
| Pearl millet | | 269.0 a | 155.2 b | 261.8 a |
| Fumigated | | 381.0 b | 140.2 ab | . |
| | P-value | <0.0001 | 0.0282 | 0.0003 |

[z] Letters represent treatments that are significantly different from one another ($\alpha \leq 0.05$)

As with the 2012 measurements, any trees planted after spring 2011, when the first measurements of the recently planted trees were taken, were not measured and included in the spring and fall 2011 data set. TCSA measurements from spring and fall 2011 for Hub and Satellite 2 have been reanalyzed with the buffer trees described above removed. Trees that were either dead or replanted were considered as missing data points. There are not enough trees at Satellite 1 to have a buffer. At Satellite 1 there were two TCSA measurements that were outliers and because these two TCSA were higher in the spring than in November the values were removed from the data set and considered as missing data points. Compared to the final report which was submitted in March 2012, there were slight differences in numerical values after buffers were removed however there were no changes in significant differences between treatments (Table 2).

Table 2: Apple tree cross-sectional area ($mm^2$), spring and fall 2011

| Treatment | | Hub Norfolk | Satellite 1 Simcoe $mm^2$ | Satellite 2 Harrow |
|---|---|---|---|---|
| | | Spring 2011 | | |
| Control | | 114.5 ns$^z$ | 109.4 ns | 101.4 ns |
| Oriental mustard | | 113.5 | 110.7 | 100.2 |
| Pearl millet | | 120.1 | 111.6 | 101.6 |
| Fumigated | | 117.8 | 109.9 | . |
| | P-value | 0.0662 | 0.9493 | 0.8091 |
| | | Fall 2011 | | |
| Control | | 173.2 a$^z$ | 128.3 ns | 157.4 a |
| Oriental mustard | | 165.4 a | 130.0 | 173.8 b |
| Pearl millet | | 171.8 a | 134.1 | 163.5 ab |
| Fumigated | | 214.6 b | 136.2 | . |
| | P-value | <0.0001 | 0.2949 | 0.0086 |
| | Time P-value | <0.0001 | <0.0001 | <0.0001 |
| | Time*Treatment P-value | <0.0001 | 0.5826 | 0.0106 |

$^z$ ns-no significant difference

$^y$ Letters represent treatments that are significantly different from one another ($\alpha \leq 0.05$)

## Blossom Ratings

The apple orchard sites had blossom ratings performed in the spring of 2013 during the third full week of May. The blossom rating scale is from 1-5; 1-no bloom, 2-light bloom, 3-medium bloom, 4-full bloom, 5-exceptional bloom. Buffer areas are the same as for TCSA, i.e. the same trees that were used to analyze TCSA were used for blossom ratings. Trees that were either dead or had been replanted were considered as missing data points. While Satellite2 had much fuller blooms with ratings between 4.5 and 5, than both Hub and Satellite1, there were no observed differences between treatments (Table 3). At Hub the fumigated treatment had the fullest blooms with a rating of 2.3 and was significantly higher than the three other treatments while at Satellite1 Pearl millet was the treatment with the fullest blooms, with a rating of 1.7 and was significantly higher than the control and Oriental mustard.

Table 3: Apple blossom ratings (1-no bloom, 2-light bloom, 3-medium bloom, 4-full bloom, 5-exceptional bloom), spring 2013

| Treatment | Hub Norfolk | Satellite 1 Simcoe | Satellite 2 Harrow |
|---|---|---|---|
| | *Late March 2013* | | |
| Control | 2.29 a | 1.56 a | 4.77 ns |
| Oriental mustard | 2.11 a | 1.38 a | 4.67 |
| Pearl millet | 2.29 a | 1.71 b | 4.83 |
| Fumigated | 2.75 b | 1.52 ab | . |
| P-value | <0.0001 | 0.0059 | 0.2368 |

[z] Letters represent treatments that are significantly different from one another ($\alpha \le 0.05$)

[y] ns-no significant difference