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| *Table 1.*Soil characteristics and spring PSNT values† in Hickory Corners, MI (KBS) and E. Lansing, MI (MSU) (2012-2014). |
|  | 2012-2013 |  | 2013-2014 |
|  | KBS | MSU |  | KBS | MSU |
| *Soil characteristics* |  |  |  |  |  |
| Type | Kalamazoo loam (fine-loamy mixed mesic Typic Hapludalfs) | Riddles-Hillsdale sandy loam (fine-loamy, mixed, mesic Typic Hapludalfs) |  | Kalamazoo loam (fine-loamy mixed mesic Typic Hapludalfs) | Capac loam (fine-loamy, mixed, mesic Aeric Ochraqualfs) |
| Slope (%) | 0-3 | 2-6 |  | 0-3 | 0-3 |
| Soil pH | 6.4 | 5.4 |  | 6.1 | 5.8 |
| Soil organic matter (%) | 2.6 | 2.5 |  | 1.7 | 3.8 |
|  |  |  |  |  |  |
| *Spring PSNT values* | \_\_\_\_\_\_\_\_\_\_\_kg N ha-1\_\_\_\_\_\_\_\_\_\_\_ |  | \_\_\_\_\_\_\_\_\_\_\_kg N ha-1\_\_\_\_\_\_\_\_\_\_\_ |
| Radish | 30 | 15 |  | 16 | 24 |
| Annual ryegrass | 11 | 11 |  | 14 | 22 |
| Radish + ryegrass | 14 | 16 |  | 13 | 31 |
| Control | 20 | 15 |  | 9 | 16 |
| † Soil samples were aggregated by treatment prior to KCl extraction so no statistical analysis was performed. |

**Appendix 2 – Tables and Figures**

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| *Table 2.* Field operation and data collection dates in Hickory Corners, MI (KBS) and E. Lansing, MI (MSU) (2012-2014). |
|  | 2012-2013 |  | 2013-2014 |
|  | KBS | MSU |  | KBS | MSU |
| *Field management* |  |  |  |  |  |
| Fall tillage  |  25 Jul. 2012 | - |  | 19 Aug. 2013 | - |
| Cover crop planting |  25 Jul. 2012 | 13 Aug. 2012 |  | 19 Aug. 2013 |  2 Sept. 2013 |
| Cover crop chemical termination | 7 May 2013 |  8 May 2013 |  | 10 May 2014 | 19 May 2014 |
| Spring tillage | 13 May 2013 | 20 May 2013 |  | 24 May 2014 | 28 May 2014 |
| Corn planting | 15 May 2013 | 20 May 2013 |  | 24 May 2014 | 28 May 2014 |
| *Data collection* |  |  |  |  |  |
| Fall biomass harvest | 2 Nov. 2012 | 5 Nov. 2012 |  | 29 Oct. 2013 | 25 Oct. 2013 |
| Fall baseline gas sampling dates | 29 Oct. 2012 | 2 Nov. 2012 |  | 28 Oct. 2013 | 24 Oct. 2013 |
|  | 5 Nov. 2012 | 9 Nov. 2012 |  | 20 Nov. 2013 | 15 Nov. 2013 |
|  | 26 Nov. 2012 | 1 Dec. 2012 |  |  2 Dec. 2013 | 2 Dec. 2013 |
| Fall soil sampling |  2 Oct. 2012 | 28 Sept. 2012 |  | 20 Nov. 2013 | 15 Nov. 2013 |
| Spring gas sampling dates | 29 Mar. 2013 | 29 Mar. 2013 |  | 7 Apr. 2014 | 31 Mar. 2014 |
|  |  3 Apr. 2013 | 5 Apr. 2013 |  | 10 Apr. 2014 | 7 Apr. 2014 |
|  |  5 Apr. 2013 | 7 Apr. 2013 |  | 11 Apr. 2014 | 11 Apr. 2014 |
|  |  |  |  | 18 Apr. 2014 |  |
| Spring biomass harvest | 7 May 2013 |  8 May 2013 |  | 10 May 2014 | 13 May 2014 |
| Spring soil sampling | 7 May 2013 |  8 May 2013 |  | 10 Apr. 2014 |  7 Apr. 2014 |
|  |  |  |  |  |  |
| Summer gas sampling dates |  6 May 2013 |  3 May 2013 |  | 10 May 2014 | 11 May 2014 |
|  |  17 May 2013 | 26 May 2013 |  |  1 Jun. 2014 | 31 May 2014 |
|  |  4 Jun. 2013 |  9 Jun. 2013 |  |  9 Jun. 2014 |  6 Jun. 2014 |
|  |  10 Jul. 2013 |  11 Jul. 2013 |  |  27 Jun. 2014 |  30 Jun. 2014 |
|  |  25 Aug. 2013 | 20 Aug. 2013 |  |  29 Jul. 2014 |  1 Aug. 2014 |
|  |  |  |  |  8 Aug. 2014 |  |
| Corn height measurement |  23 Jun. 2013 | 27 Jun. 2013 |  |  27 Jun. 2014 |  30 Jun. 2014 |
|  |  |  |  |  17 Sept. 2014 |  |
| Corn VT SPAD |  5 Aug. 2013 |  9 Aug. 2013 |  |  4 Aug. 2013 |  7 Aug. 2014 |

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| *Table 3.* Fall and spring cover crop dry aboveground biomass production (kg ha-1), C:N ratios, and N accumulation in Hickory Corners, MI (KBS) and E. Lansing, MI (MSU) (2012-2014). |
|  | Fall biomass |  | Spring biomass |
|  | KBS | MSU |  | KBS | MSU |
| *Treatment* | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_kg ha-1\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |  | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_kg ha-1\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Radish | 1564 |  2631a† |  |  0c |  0c |
| Annual ryegrass | 1318 | 1862b |  | 1696a | 1425a |
| Radish + ryegrass | 1346 | 2460a |  | 1156b |  590b |
| P value | 0.18 | 0.002 |  | <0.0001 | <0.0001 |
|  |  |  |  |
|  | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Fall C:N ratio\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |  | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Spring C:N ratio\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Radish | 19:1 | 13:1 |  | - | - |
| Annual ryegrass | 23:1 | 19:1 |  | 28:1a | 18:1 |
| Radish + ryegrass | 22:1 | 16:1 |  | 25:1b | 16:1 |
| P value | 0.09 | 0.22 |  | <0.0001 | 0.38 |
|  |  |  |  |
|  | \_\_\_\_\_\_\_\_\_\_\_\_Fall N accumulation kg ha-1\_\_\_\_\_\_\_\_\_\_\_\_\_ |  | \_\_\_\_\_\_\_\_\_\_\_Spring N accumulation kg ha-1\_\_\_\_\_\_\_\_\_\_\_\_ |
| Radish | 33 | 67a |  | - | - |
| Annual ryegrass | 25 | 44b |  | 22 | 28 |
| Radish + ryegrass | 21 | 32b |  | 16 | 24 |
| P value | 0.19 | 0.002 |  | 0.20 | 0.67 |
| † Within each column, values followed by the same letter are not significantly different according to the Tukey test (α ≤ 0.05). |

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| *Table 4.* Soil NO3 values during fall and spring cover crop phases and after corn harvest in Hickory Corners, MI (KBS) and E. Lansing, MI (MSU) (2012-2014). |
|  | Fall-cover crop phase† |  | Spring–cover crop phase |  | Fall-after corn harvest |
|  | KBS | MSU |  | KBS | MSU |  | KBS | MSU |
| *Treatment* | \_\_\_\_\_\_\_\_\_\_\_ kg ha-1\_\_\_\_\_\_\_\_\_\_\_ |  | \_\_\_\_\_\_\_\_\_\_\_ kg ha-1\_\_\_\_\_\_\_\_\_\_\_\_ |  | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_kg ha-1\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Radish |  5a‡ | 12b |  | 7a | 17 |  | 12 | 18 |
| Annual ryegrass | 1b |  8b |  |  4b | 12 |  | 11 | 26 |
| Radish + ryegrass | 2b | 13b |  |  6ab | 13 |  | 12 | 18 |
| Control | 7a | 30a |  |  7ab | 16 |  | 11 | 20 |
| P value | 0.0001 | 0.0001 |  | 0.04 | 0.61 |  | 0.95 | 0.63 |
| † Data presented were from the fall of 2013, not data combined across years. |
| ‡ Within each column, values followed by the same letter are not significantly different according to the Tukey test (α ≤ 0.05). |

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| *Table 5.* Corn height at stage V6, SPAD at stage VT, ear leaf N, and corn grain yield in Hickory Corners, MI (KBS) and E. Lansing, MI (MSU) (2013-2014). |
|  | Corn height |  | VT SPAD |  | Corn ear leaf N |  | Corn grain yield |
|  | KBS | MSU |  | KBS | MSU |  | KBS | MSU |  | KBS | MSU |
| *Treatment* | \_\_\_% of the control\_\_ |  | \_\_\_% of the control\_\_ |  | \_\_\_\_\_\_\_\_\_\_\_%\_\_\_\_\_\_\_\_ |  | \_\_\_\_\_\_\_\_\_ kg ha-1\_\_\_\_\_\_\_\_\_\_\_ |
| Radish | 106a† | 107a |  | 108a | 99a |  | 1.4 | 2.0 |  | 4556 | 9786 |
| Ryegrass | 94c | 98c |  |  97b | 90b |  | 1.3 | 1.9 |  | 4368 | 8331 |
| Radish + ryegrass | 109a | 104ab |  | 102b | 98a |  | 1.4 | 2.0 |  | 4671 | 9153 |
| Control | 100b | 100bc |  | 100b |  100a |  | 1.5 | 2.0 |  | 4383 | 9280 |
| P value | <0.0001 | <0.0001 |  | <0.0001 | <0.0001 |  | 0.70 | 0.97 |  | 0.95 | 0.77 |
| † Within each column, values followed by the same letter are not significantly different according to the Tukey test (α ≤ 0.05). |

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*Figure 1.* Temperature (°C) (jagged lines, top graph), daily precipitation (mm) (bars, top graph), and nitrous oxide emissions (g N2O-N ha-1 day) (bottom graph) from 29 Oct. 2012 – 15 Aug. 2013 in Hickory Corners, MI (KBS). Each error bar represents one standard error from the mean.

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*Figure 2.* Temperature (°C) (jagged lines, top graph), daily precipitation (mm) (bars, top graph), and nitrous oxide emissions (g N2O-N ha-1 day) (bottom graph) from 11 Nov. 2012 – 20 Aug. 2013 in E. Lansing, MI (MSU). Each error bar represents one standard error from the mean.



*Figure 3.* Temperature (°C) (jagged lines, top graph), daily precipitation (mm) (bars, top graph), and nitrous oxide emissions (g N2O-N ha-1 day) (bottom graph) from 28 Oct. 2013 – 20 Aug. 2014 in Hickory Corners, MI (KBS). Each error bar represents one standard error from the mean.



*Figure 4.* Temperature (°C) (jagged lines, top graph), daily precipitation (mm) (bars, top graph), and nitrous oxide emissions (g N2O-N ha-1 day) (bottom graph) from 24 Oct. 2013 – 21 Aug. 2014 in E. Lansing, MI (MSU). Each error bar represents one standard error from the mean.