## **Potential Carbon Sequestration and Nitrogen Cycling in Long-Term Organic Management Systems**

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**Supplementary Information**

**Supplementary Table S1.** Crop rotation and important field operation dates in the LOTS plots, 2011-2014.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Crop** | **2011** | **2012** | **2013** | **2014** |
| **Planting date** |
| **Winter wheat** | 13 Sep 2010 | 30 Sep 2011 | 30 Sep (2012); reseed with spring wheat 07 May | 25 Oct (2013); reseed with spring wheat 20 May |
| **Proso millet/Oat-Field Pea-Radish-Turnip (polyculture) cover crop** | 29 June  | - | 26 Aug | -  |
| **Hairy vetch (HV) cover crop** | 13 Aug 2010 | See 2011 | Reseed with spring pea 07 May | See 2013 |
| **Winter rye cover crop** | 13 Sep 2010 | See 2011 | See 2012 | See 2013 |
| **Buckwheat*1*** | 24 June | - | - | - |
| **Navy bean** | - | 25 May (CT); 21 June (NT)  | 11 June (CT); 25 June (NT) | 4 June (CT); 23 June (NT) |
| **Flax/Lentil (intercrop)*2*** | 15 June | - | - | - |
| **Spring pea** | - | 23 April | 8 May | 15 May (CT); 21 Apr (NT) |
| **Millet** | 24 June | 24 May | 7 June | 23 May (CT); 30 May (NT) |
| **Harvesting date** |
| **Winter wheat** | 25 Aug | 20 July | 16 Aug | 5 Sep |
| **Proso millet/Oat-Field Pea-Radish-Turnip (polyculture) cover crop**  | 9 Aug (mowed) | Not seeded (too dry)  |  26-27 Aug | Not seeded (too dry) |
| **Buckwheat†** | 7 Sep (swathed); harvested 19 Sep  | - | - | - |
| **Flax/Lentil (intercrop)*2*** | 7 Sep (swathed); harvested 19 Sep | - | - | - |
| **Spring pea** | - | 19 July |  12 Aug | 11 Aug (CT); 25 July (NT) |
| **Navy bean** | - | 03 Oct (CT) | Not recorded | Not recorded |
| **Millet** | 15 Sep (swathed); harvested 23 Sep  |  15 Sep (swathed); harvested 21 Sep | Not recorded  | Not recorded |
| **Other field operations** |
| **Terminate cover crops** | HV: 7 & 20 July | HV: 14 & 29 June; Rye: 15 & 29 June  | HV: 18 July; Rye: 6 June & 21 July | HV: 2 & 23 June; Rye: 24 & 29 July  |
| **Tillage** |  - | 21 June & 09 July – CT, row cultivation (navy bean) |  1 July – CT, row cultivation (navy bean) | 3 & 26 June – CT row cultivation (navy bean) |
| **Plant fall cover crop** | HV – 8 Sep, rye 15 Sep | HV -15 Aug, rye 30 Sep |  HV – 6 Sep rye - 28 Sep  | HV –5 Sep NT & 15 Sep (CT) rye 25 Oct  |
| **Grazing** | - | Not recorded | 26-30 Aug (pea); Not recorded (wheat & millet)  | 22-28 May (before millet); 12-15 Aug (pea); Not recorded (wheat & millet) |

*1* In 2012, buckwheat was replaced by navy bean/winter rye cover crop.

*2* In 2012, flax/lentil was replaced by field pea/hairy vetch cover crop.

**Supplementary Table S2.** Vegetable planting, harvest and field operation dates in the IFSYS plots, 2009-2014.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Crop** | **2009** | **2010** | **2012** | **2013** | **2014** |
|  | **Planting date** |
| Broccoli | 5 June | 1 June | 17 May | - | - |
| Winter squash | 8 June | 8 June | 18 May | - | 16 May |
| Snap bean | - | - | - | - | - |
| Spinach | - | - | - | - | - |
| Lettuce 1 | 19 May | 19 May | 4 June | 24 June | 6 May |
| Lettuce 2 | 21 July | 21 July | 7 Aug | 7 Aug | 26 June |
|  | **Harvest date** |
| Broccoli | 29 July | 20 Aug | 23 July | - | - |
| Winter squash | 3 Sept | 21 Sept | 12 Sept | - | 2 sept |
| Snap bean | - | - | - | - | - |
| Spinach | - | - | - | - | - |
| Lettuce 1 | 30 June | 8 July | 17 July | 30 July | 19 Jun |
| Lettuce 2 | 24 Aug | 27 Aug | 11 Sept | 12 Sept | 20 June |
|  | **Field activities** |
| Terminate cover crops | 4 May | 30 Apr | 23 Apr | 13 May | 11 Apr |
| Apply amendments | 7 May | 11-12 May | 26-27 Apr | 15 May | 14 Apr |
| Plant fall cover crop | 12 Aug | \* | 28 Aug | 3 Oct | 22 Sept |
| Plant pasture | 18 Sep | \* | 17 Oct | 3 Oct | - |

Note: \* means winter wheat was planted in the fall of 2010 in place of cover crops.

**Supplementary Table S3.** Totalcarbon (C) and nitrogen (N) content of the amendments added in the IFSYS plots, 2003-2014.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Year***1* | **C:N ratio**  | **Application rate** | **Total C applied** | **Total N applied** |
|  |  ˗˗˗˗˗˗˗˗˗Mg ha-1 ˗˗˗˗˗˗˗˗ kg ha-1 |
|  | **Mixed compost** |
| 2003-2009 | 15 | 28 | 7.5 | 513 |
| 2010 | 18 | 16 | 5.5 | 316 |
| 2012 | 12 | 18 | 4.9 | 425 |
| 2013 | 13 | 24 | 4.5 | 396 |
| 2014 | 13 | 21 | 4.3 | 299 |
|  | **Broiler litter** |
| 2003-2009 | 11 | 5.5 | 2.2 | 190 |
| 2010 | 17 | 3.4 | 1.2 | 68 |
| 2012 | 11 | 4.3 | 1.3 | 113 |
| 2013 | 12 | 5.7 | 1.2 | 98 |
| 2014 | 12 | 5.3 | 1.1 | 92 |

 *1* No amendments were applied in 2011.