SOIL HEALTH IN MATTED ROW STRAWBERRIES

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Introduction:

Soil health is defined as "the capacity of a specific kind of soil to function, within natural or managed ecosystem boundaries, to sustain plant and animal productivity, maintain or enhance water and air quality, and support human health and habitation" (Doran et al. 1994). To measure soil health, soil health indicator tests that assess the soil's functionality, ecosystem sustainability, and ability to support humans have to be selected. Soil health tests have not been used on my strawberry fields to date, so indicator test selection and valuation is still under way.

In general soil amendments positively affect soil health indicator tests (Tu et al. 2006), but the qualities of those amendments can affect the tests to different degrees (Bengtsson et al. 2003, Frankenberger and Abdelmagid 1985, Martens 2000). The C:N ratio of a soil amendment is one of those impactful qualities (Nicolardot et al. 2001, Trinsoutrout et al. 2000). Soil cultivation has also been shown to affect soil health indicator tests such as worm counts and microbial diversity (Beare et al. 1997, Blanco-Canqui and Lal 2007, Braunack et al. 2012, Frey et al. 1999). We hypothesized that adding different soil amendments to a strawberry field along a C:N ratio scale and cultivating at two different depths would affect soil health indicator tests.

Methods:

To test this hypothesis, grass-, straw-, sawdust-, or no-amendments were applied to a field in fall 2013. Honeoye strawberries were planted the next spring and the planting was deep or shallowly tilled for the 2014 growing season, as needed. Again, amendments were added in fall 2014 and treatments were tilled appropriately for the 2015 growing season. All 8 treatment combinations were replicated 4 times within the field. Soil was sampled both between the rows of strawberries and within the rows of strawberries. Samples were taken in May, June, and September 2014 and May and August 2015. Several biological soil health indicators were measured: potentially mineralizable nitrogen (PMN), soil respiration, C:N ratio, pH, and soil moisture. Yield data was collected in June 2015. All results reported are significant with a *p-value* < 0.05.

Results:

Soil amendment treatments did affect yield; straw-amended soil had lower yield and plant density than all other treatments. Soil amendments also affected soil respiration and PMN data. Sawdust amended soil had the highest respiration in the spring of 2014 and the spring and summer 2015. Sawdust amended soil also had the highest PMN in spring of 2014. Although soil amendments affected both yield and soil health indicator tests, there was no pattern of correlation between yield and soil health indicator tests. Tillage depth did not affect yield or soil health indicator tests. pH was higher between the rows of strawberries than within the rows of strawberries, this soil acidification may be due in part to the banded application of urea fertilizer within rows. C:N ratio and soil moisture data were not consistently affected by any treatment and were not correlated with yield.

Conclusion:

Straw decreased strawberry plant growth and yield, and soil amendments did affect soil health indicator tests. Ideally soil health indicator tests would be correlated with yield, and in this case they were not. Despite the reduced plant growth and yield in plots amended with straw, we do not recommend stopping straw use at this time. Straw has other benefits in the strawberry production cycle, such as insulating berries over the winter, providing a protective layer between the berries and the soil during harvest, and decreasing fruit disease (Boyce, 1991, Carroll et al. 2013, Ellis et al. 1998). It is important to recognize that strawberries grown in straw-amended soil may not be producing to their full potential, but until the mechanism behind this interaction is understood and an appropriate substitute selected, growers should continue using straw.

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