Cornell University Cooperative Extension

SARE Sustainable Agriculture Research & Education

ONE12-156 – Integrating ground cover crops and new herbicide strategies (conventional and organic) for tree growth and soil health -- Part II.

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Lamont Fruit Farm, Mason Farms, Fowler Farms

Soil Health assessment after 2 seasons of weed management in high density orchards.

Table 16. Lamont Fruit Farms Soil Health

Baseline sample collected on Jun 13, 2011

Treatment samples were collected on Oct. 19, 2012

	Soil texture			overall score/ 100
	% sand	% silt	% clay	
Baseline	35.9	55	9.2	68
Trt 15	38.9	50.2	10.9	54.6
Trt 11	37.5	52.7	9.8	52.9
Trt 10	34.8	53.8	11.5	52.3
Trt 4	35.9	53.2	10.9	53.7

Colored cells show the soil test quality rating for that test.

high | med | low

Treatments

15	untreated check - hand pulled weeds at end of 2011 and after soil health tests in 2012.
11	Sinbar plus paraquat
10	Surflan/Goaltender/Matrix/P
4	Prowl/Chateau/glyphosate

	Physical								
	Aggregate stability %		Available water capacity m/m		Surface hardness psi		SubSurface hardness psi		Infiltration rate in/hr
Baseline	30.5	41	0.17	55	160	56	310	42	
Trt 15	51.3	80	0.14	36	250	18	395	14	7.3
Trt 11	59.3	90	0.14	34	225	27	328	28	
Trt 10	55.4	86	0.15	41	233	24	353	26	5.6
Trt 4	49.9	78	0.15	43	235	23	373	20	

Soils with low aggregate stability tend to form surface crust. Aggregate stabilty improved without tillage.
But soil surface hardness measurements show a subsurface pan with deep compaction at 9 inch depth.
Available water capacity was slightly reduced over 2 seasons.

Cont.

	Biological									
	OM %		Active carbon ppm		Potential mineralizable N µgN/gdwsoil/week		Root health	
Baseline	4	64	246	*3	27.2	100	4.7	63
Trt 15	3.9	62	526	32	11.8	47	5.3	50
Trt 11	3.61	53	474	23	4.2	15	5.3	50
Trt 10	3.44	48	476	23	7.8	28	4.3	63
Trt 4	3.62	54	506	29	5.6	19	4.3	63

Organic matter: no real change over 2 years.

Active carbon: almost 2X increase after 2 years but no difference among treatments

Mineralizable N: significant reduction after 2 seasons, more N in untreated control>Trt 10>Trt 4> Trt 11.

Low soil biological activity, N supply capacity for Trt 11, 10, 4

	Chemical								
						Minor elements			
	pH	Extract- able phosphorus (PPM)	Extract-able potassium (ppm)	Ca (ppm)	Mg (ppm)	Al	Zn	Mn	Fe
Baseline	6.6	3.9	87.3	1725	214	36.1	1.3	29.3	4.3
Trt 15	6.83	1.5	58.3	1709.7	197.4	18.4	0.4	8.5	1.3
Trt 11	7.15	2.3	59.5	2621.4	163.4	10.7	0.4	8.6	1
Trt 10	6.63	1.3	58.4	1641.3	186.9	16.4	0.5	8	1.4
Trt 4	6.95	1.5	56.3	1836	195.7	10.3	0.3	8.2	1

pH has increased over 2 seasons

Extractable phosphorus (PPM) has been reduced by 41% in trt 11, 61% in Trt 15, 10, and 4

<4.5 Plant P availability, >25 Env. Loss Potential

Extractable potassium was reduced in all treatment from first leaf by 33%

Why was TRT 11 sugnificant increase in Calcium

Aluminum was reduced over 2 seasons

Zinc was reduced over 2 seasons by about 70%

MN was reduced by 72%

Fe was reduced by 73%