WSU EXTENSION
San Juan County

Oak Knoll Aeration and Over-Seeding Trial
Soil Health Results 2018 and 2019

2018—Table 1. Mean ± standard deviations (SD) for aeration treatments

Observation	No aeration	With aeration	*p*[1]
pH, 1:1	6.22 ± 0.07	6.24 ± 0.07	0.71843
EC, mmhos/cm	0.03 ± 0.03	0.03 ± 0.02	0.9296
Sat. Paste EC, mmhos/cm	0.07 ± 0.08	0.07 ± 0.04	0.9444
Organic matter, %	5.79 ± 1.87	6.68 ± 1.41	0.16547
Total organic C, mg/kg	178 ± 30.6	179 ± 27.4	0.86320
Organic C, %	3.41 ± 1.11	3.9 ± 0.85	0.19598
POXC active carbon, mg/kg	726 ± 87.9	744 ± 127	0.7274
Total N, mg/kg	11.9 ± 1.86	11.7 ± 2.16	0.74918
Organic N, mg/kg	10.7 ± 1.88	10.4 ± 2.09	0.657977
Nitrate N, mg/kg	0.6 ± 0.13	0.588 ± 0.16	0.8780
Ammonium N, mg/kg	0.63 ± 0.09	0.71 ± 0.18	0.1803
Sand, %	71.6 ± 8.73	71.9 ± 7.08	0.921307
Silt, %	21.8 ± 6.69	22 ± 5.40	0.89947
Clay, %	6.62 ± 2.39	6.12 ± 2.23	0.54926
Avail. water hold. cap., in/ft	1.26 ± 0.32	1.31 ± 0.24	0.62817
CO_2-C, mg/kg	125 ± 14.8	126 ± 13.5	0.8911
Mineralizable N, lbs./acre	103 ± 4.37	103 ± 4.46	0.7379
Organic C:N	16.9 ± 2.36	17.5 ± 1.77	0.9195

[1]The probability value associated with the treatment in the analysis of variance.
*For observations where a significant treatment effect ($p \leq 0.05$) was indicated, values are highlighted in bold and denoted with an asterisk.

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2018—Table 2. Mean ± standard deviations (SD) for overseeding treatments

Observation	No seeding	With seeding	*p*[1]
pH, 1:1	6.2 ± 0.76	6.26 ± 0.05	0.09573
EC, mmhos/cm	0.03 ± 0.03	0.03 ± 0.02	0.7912
Sat. Paste EC, mmhos/cm	0.08 ± 0.08	0.07 ± 0.04	0.7807
Organic matter, %	6.66 ± 1.34	5.8 ± 1.93	0.17645
Total organic C, mg/kg	**172 ± 24.2**	**185 ± 31.7**	**0.04336***
Organic C, %	3.92 ± 0.79	3.39 ± 1.14	0.15795
POXC active carbon, mg/kg	740 ± 103	730 ± 116	0.8428
Total N, mg/kg	11.5 ± 2.44	12.1 ± 1.41	0.34847
Organic N, mg/kg	10.2 ± 2.34	10.9 ± 1.51	0.354932
Nitrate N, mg/kg	0.63 ± 0.15	0.56 ± 0.14	0.4501
Ammonium N, mg/kg	0.63 ± 0.09	0.71 ± 0.18	0.1803
Sand, %	73.2 ± 5.52	70.2 ± 9.53	0.253788
Silt, %	21.4 ± 4.84	22.4 ± 7.07	0.61576
Clay, %	**5.38 ± 0.92**	**7.38 ± 2.77**	**0.03450***
Avail. water hold. cap., in/ft	1.27 ± 0.20	1.3 ± 0.35	0.80312
CO_2-C, mg/kg	126 ± 11.5	124 ± 16.3	0.8641
Mineralizable N, lbs./acre	103 ± 3.66	103 ± 5.04	0.7379
Organic C:N	17.1 ± 2.36	17.2 ± 1.83	0.9195

[1]The probability value associated with the treatment in the analysis of variance.
*For observations where a significant treatment effect ($p \leq 0.05$) was indicated, values are highlighted in bold and denoted with an asterisk.

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2019—Table 1. Mean ± standard deviations (SD) for aeration treatments

Observation	No aeration	With aeration	*p*[1]
pH, 1:1	6.25 ± 0.11	6.21 ± 0.14	0.6535
EC, mmhos/cm	**0.16 ± 0.03**	**0.2 ± 0.03**	**0.017*†**
Sat. Paste EC, mmhos/cm	**0.42 ± 0.07**	**0.52 ± 0.07**	**0.014*†**
Organic matter, %	5.54 ± 1.17	5.87 ± 1.01	0.5690
Total organic C, mg/kg	138 ± 32.4	116 ± 19.4	0.08919
Organic C, %	3.26 ± 0.71	3.44 ± 0.62	0.6225
POXC active carbon, mg/kg	780 ± 69.9	795 ± 55.1	0.7146
Total N, mg/kg	-	-	-
Without over-seeding	9.33 ± 1.67	9.48 ± 1.14	0.8051
With over-seeding	9.93 ± 1.83	6.97 ± 0.40	0.1285
Organic N, mg/kg	5.51 ± 1.99	5.0 ± 2.09	0.5744
Nitrate N, mg/kg	1.92 ± 0.83	1.63 ± 0.72	0.4635
Ammonium N, mg/kg	2.19 ± 0.96	1.77 ± 0.99	0.4740
Sand, %	72.2 ± 5.20	72.7 ± 3.99	0.62569
Silt, %	21.9 ± 3.76	21.0 ± 3.27	0.50214
Clay, %	5.88 ± 1.96	6.29 ± 1.50	0.8387
Avail. water hold. cap., in/ft	1.24 ± 0.20	1.25 ± 0.16	1.0
CO_2-C, mg/kg	85.2 ± 18.9	90.1 ± 16.3	0.5802
Mineralizable N, lbs/acre	86.2 ± 9.48	89.1 ± 7.95	0.4401
Organic C:N	31.0 ± 20.6	29.3 ± 18.9	0.8549

[1]The probability value associated with the treatment in the analysis of variance.
*For observations where a significant treatment effect ($p \leq 0.05$) was indicated, values are highlighted in bold and denoted with an asterisk.
†Probability values calculated using PERMANOVA for distributions requiring non-parametric tests.

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2019—Table 2. Mean ± standard deviations (SD) for overseeding treatments

Observation	No seeding	With seeding	*p*[1]
pH, 1:1	6.26 ± 0.11	6.20 ± 0.13	0.4461
EC, mmhos/cm	0.18 ± 0.04	0.18 ± 0.02	1.000†
Sat. Paste EC, mmhos/cm	0.47 ± 0.12	0.46 ± 0.05	0.930†
Organic matter, %	5.52 ± 1.01	5.89 ± 1.20	0.5383
Total organic C, mg/kg	125 ± 22.6	132 ± 35.7	0.85396
Organic C, %	3.25 ± 0.62	3.46 ± 0.72	0.5697
POXC active carbon, mg/kg	783 ± 72.8	791 ± 51.5	0.8189
Total N, mg/kg	-	-	-
Without aeration	9.33 ± 1.67	9.93 ± 1.83	0.34287
With aeration	**9.48 ± 1.14**	**6.97 ± 0.40**	**0.02068***
Organic N, mg/kg	5.78 ± 1.52	4.70 ± 2.39	0.3091
Nitrate N, mg/kg	1.84 ± 0.89	1.73 ± 0.66	0.7019
Ammonium N, mg/kg	1.79 ± 0.95	2.23 ± 0.99	0.5908
Sand, %	73.8 ± 2.92	71.0 ± 5.74	0.18533
Silt, %	20.4 ± 1.77	22.7 ± 4.54	0.14889
Clay, %	5.88 ± 1.64	6.29 ± 1.89	0.8387
Avail. water hold. cap., in/ft	1.19 ± 0.12	1.30 ± 0.22	0.18403
CO_2-C, mg/kg	89.5 ± 14.7	85.1 ± 20.8	0.3353
Mineralizable N, lbs./acre	88.8 ± 7.25	86.3 ± 10.4	0.2781
Organic C:N	24.0 ± 11.9	37.3 ± 24.1	0.3045

[1]The probability value associated with the treatment in the analysis of variance.
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†Probability values calculated using PERMANOVA for distributions requiring non-parametric tests.

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Trial Methods

Fall 2017 - Aerated
5/7/18 – Over-seeded with Birds Foot Trefoil at 15 lbs per acre
7/13/18 - Sampled forage biomass and quality
9/11/18 - Sampled soil quality
Fall 2018 - Aerated
6/14/19 - Sampled forage biomass and quality
9/18/19 - Sampled soil quality

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