

Belowground herbivory initiates a cascade that increases abundance of Lyme disease vectors

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Online Resource 1. Soil characteristics of 31 red pine study sites in Wisconsin. Soils were characterized by collecting three soil samples, each 2 cm in diameter to a depth of 15 cm, from each site in April 2010. Samples were taken in the center and on the east and west edge of each diseased stand or asymptomatic control plot. Samples were composited and sent to the University of Wisconsin Soil and Plant Analysis Laboratory (Middleton, WI, USA) for texture and nutrient analyses. Based on optimal soil nutrient ranges for red pine growth (Burns and Honkala 1990), most of our study sites were low in P and organic matter (OM), and had elevated levels of Ca and Mg.

Variable	Region	N	Mean	Minimum	Maximum	Median
pH	BRF/WS	14	4.9 ± 0.0	4.7	5.1	4.9
	CS	8	5.1 ± 0.1	4.7	5.4	5.1
	KM	6	4.9 ± 0.1	4.7	5.2	4.9
	SG	3	5.6 ± 0.3	5.3	6.1	5.4
Sand (%)	BRF/WS	14	87.5 ± 1.6	68.0	92.0	89.0
	CS	8	87.1 ± 0.7	83.0	89.0	87.5
	KM	6	79.8 ± 5.5	62.0	91.0	87.0
	SG	3	88.3 ± 1.8	85.0	91.0	89.0
Silt (%)	BRF/WS	14	6.6 ± 1.6	3.0	26.0	5.0
	CS	8	7.0 ± 0.5	5.0	10.0	7.0
	KM	6	12.5 ± 4.6	3.0	27.0	6.5
	SG	3	5.0 ± 1.2	3.0	7.0	5.0
Clay (%)	BRF/WS	14	5.8 ± 0.2	5.0	7.0	6.0
	CS	8	5.9 ± 0.3	5.0	7.0	6.0
	KM	6	7.8 ± 1.0	6.0	11.0	6.5
	SG	3	7.0 ± 0.6	6.0	8.0	7.0
OM (%)	BRF/WS	14	1.41 ± 0.13	0.83	2.73	1.32
	CS	8	1.31 ± 0.12	0.83	2.00	1.27
	KM	6	1.76 ± 0.36	0.90	2.97	1.45
	SG	3	1.41 ± 0.17	1.07	1.60	1.57
N (%)	BRF/WS	14	0.07 ± 0.00	0.05	0.09	0.06
	CS	8	0.06 ± 0.00	0.05	0.07	0.06
	KM	6	0.07 ± 0.02	0.04	0.13	0.06
	SG	3	0.05 ± 0.01	0.03	0.06	0.05
P (ppm)	BRF/WS	14	9.27 ± 1.09	3.46	15.25	9.54
	CS	8	7.38 ± 0.43	6.14	9.40	7.10
	KM	6	13.25 ± 2.45	7.59	21.71	11.96
	SG	3	6.29 ± 0.62	5.05	7.00	6.82

K (ppm)	BRF/WS	14	21.98 ± 1.21	15.67	31.33	22.34
	CS	8	29.50 ± 3.88	14.33	50.00	30.50
	KM	6	36.06 ± 9.17	19.33	80.33	29.34
	SG	3	17.89 ± 2.51	13.33	22.00	18.33
B (ppm)	BRF/WS	14	0.28 ± 0.01	0.23	0.40	0.27
	CS	8	0.31 ± 0.02	0.23	0.37	0.30
	KM	6	0.43 ± 0.06	0.30	0.67	0.37
	SG	3	0.27 ± 0.03	0.20	0.30	0.30
Ca (ppm)	BRF/WS	14	159.71 ± 14.86	76.33	249.00	167.00
	CS	8	189.87 ± 18.75	125.33	240.67	212.17
	KM	6	287.39 ± 96.36	84.67	741.67	233.67
	SG	3	312.55 ± 20.58	287.33	353.33	297.00
Mg (ppm)	BRF/WS	14	29.07 ± 2.30	15.00	43.00	28.00
	CS	8	36.88 ± 3.36	23.00	50.00	36.50
	KM	6	50.83 ± 16.67	18.00	131.00	43.00
	SG	3	67.00 ± 7.00	56.00	80.00	65.00
Mn (ppm)	BRF/WS	14	13.79 ± 1.45	6.00	23.67	13.00
	CS	8	23.75 ± 1.46	20.33	32.67	22.00
	KM	6	35.11 ± 8.32	12.00	63.67	27.34
	SG	3	13.00 ± 4.58	7.00	22.00	10.00
S (ppm)	BRF/WS	14	1.83 ± 0.11	1.07	2.50	1.82
	CS	8	1.94 ± 0.07	1.73	2.27	1.87
	KM	6	2.28 ± 0.10	2.00	2.60	2.30
	SG	3	2.38 ± 0.35	2.00	3.07	2.07
Zn (ppm)	BRF/WS	14	1.03 ± 0.08	0.63	1.57	0.97
	CS	8	1.06 ± 0.08	0.83	1.47	0.99
	KM	6	1.72 ± 0.34	0.77	2.83	1.42
	SG	3	1.12 ± 0.10	0.97	1.30	1.10

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Online Resource 2. *Dermacentor variabilis* adult abundance at four study areas in Wisconsin in 2008 and 2009. Ticks were collected using standard sheet dragging methodology (Gladney 1978; Burg 2001).

Year	Region	<i>Dermacentor variabilis</i> (mean \pm SE) per 100 m		
		June	August	October
2008	West Salem	0.31 \pm 0.09	0.04 \pm 0.04	Not sampled
	Central Sands	0.03 \pm 0.03	0.03 \pm 0.03	Not sampled
	Spring Green	0.02 \pm 0.02	6.81 \pm 4.20	Not sampled
	Kettle Moraine	0.07 \pm 0.07	0	Not sampled
2009	West Salem	0.06 \pm 0.04	0.02 \pm 0.02	0
	Central Sands	0.17 \pm 0.12	0.06 \pm 0.04	0
	Spring Green	0	0	0
	Kettle Moraine	0	0	0

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