

[10.1071/SR21022](https://doi.org/10.1071/SR21022)

Soil Research

Supplementary Material

Soil characteristics and tillage can predict the effect of 'structure lime' on soil aggregate stability

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Supplementary Table S1

Table S1. Denomination, calculated SmV-index in the clay fraction (< 2 µm), date of spreading and tillage of the soil before and after the spreading of structure lime on the 30 trial sites. LC=low clay content, HC=high clay content, LO=low SOM content and HO=high SOM content. In the column Tillage before spreading no differentiation is made between different types of tillage, but the column describes whether the soil was not tilled (0) or tilled (1–2) with 1 and 2 indicating the number of passes before the spreading of lime. In the columns Tillage after spreading tines refers to equipment working mainly with tines, whereas Tillage after spreading discs refers to shallow working equipment with only discs. The column Tillage after spreading combination refers to combination cultivators working with discs, tines and reconsolidating packers. Abbreviations for crops grown are WW = winter wheat, SuB = sugar beet, SB = spring barley, WOSR = winter oil seed rape

Trial	Denom.	SmV index	Date of spreading	Tillage before spread.	Tillage after spread. - tines	Tillage after spread. - discs	Tillage after spread. - combi	Crop grown 1 st year after liming
Krageholm 1	Kra 1	0.6	2014-09-05	0	1	1	0	WW
Krageholm 2	Kra 2	0.6	2014-09-05	0	1	1	0	WW
Krageholm 3	Kra 3	0.6	2014-09-05	0	1	1	0	WW
Krageholm 4	Kra 4	0.6	2014-09-05	0	1	1	0	WW
Lönhult 1	Lon 1	1.1	2014-08-28	1	0	1	1	WW
Lönhult 2	Lon 2	1.1	2014-08-28	1	0	1	1	WW
Lönhult 3	Lon 3	1.1	2014-08-28	1	0	1	1	WW
Lönhult 4	Lon 4	1.1	2014-08-28	1	0	1	1	WW
Vadensjö 1	Vad 1	2.9	2014-08-27	2	1	1	2	SuB
Vadensjö 2	Vad 2	2.9	2014-08-27	2	1	1	2	SuB
Vadensjö 3	Vad 3	2.9	2014-08-27	2	1	1	2	SuB
Vadensjö 4	Vad 4	2.9	2014-08-27	2	1	1	2	SuB
Kornheddinge 1	Korn 1	3.1	2014-09-20	2	0	0	2	WW
Kornheddinge 2	Korn 2	3.1	2014-09-28	1	1	1	0	SB
Kornheddinge 3	Korn 3	1.9	2014-09-28	2	0	0	2	WW
Kornheddinge 4	Korn 4	1.9	2014-09-28	2	0	0	2	WW
Kadesjö LC	Kad LC	1.1	2016-09-02	1	2	0	0	WW
Kadesjö HC	Kad HC	1.0	2016-09-02	1	2	0	0	WW
Stureholm LC	Stu LC	1.6	2016-07-30	1	2	1	0	WOSR
Stureholm HC	Stu HC	1.0	2016-07-30	1	2	1	0	WOSR
Eka LC	Eka LC	1.8	2016-08-15	0	2	1	0	WW
Eka HC	Eka HC	1.2	2016-08-15	0	3	2	0	WW
Svinarp LC	Svi LC	3.5	2016-08-05	0	2	1	0	WW
Svinarp HC	Svi HC	3.8	2016-08-05	0	2	1	0	WW
Bjärstad	Bja	0.80	2017-09-29	1	2	0	0	WW
Brunnsholm	Bru	0.40	2017-09-19	0	2	0	0	SB
Skottlandshus LO	Sko LO	1.08	2017-08-24	1	2	2	0	WW
Skottlandshus HO	Sko HO	1.30	2017-08-24	1	2	2	0	WW
Kadesjö LO	Kad LO	1.55	2017-09-03	0	2	1	0	WW
Kadesjö HO	Kad HO	1.02	2017-09-03	1	2	1	0	WW

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Supplementary Table S2

Table S2. Chemical composition, including variation width, of structure liming product Nordkalk Aktiv Struktur/Fostop Struktur – a mixture of approximately 80–85% ground limestone and 15–20% slaked lime – used in trials 2014–2017. Water content 15–25% depending on storage. Nutrients and compounds are expressed as concentrations of dry matter. Bulk density 0.8–1.0 t m⁻³. Source: Nordkalk Corp.

Macro nutrient or compound	Concentration (%)	Micro nutrient	Concentration (mg kg ⁻¹)
Total Ca as CaO	50.0–51.0	Cd	1.0–1.8
Mg	0.6–1.0	Co	2–9
SiO ₂	2.0–5.4	Cr	9–26
Al ₂ O ₃	1.0–3.4	Cu	8–48
Fe ₂ O ₃	0.3–1.5	Hg	< 0.02
K	0.1–2.5	Ni	5–28
Na ₂ O	0.5–1.0	Pb	4–58
S	0.5–1.7	Zn	160–280
P	0.07–0.2		

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Supplementary Table S3

Table S3. Texture and soil nutritional status in topsoil (0–20 cm) of the 30 trials prior to structure liming in autumns 2014, 2016 and 2017

Trial	SOM ^a	Sand ^b > 60 µm	Silt ^c 60-2 µm	Clay ^d < 2 µm	pH H ₂ O	P-AL ^e mg kg ⁻¹	K-AL ^e mg kg ⁻¹	Mg-AL ^e mg kg ⁻¹	K/Mg ratio	Ca-AL ^e mg kg ⁻¹
Krageholm 1	2.2	69.0	21.1	9.9	6.2	68	72	59	1.3	950
Krageholm 2	2.4	39.5	41.4	19.1	6.2	25	82	95	0.9	1570
Krageholm 3	2.2	23.6	51.3	25.1	6.4	38	125	153	0.9	1370
Krageholm 4	2.5	19.5	52.7	27.8	6.6	29	111	151	0.8	1850
Lönhult 1	5.0	43.4	28.5	28.1	7.7	129	188	146	1.4	4040
Lönhult 2	3.9	49.1	21.8	29.1	7.9	133	200	165	1.3	4580
Lönhult 3	4.2	30.8	24.8	44.4	8.1	138	291	282	1.1	7860
Lönhult 4	3.9	29.1	24.1	46.8	8.2	127	307	353	0.9	10540
Vadensjö 1	4.0	46.3	32.8	20.9	7.2	130	97	121	0.8	3100
Vadensjö 2	4.1	42.3	32.5	25.2	7.0	165	126	159	0.8	3240
Vadensjö 3	4.1	40.2	33.0	26.8	7.7	116	117	178	0.7	4410
Vadensjö 4	3.3	44.1	29.5	26.4	8.2	89	148	229	0.7	11430
Kornheddinge D1	2.8	53.8	25.4	20.8	7.4	48	99	87	1.1	3040
Kornheddinge D2	3.6	39.8	32.4	27.8	8.0	133	153	195	0.8	7320
Kornheddinge D3	2.8	49.9	24.3	25.8	7.8	58	173	154	1.3	6090
Kornheddinge D4	2.6	45.8	25.7	28.5	7.8	114	203	218	1.1	7050
Kadesjö LC	2.7	53.2	29.5	17.3	6.4	46	118	83	1.4	1800
Kadesjö HC	3.4	12.9	53.7	33.4	6.3	22	138	146	1.0	2290
Stureholm LC	4.4	35.8	28.9	35.3	7.0	36	189	234	0.8	3730
Stureholm HC	4.4	30.0	32.4	37.6	7.0	28	187	207	0.9	3940
Eka LC	7.1	26.1	52.2	21.7	6.3	52	106	93	1.1	3190
Eka HC	4.3	30.9	36.0	33.1	6.7	30	172	137	1.3	3610
Svinarp LC	3.3	58.2	19.5	22.3	7.9	98	127	153	0.8	3690
Svinarp HC	4.7	29.9	36.8	33.3	7.9	88	173	314	0.6	5430
Bjärstad	4.0	7.0	32.1	60.9	6.2	32	243	675	0.4	3620
Brunnsholm	2.6	12.7	36.0	51.3	6.5	61	303	366	0.9	2330
Skottlandshus LO	4.1	18.0	44.4	37.6	8.3	258	180	195	0.9	11450
Skottlandshus HO	5.2	18.8	50.2	31.0	7.1	78	131	132	1.0	4330
Kadesjö LO	2.5	52.1	32.8	15.1	6.3	61	99	58	1.8	1550
Kadesjö HO	5.7	22.6	43.4	34.0	6.4	83	158	163	1.0	3530

^a ignition loss

^b wet sieving

^c calculated as difference between fractions Sand and Clay

^d hydrometer sedimentation

^e extraction with 0.1 M ammonium lactate + 0.4 M acetic acid, pH 3.75 (Egnér et al., 1960)