

Effects of long-term field experiment on early stage litter decomposition in Austria and Sweden

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Introduction and objectives

Soil organic matter decomposition affects the local and global C cycles. This study tested the effect of land use and management, litter type, and climate on the early decomposition rates and stabilization in long-term field experiments (LTEs) in Austria and Sweden.

Material and methods

Rooibos and Green tea bags (Lipton, Fig.1) were used according to the Tea Bag Index (TBI) protocol for comparison of decomposition rate (k) and stabilization factor (S) after ~90 days.

- 16 sites in Austria (2015 and 2016): focused on organic and N fertilization, crop residues management, and tillage systems.
- 13 sites in Sweden (2016): focused on annual and perennial crops rotation, organic and mineral fertilization, and tillage systems.

| Sweden | | | Austria | | | |
|--------|---------------|-------|---------|--------------|-------|------|
| Site | Place | Exper | Site | Place | Exper | Year |
| SE1 | Börgeby | CMP | AT1 | Mubil | CB | 2014 |
| SE2 | Ekebo | CMP | AT2 | Mubil | CB | 2015 |
| SE3 | Högasa | CMP | AT3 | Ritzlhof | CB | 2015 |
| SE4 | Kungsängen | CMP | AT4 | Rottenhaus | CB | 2016 |
| SE5 | Röbacksdalen | CMP | AT5 | Rutzendorf | CB | 2015 |
| SE6 | Vreta Kloster | CMP | AT6 | Rutzendorf | CB | 2016 |
| SE7 | Lanna | ROT | AT7 | Breitstetten | SF | 2015 |
| SE8 | Lönstorp | ROT | AT8 | Breitstetten | SF | 2016 |
| SE9 | Röbacksdalen | ROT | AT9 | Fuchsenbigl | SF | 2016 |
| SE10 | Säby | ROT | AT10 | Haringsee | SF | 2015 |
| SE11 | Lanna | TS | AT11 | Haringsee | SF | 2016 |
| SE12 | Säby | TS | AT12 | Rottenhaus | SF | 2016 |
| SE13 | Ultuna | TS | AT13 | Zinsenhof | SF | 2016 |
| | | | AT14 | Zissersdorf | SF | 2016 |
| | | | AT15 | Fuchsenbigl | TS | 2015 |
| | | | AT16 | Fuchsenbigl | TS | 2016 |

Calculating TBI

Initial decomposition rate (k): $W_r(t) = a_r e^{-kt} + (1-a_r)$

Stabilization factor (S): $S = 1 - a_g / H_g$

Where: $a_r = H_r(1-S)$

a_r : decomposable fraction of RT

a_g : decomposable fraction of GT

H_g : hydrolysable fraction of GT

H_r : hydrolysable fraction of RT



Fig.1: Rooibos and Green tea bags, Lipton

Preliminary results

In Austria, decomposition differed more between sites than between treatments. Minimum tillage had higher decomposition rates compared to conventional tillage.

In Sweden, ploughing tillage tended to result in the lowest k . The northernmost site resulted in the highest k value. Results indicated higher stabilization in perennial forage crops compared to annual crops.

S and k showed differences among sites and treatments (Fig. 2). In Austria were quite different at the same sites for 2015 and 2016, likely because differences in weather conditions.

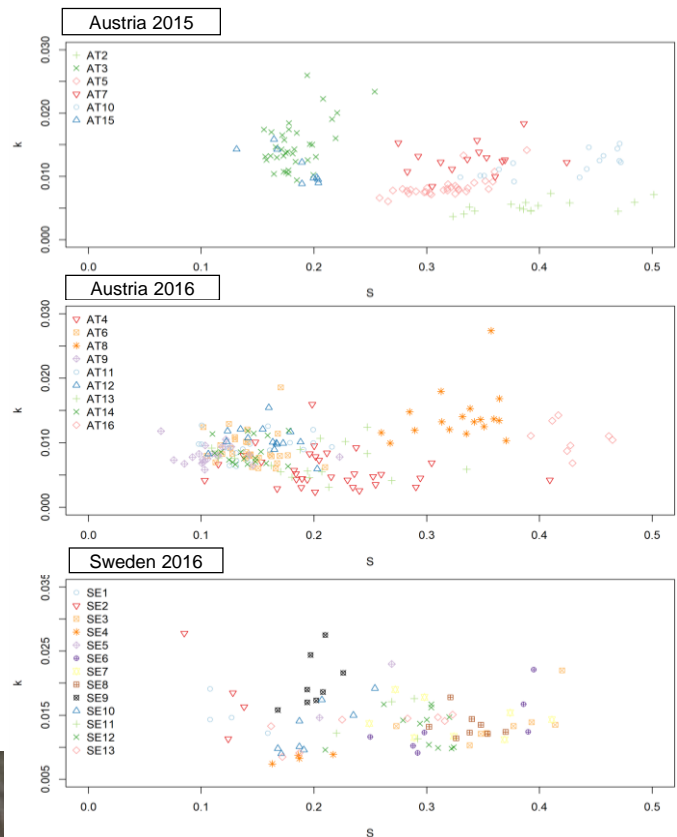


Fig.2: S and k parameters in Austria 2015, 2016, and Sweden 2016