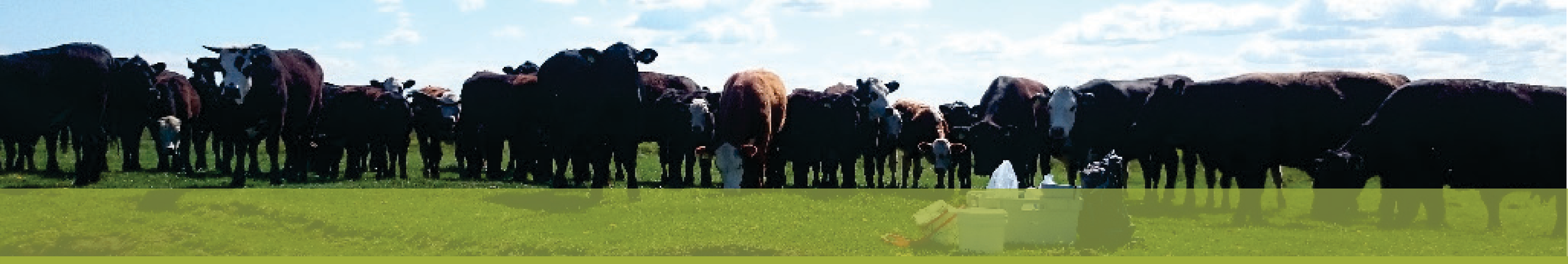


Short transport of *B. anthracis* **spores** in **sandy soil** with **precipitation**

Bacillus anthracis contamination, a study of spore transport in a soil profile

Johanna Thelaus, Jeff Lewis, Stina Bäckman, Malin Granberg, Jan Sjöström, Jan Burman, Bo Segerman and Joakim Skarin

A recent increase of Anthrax in cattle and wildlife in Sweden has set the focus on resource intensive and expensive risk reducing measures in the affected areas.

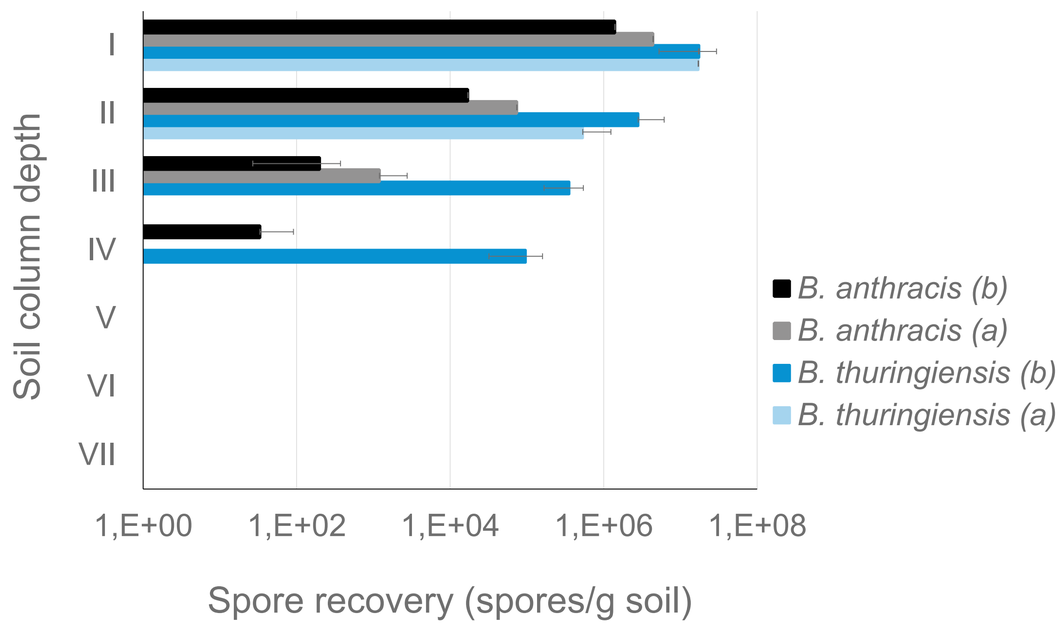
Objective

Provide data to decision makers at the Swedish agencies responsible for the process of outbreak mitigation.

Method

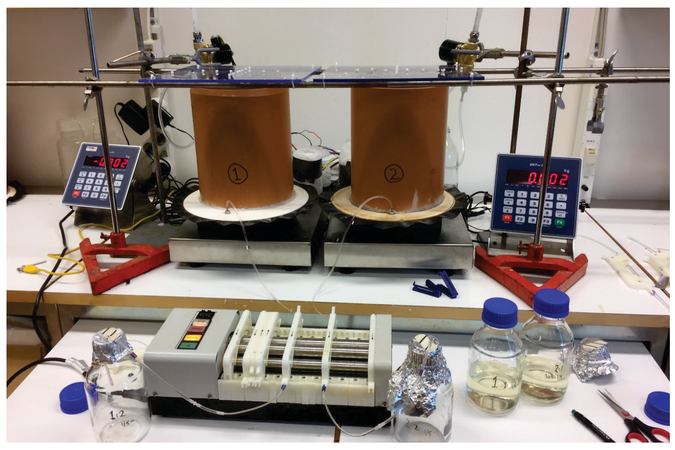
- Four unsaturated columns packed with autoclaved sandy soil with low organic content and constant moisture.
- Sterilized and filtered rainwater with a pH of 4,8 simulated snow melt.
- Spores were seeded at the top of the columns as single event contamination.
- Effluent water was analyzed for presence of spores.
- Columns were run for 35 days with a total flow through of 3 times the effective pore volume.
- At the end of the experiment, core samples were harvested in triplicates and analyzed for presence of spores.

Result



Conclusion

Lysimetric data show that there is a limited vertical transport of spores in unsaturated sandy soil (i.e. 15 cm in 35 days) with a simulated infiltration that that amounts to the snow melt period in northern Sweden. No spores were detected in the effluent of the lysimeters. Spores were transported further down the soil profile in replicates with higher flow rates. This suggest that water flow rate and tortuosity influence the transport of spores.



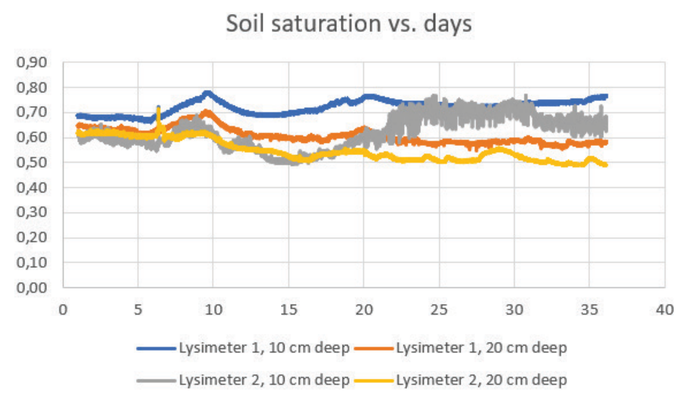
Strains

- *Bacillus thuringiensis israelensis*
- *Bacillus anthracis* 4229 Pasteur, ATCC 6602, a strain that lack the pX01 toxin plasmid
- Inoculum of ~3 x 10^9 spores / column

Humidity and flow through

- Soil columns total volume of 9,98 L
- Total pore volume 3,49 L based on solid density of sand particles and total volume of lysimeter
- Effective pore volume estimated to 2 – 2,5 L due to unsaturated conditions. Only water-filled pores contribute to spore transport.

Soil Parameter	Value
pH	4.8
% clay (by mass)	<2%
% silt (by mass)	5%
% sand (by mass)	87%
% gravel (by mass)	6%
% OC (by mass)	0.65%
CEC (meq/100 g)	<1



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