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Anaerobic digestion as a tool to eliminate animal parasites and weed seeds

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Background

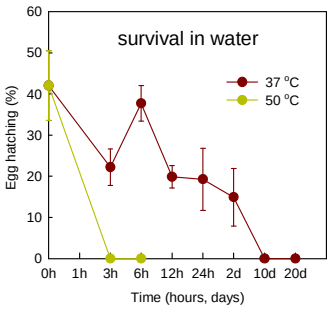
Anaerobic digestion of animal manure and crop residuals offers an opportunity to produce bioenergy and plant fertilizers simultaneously. The digestion process may also help eliminate animal parasites, pathogens and weed seeds.

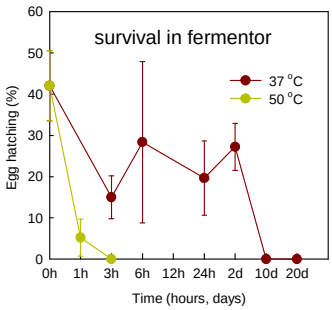
Objective

To study survival of propagules of weed plants and the pigs large roundworm *Ascaris suum* under conditions simulating processing in a biogas plant.

Materials and methods

Non-embryonated eggs of the pigs large roundworm *Ascaris suum* and seeds of six weed species were batch incubated (1-L mini-fermentors) under conditions similar to biogas plants managed at meso- (37 ℃) and thermophilic (50 ℃) conditions. Cattle manure was used as digestion substrate and experimental units were sampled destructively during time.





Results – *A. suum*

- At 50 ℃, *A. suum* eggs did not survive more than 3h of incubation.
- At 37 ℃, survival of *A. suum* eggs was not affected during the first two days and it took up to 10 days before total elimination was reached.

Plant species	Characteristics	Germination-% at 37 °C 2 d*	4 d	7 d	11 d	22 d
Brassica napus	Seed survival >8Y	1	0	0	0	0
Avena fatua	Common, spread easy	0	0	0	0	0
Sinapsis arvensis	Competitive	0	0	0	0	0
Fallopia convolvolus	Good survival in dung	7	2	2	0	0
Amzinckia micranta	Invasive and aggressive	1	0	1	0	0
Chenopodium album	Common and tough	78	56	28	0	0
Solidago canadensis	New invasive species	0	0	0	0	0

At 50 °C no seeds were able to germinate at any time
*d: days of incubation in fermentor

Results – weed seeds

- At 50 ℃ complete mortality of all weed seed specie s was reached within two days.
- At 37 ℃ seeds of *A. fatua*, *S. arvensis*, *S. Canadensis* was eliminated after 2 days. *B. napus*, *F. convolvulus* and *A. micranta* had low germination levels (~1%) after 7 days. *C. album* survived one week at substantial levels (7%) but after 11 days germination ability was totally lost.

Conclusions

In general, anaerobic digestion in biogas plants seems an efficient way (thermophilic more efficient than mesophilic) to treat organic farm wastes in a way that suppresses animal parasites and weeds so that the digestates can be applied safely as fertilizers. Anaerobic digestion may be utilized as a feasible procedure for diminishing levels of various hazardous organisms.

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