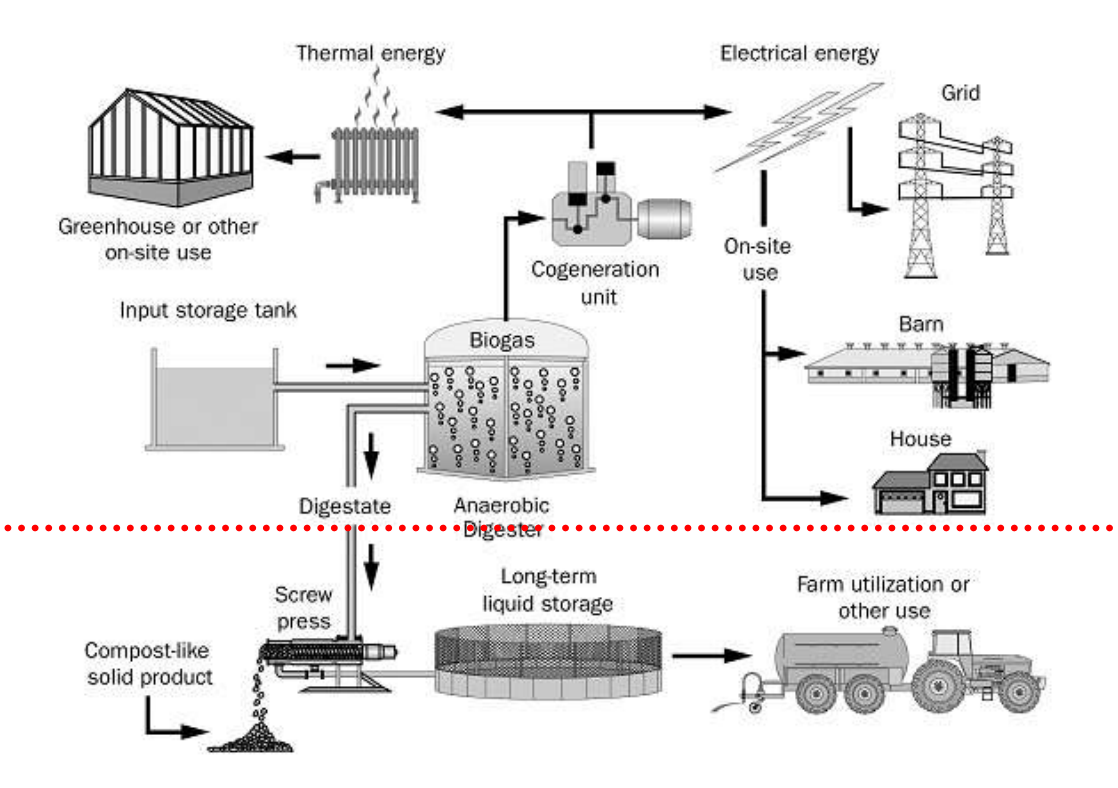
The impact of biogas digestate application on young short rotation willow ecosystem

Katrin Heinsoo

Estonian Life Science University

What is digestate



- Depending on the substrate can be waste or fertilizer

What is digestate

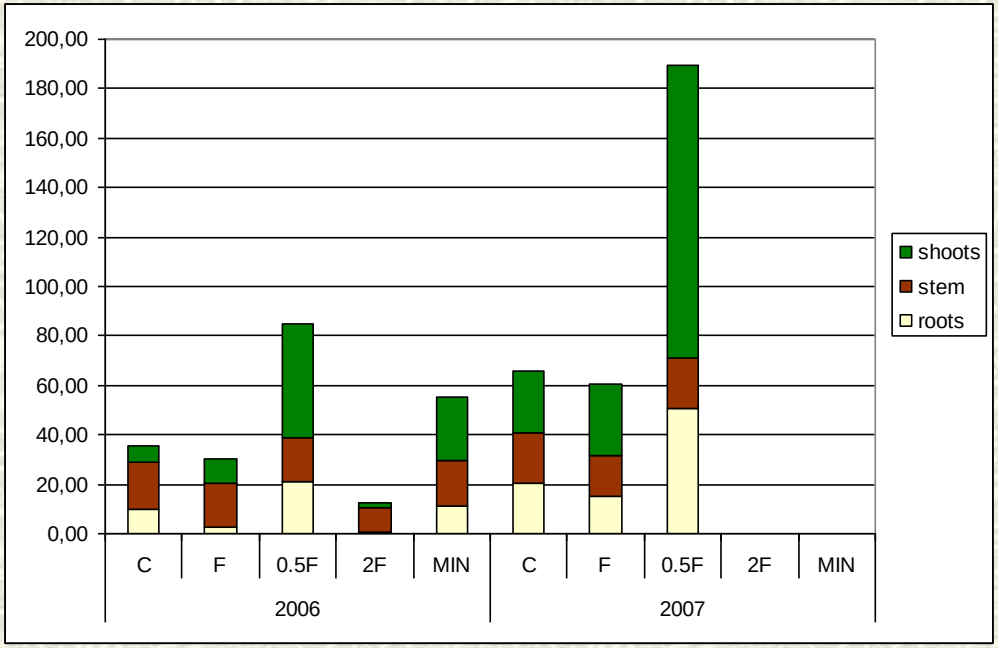
- N from slurry remains in digestate (more in NH_4 form)
- Dry matter content decreases
- pH increases
- Hygienic risks smaller than for organic wastes

Material	**Dry matter** (g/kg)	**Total N** (g/kg wet weight)	**NH_4-N** (g/kg wet weight)	**NH_4-N** (% kogu N-st)	**pH**
Input (slurry mainly)	69,0	3,33	1,78	53,5	7,23
Digestate	54,8	3,36	2,10	62,5	7,92
Difference*	-21 %	+0,8 %	+15,2 %	-	-

2 greenhouse experiments

- 2-year experiments
- Water-saturated
- Opened to wind and sunshine
- 5 replicas per clone/age/fertilisation
- Load equal per tot N

1st study: yield and soil



- Small dose of digestate was the best
- Shoot proportion was the same for small digestate and mineral series
- Too large load of digestate killed quickly
- Digestate supported winter survival

1st: ... and soil

	2 years			1 year	
	C	0.5F	F	2F*	MIN*
pH_{KCl}	6,59	6,05	5,94	6,07	5,09
organic matter %	2,96	4,72	4,01	4,50	4,00
NH_4-N (mg/kg)	14,1	8,7	2,1	6,0	18,2
N %	0,15	0,26	0,23	0,25	0,22
P (mg/kg)	97,5	218,4	314,0	214,3	260,6
K (mg/kg)	260,5	432,9	597,9	922,0	533,4

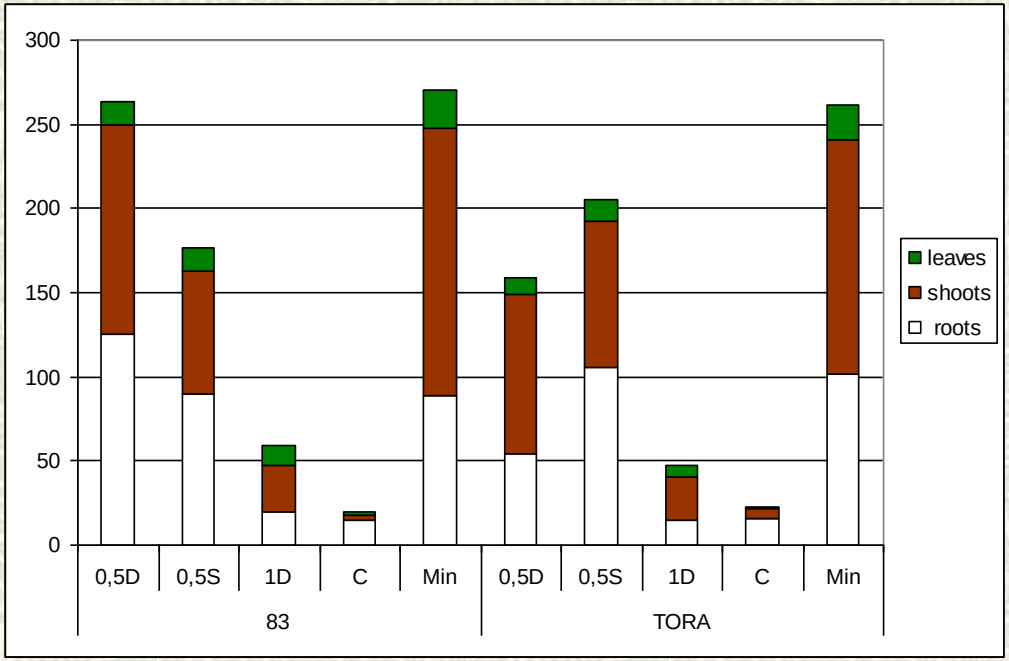
- pH decreased! Microbial activity?
- N deposition did not increase in time
- Extra P and K from digestate in two years was not larger than that from annual mineral fertilisation

2nd study

- Production (incl leaves)
- Photosynthesis
- Physiological responses
- Soil microbiological activity

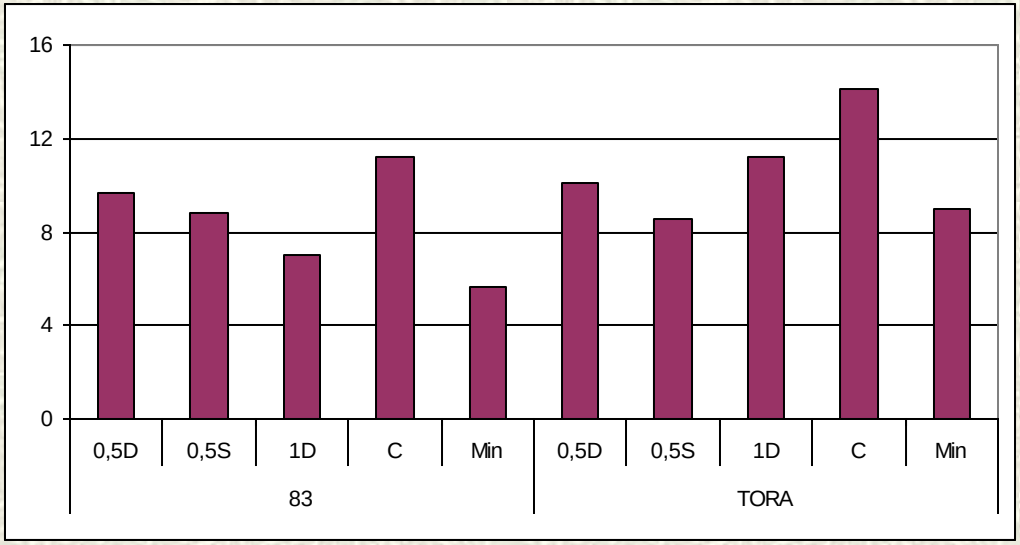
2nd study: productivity

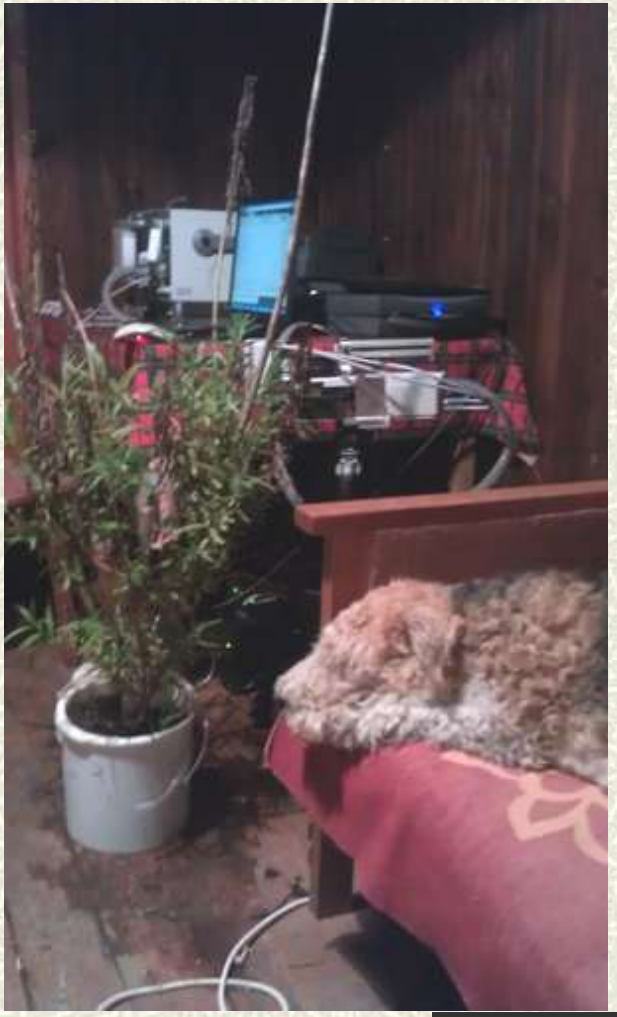
- Larger load of **D**igestate was too much
- **D**igestate and **S**lurry did not give differences
- The best was liquid **M**ineral fertilizer



2nd: photosynthesis

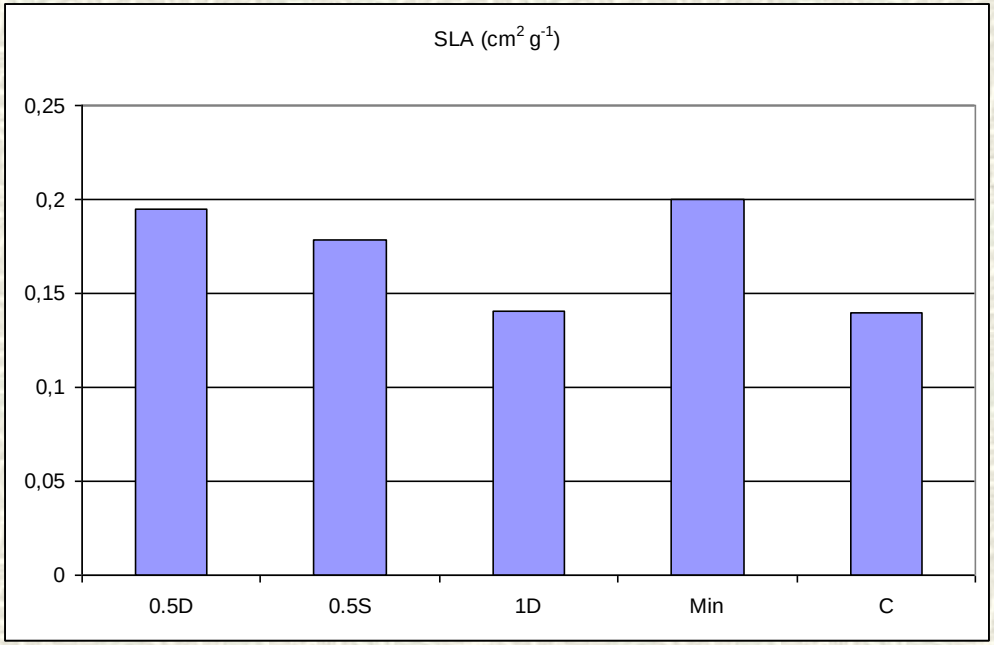
- Salix is very capricious object for FS measurements





2nd: specific leaf area

- SLA higher in 0.5**S**ludge, 0.5**D**igestate and **M**ineral fertilisation cases



Thank you for your attention!