

# The use of wood chips in agricultural soils

28/05/2024



Europees Landbouwfonds  
voor Plattelandsontwikkeling:  
Europa investeert  
in zijn platteland



Bodemkundige  
Dienst van België VZW



BOEREN  
NATUUR  
VLAANDEREN

# History

15 years of experience



2008 - 2012  
Project operation  
BB, a|b, VLM, ANB  
Lisro, Rurant



2012 - 2020  
NGO  
Afgevaardigden ABG's,  
Werkers (=a|b), BB, ABS  
VLM, ANB, Dep LV



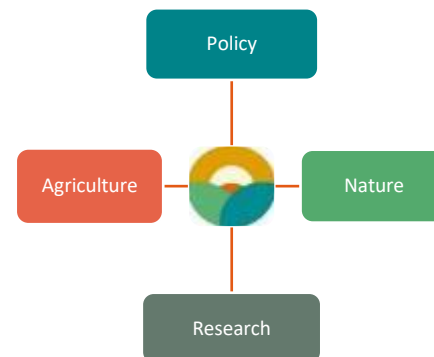
2020 - now  
NGO  
Afgevaardigden ABG's,  
Werkers, BB, ABS  
VLM, ANB, Dep LV



Customized business advice

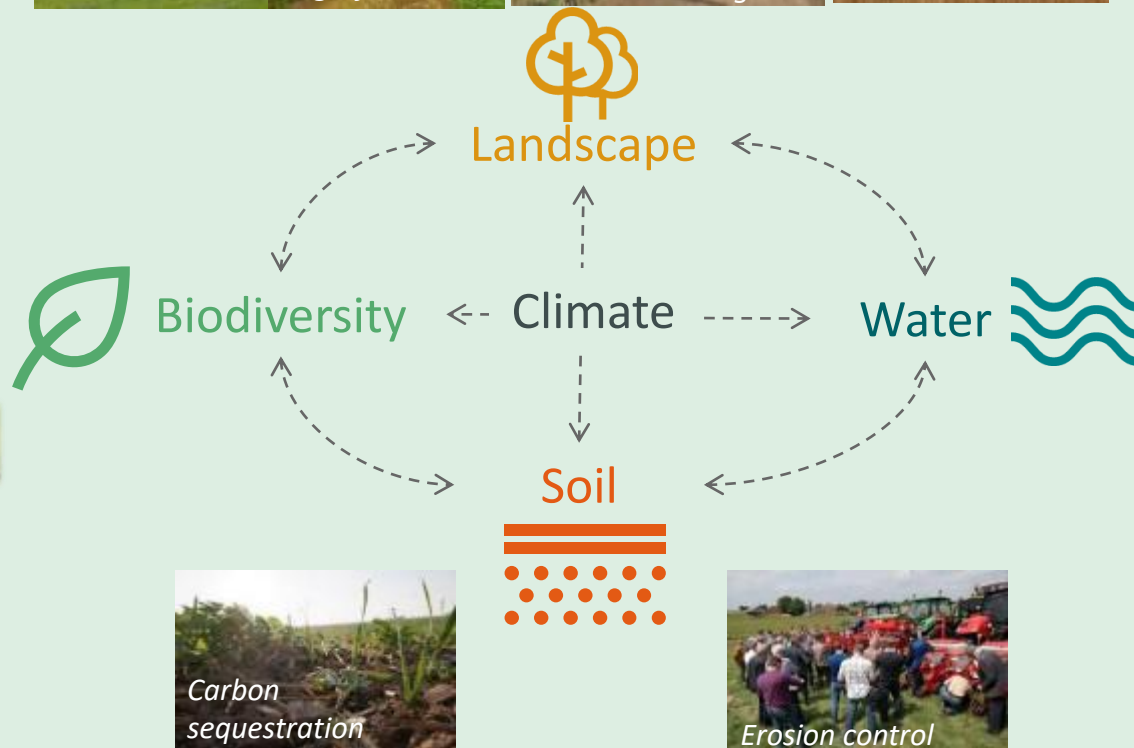
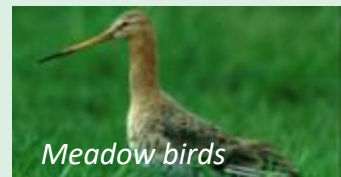


We support 33 agro-management groups, 500 members



The use of wood chips in agricultural soils









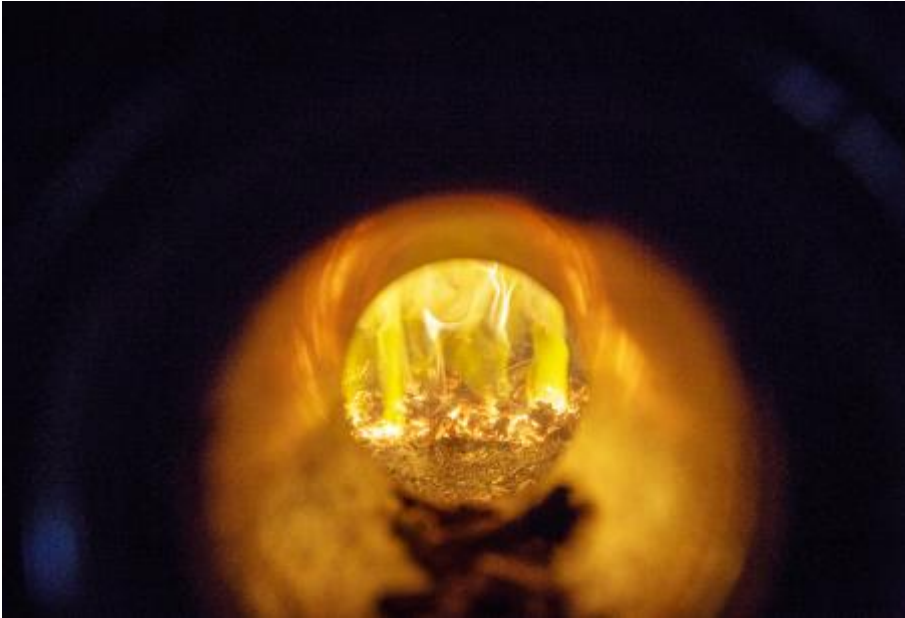
**No money & no time**



**Major impact on ecological functions**

# Economic valorisation of management residues

## Energetic valorisation (biomass boiler)



## Soil improvement agent

- 15 projects
- First trial plot established in 2018
- 38 plots, up to 150 ha



## Technique wood chips as C source

- 40-45 m<sup>3</sup>/ha = 10-15 T/ha
- Apply every 4-5 years (depending on crop rotation)
- Branches of deciduous trees, sufficiently shredded
- Sufficient heartwood, not just small branches
- We have no experience with softwood, little info available in literature
- Application in autumn (Jul-Okt) + cover crop
- Shallow incorporation, preferably no tillage
- Cost 500 – 900 €/ha

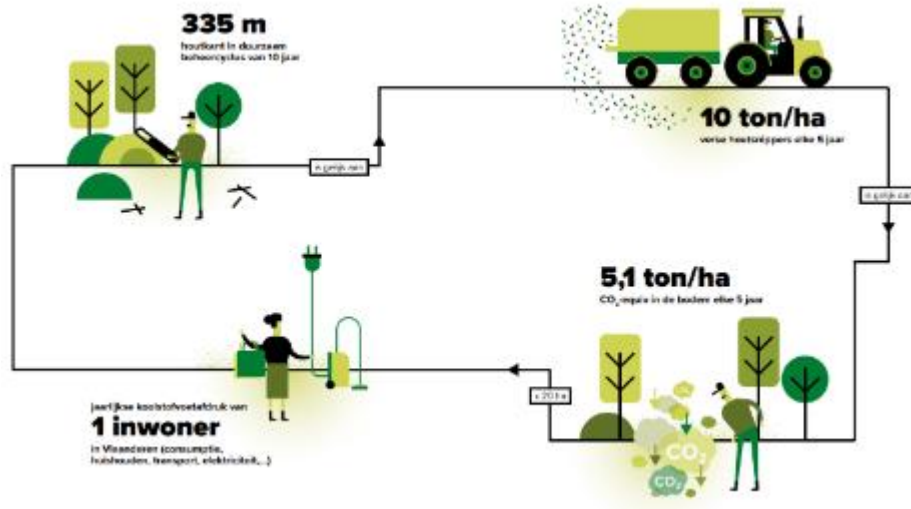


Hedgerow management	<b>4 km</b>
Amount fresh wood chips	<b>300 ton</b>
Yield fresh wood chips	<b>75 kg/lm</b>
Cost of fresh wood chips	<b>46,67 euro/ton</b>
Cost of fresh wood chips (10T/ha)	<b>466,67 euro/ha</b>
Cost of fieldwork	<b>63,86 euro/ha</b>
Total cost	<b>530,52 euro/ha</b>

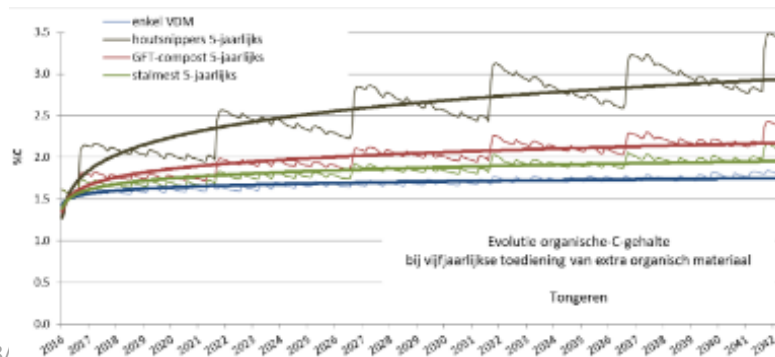
Source: Koester de Kemense koolstof, 2020



# Carbon from hedgerow to soil



- High C/N-ratio
- Closing cycles
- Soil life ↑
- Soil fertility ↑
- Water storage capacity ↑
- Immobilisation of N! (apply in fall)
- Sustainable origin!
- Legislation!
- Long term(20 years)!
- Not the solution, but an option





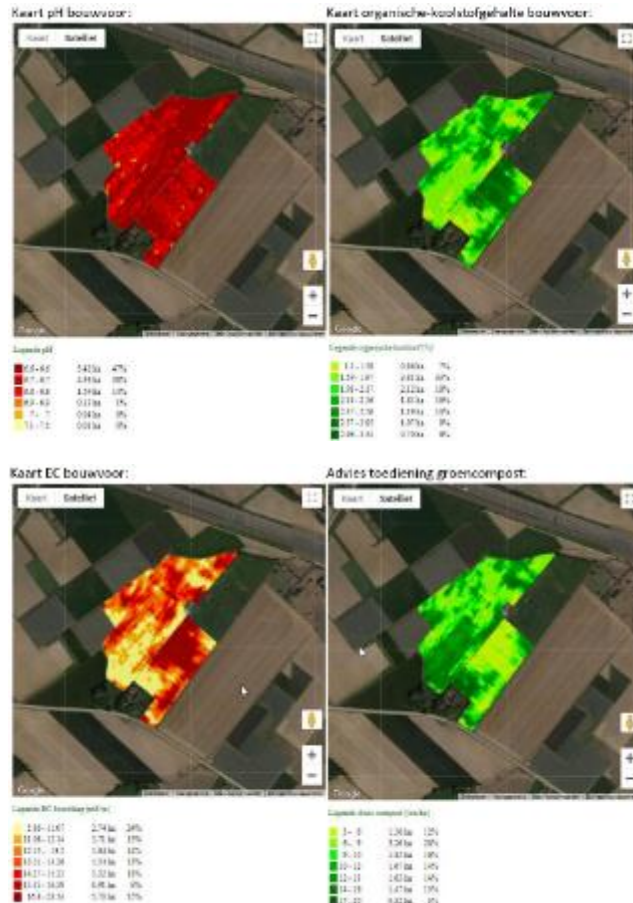


Common muck spreader  
Strip tests and full-field





## Alternative: gradual spreading after soil scan



‘Veris’ soil scan (pH, OC, EC) + Standard soil sample analysis


Spreading plan

Gradual spreading with task cards



## Woodchips

High in carbon, low in nutrients



	Organic matter	pH	Nitrogen total	P2O5 (g/kg)	K2O (g/kg)	C/N	C/P	Volume Density (kg/l)
Wood chips	965	5,6	6,4	0,13	4,11	88	4316	0,219
Shredded tree roots	923	6,8	3,7	2,1	3,9	145	256	0,123
Wood chips siftings	890	6	10,15	1,5	3,9	51	345	0,247
Miscanthus (autumn)	968	6,1	4,2	1,9	8,1	134	296	0,098
Miscanthus (spring)	961	6,0	2,5	1,5	2,8	223	372	0,107
Cattle manure	762		29,5	13,8	36,7	15	32	
Green compost	333	8	11,7	4,7	10	17	41	
VGF compost	357	8	17,1	8,6	14,3	12	24	
Shredded prunings	760	7	7,5	1,77	5,7	59	250	0,319
Based on sampling, averages and assumptions								

Bron: PIBO, BDB, Praktijkpunt Landbouw, Boerenatuur Vlaanderen



## Effect on mineral nitrogen content



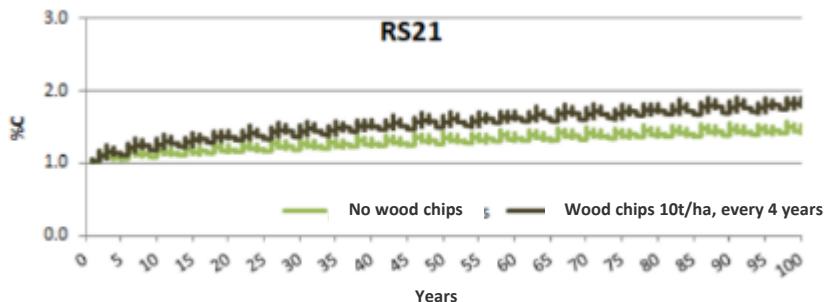
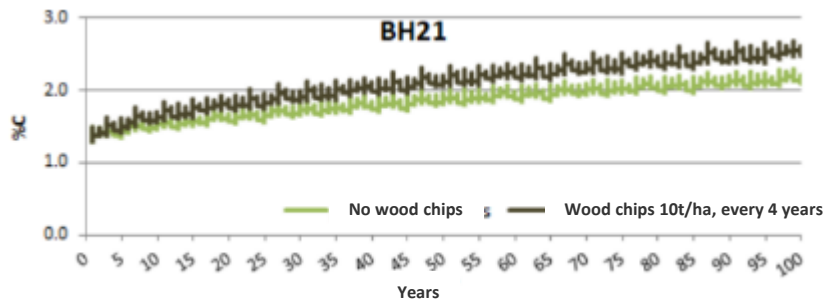
Clearly lower nitrate residue, both in year x and x+1

This is to be expected, but we don't see it everywhere

→ possible explanation: control plots on edge of the field (practical choice)



## Effect on carbon sequestration



C-slim (model from Soil service of Belgium)

Based on current crop rotation and fertilization

Even without wood chips, there is a carbon sequestration

But it does go faster when using wood chips

Long-term

- 30 years + 0,2%
- 100 years + 0,4%





## Effect on soil life

### Microbial carbon (C<sub>mic</sub>)

Varying results

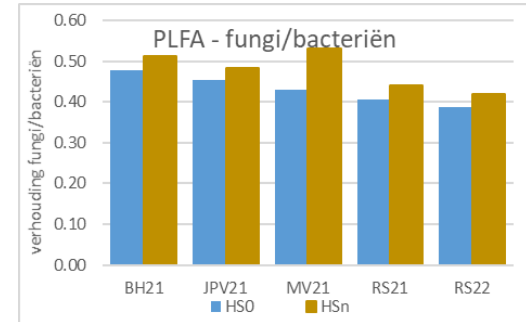
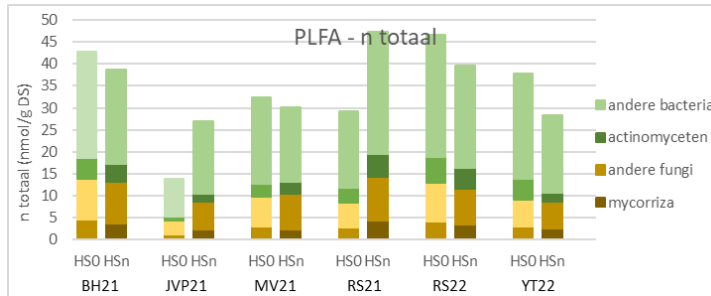
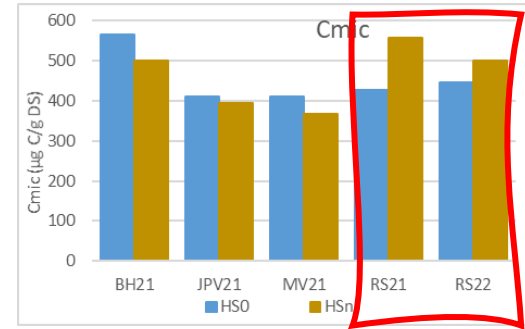
### Phospholipids in cell membranes of living microorganisms (PLFA)

Micro organisms → unique composition (fungi VS bacteria)

Measure & quantify → fingerprint of soil food web

Varying results

However, clearly higher proportion of fungi → **Indicator of better soil quality**

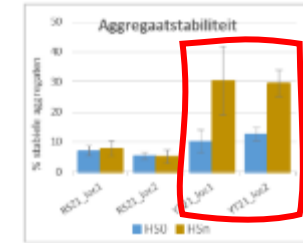


## Effect on soil physical quality

### Aggregate stability

Measure of susceptibility to clumping and erosion

Not clear why variable results, possibly history of plot

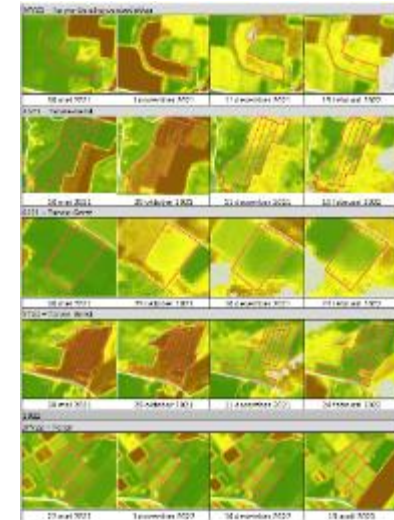


## Effect on crop growth and yield

No noticeable difference WatchItGrow (based on satellite images)

No notable observations of farmers

- 1 farmer noticed: Emergence lagged a bit just after woodchip application (N-immobilisation)
- Resolved with small gift of nitrogen



## Conclusions

- It was our first large-scale trial of wood chips on agricultural soils at municipal level  
→ not always scientifically monitored → more research needed on this level
- Had some setbacks with weather and legislation (meanwhile legislation is updated)
- Long-term expected results
  - Soil organic matter content ↑
  - N-mineralization ↑ → to be taken into account in fertilization
  - Soil life ↑
- Short-term effects
  - No effect on yield of next crop
  - Nitrate-residue ↓ → Less N-leaching → N-starvation for crop → keep an eye on it
  - Soil quality ↑ (fungi/bacteria ration)
  - Water retention capacity ↑ & resistance to dragging and erosion ↑
- Attention: availability of sufficient wood chips → local landscape is determining factor



## More info (Dutch)

*Click on the image*







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