We focus on using the soil microbiome to store carbon in soil.

We visited one of our mentor's farms Boer in Natuur and found out that after 4 years of trees growing on his land the number of fungi in the soil was still almost as low as in conventional soil.

We only found 2 fungi in 30 frames, while the forest soil held almost 300 in 30 frames. The experts that were with us considered this normal and only expected this to increase after 7 years. This started a quest to figure out how to restore fungi in the soil quicker.

We eventually found 4 scientifically backed methods, but no mention of which method would work better.

- 1. getting soil from a forest,
- 2. cooking potatoes and burying them in forest floor for a month,
- 3. fungal rich compost
- 4. digging out saplings from the forest with some soil and planting them into the target agroforestry system.

Seeing as each of these methods has very different cost structures and labor intensity it makes a huge difference to know which is quickest, cheapest and gives the best results. We decided to try all 4 at Boer in Natuur. Each in their own tree row, between these 2-meter-wide rows there is 20 meters of pasture.

- 1. We got 2 kilos of forest soil and spread it out over the target tree row of about 100 meters in the afternoon so it wouldn't get killed by the UV light from the sun. In the evening rain was expected that would carry the bacteria, fungi, and spores down into the soil.
- 2. We cooked potatoes, put them in a container and dug them into the forest soil. A month later they were colonized by some fungi and eaten by mice. This experiment didn't go as was described in the literature, but we applied it to a 100-meter tree row
- 3. We took 5 kilos of fungal rich compost and spread it out over the next 100-meter tree row
- 4. We got 5 saplings with soil and planted them in the 4th 100-meter tree row.

We went back a month later and took soil samples in all 4 plots up to 30cm and in a control plot that hadn't received any treatment. We didn't think we would have results this quickly but wanted to check anyway.

Due to circumstances we only managed to analyze the samples about a week and a half later. We used a microscope to count the number of fungi in each sample.

- 0. The control sample still had 2 fungi in 30 frames.
- 2. The potato sample also had 2 fungi in 30 frames.
- 1. & 3. The compost and forest soil had 8 fungi in 30 frames
- 4. The saplings gave us 12 fungi in 30 frames after just a month.

These results were great as this means we can increase the rate of CO2 capture in soil and symbioses much faster than previously assumed.

We will continue to research these and other methods further to improve carbon and nutrient capture in our soils.

Results 6 months later after winter

Our test to get the mycorrhizal fungi back in the soil has now been going for 6 months. We were very interested to see what the impact of winter would be on our soil microbiome.

We did the same test but with 20cm of soil and 6 months later at the end of March:

- 0. Control plot with 6 fungi
- 1. potato plot with 6 fungi
- 2. compost plot with 6 fungi
- 3. forest soil plot with 17 fungi
- 4. forest seedling plot with 16 fungi

There was a difference in depth of the sample which can explain a large part of the increase of the fungi in the control and potato plots. However, we were also going into winter and this test was at the start of spring so that might also have an impact on fungi activity or sprouting.

What we can conclude is that the fungi we had in the compost have not stayed over winter. The fungi in the forest soil are more robust for the agroforestry plot we did the test on. Also, we didn't see a difference between the two forest soil inoculation methods. This means we could save time in the future if we don't want saplings from the forest.

Around plot 4 with the forest seedlings, we took another 4 samples:

- 1. 25cm from the seedling in the treeline
- 2. 60cm from the seedling in the treeline
- 3. 25cm from the seedling into the grass
- 4. 100cm from the seedling into the grass

The most amazing result we had was that the number of fungi in these 4 samples was between 14 and 16 so not very different from the 'original' locations. This is promising as it means these networks are already expanding and bringing more life to the grassland's soil as well.