



Optimising water retention capacity of growing media used in vertical gardening

Summary of the original trial report in Dutch:

“Optimalisatie van waterretentie bij substraten voor toepassing bij groene gevels”

Date: 31/08/2019

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Trial done in the framework of IWT140993:



GREEN BUILDING
Green walls for sustainable buildings and cities

1. Trial objective

Early 2015 a consortium of research stations and private companies was formed to bring knowledge together on greening façades of buildings. Although a research topic in full expansion in Europe, studies in Belgium are scarce. As a result, too often wrong choices are made when constructing green walls.

Groen Bouwen wants to increase the overall knowledge on the subject and optimise existing systems. One of the fields of investigation is the choice and composition of the growing media.

TerraCottem BVBA, as member of the project group, had TerraCottem® universal analysed as one of the soil amendments:

- In 2017 a first report was published (full report available upon request: info@terracottem.com);
- These are the 2019 results from a complementary trial, where additional soil amendments were tested;

2. Set-up

The trial was set up at the Belgian Experimental Station for Ornamental Plants. Vertical tubes (H: 100cm; Ø: 15cm) were filled with 2 different types of growing media:

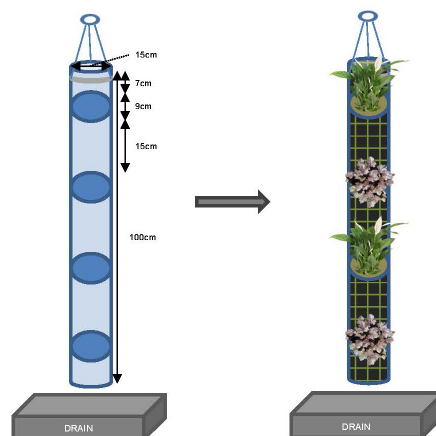
- Rockwool;
- Potting soil;

The growing media were mixed with different soil amendments:

- TerraCottem® universal (TCU): 5.0g/l;
- DCM Aquaperla® (pure polymer): 2g/l;
- Diatomaceous earth: 7.5% v/v;
- Expanded clay: 15% v/v;
- Loose textile fibres: 7.93g/l ;
- Polymer textile: 8.33g/l;

The tubes with 4 openings along the side, were alternately planted with *Heuchera* (tolerant to drought) and *Spathiphyllum* (sensitive to drought).

- Fresh weigh FW biomass production was measured at the end of the trial by cutting the plants and weighing them.
- Before cutting, the soil was washed away allowing observations on root development.
- The moisture content of all treatments was measured by inserting Delta-T probes.
- The water retention capacity of the (amended) growing media was determined by measuring the volume of drain when 1 litre of water was added at the top. Measurements were done after 30min., 4h and 24h.



3. Results

3.1 Plant Development

- Plant development in the rockwool was, understandably, less pronounced than in the “richer” potting soil.
- Nevertheless, the TCU treated plants in the rockwool were the most vital ones:

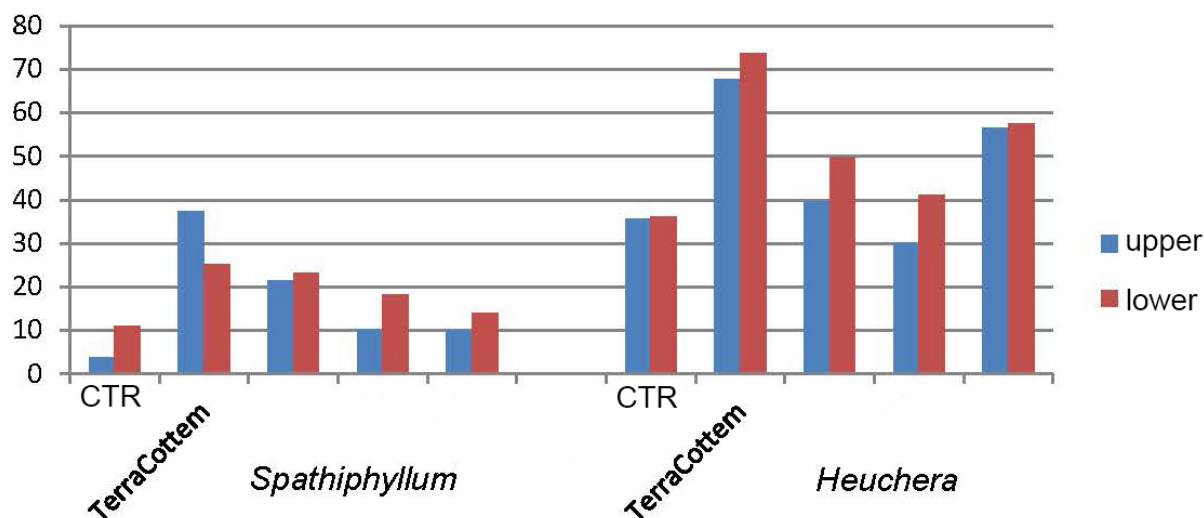


- That remained the case when the irrigation was gradually reduced and finally completely stopped. Many plants suffered under the induced drought, some of them died. Those plants treated with soil amendments containing polymers pulled through rather easily, but again the TCU treated ones survived best:



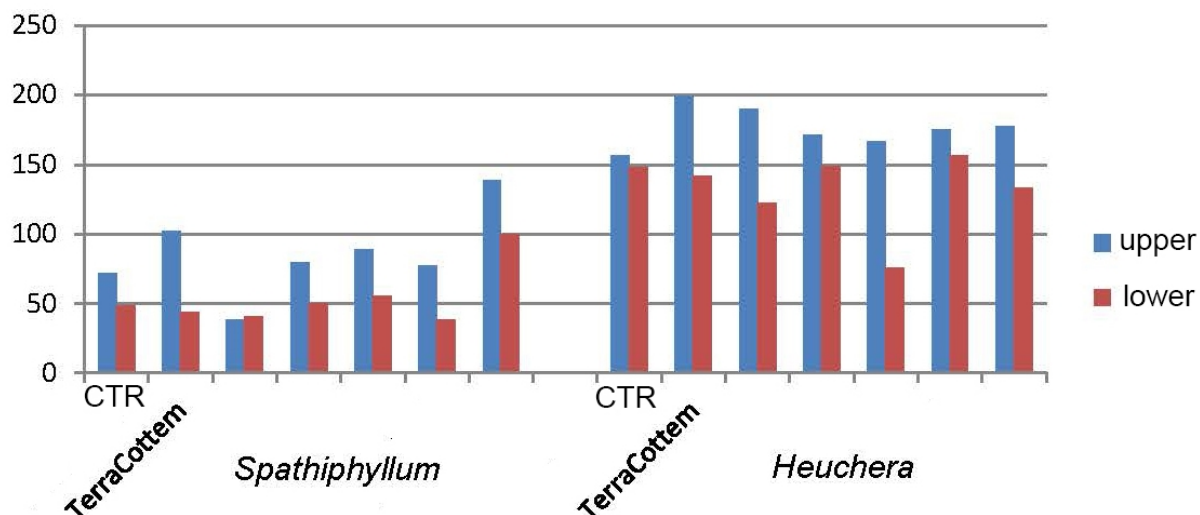
3.2 Fresh weight biomass production

3.2.1 Rockwool



- *Heuchera* biomass production was higher as compared to *Spathiphyllum*.
- Fresh weight biomass production of the TerraCottem® Universal treated plants clearly was highest, both in the upper and lower section of the tubes.

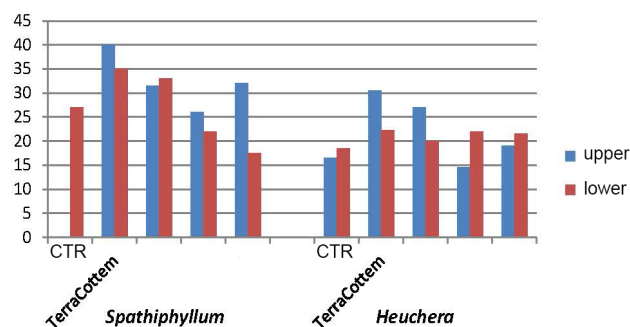
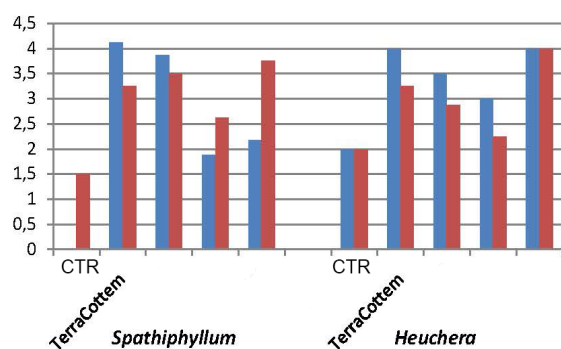
3.2.2 Potting soil



- Again, *Heuchera* biomass production was higher as compared to *Spathiphyllum*.
- Plant growth was much more pronounced in potting soil: rockwool is an inert material containing little to no nutritive elements.
- Differences in biomass production were less visible. Nevertheless, the TCU treated *Heuchera* plants scored best; the TCU treated *Spathiphyllum* came in second.
- Also, differences in biomass production in the upper and lower part of the tubes were higher. That might be explained by a higher capillarity of the rockwool, resulting in a better water distribution.

3.3 Root development

3.3.1 Rockwool



- The TerraCottem® Universal treated plants were given the highest score when visually assessing root development (left). This score was confirmed when root length was measured (right).

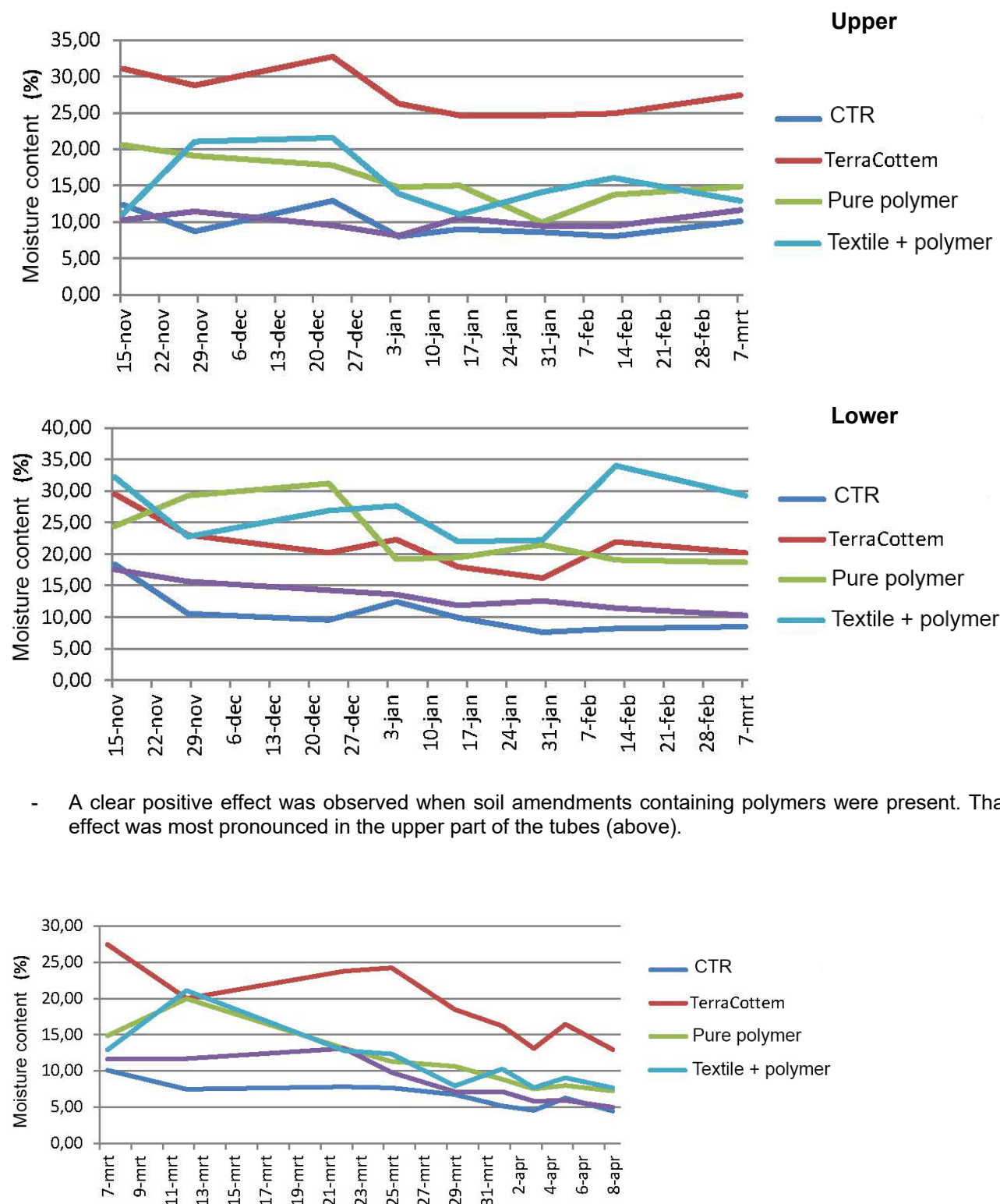


3.3.2 Potting soil

- Root development was generally higher in the potting soil, making differences less pronounced. Even the control objects scored almost equally good.

3.4 Moisture content

3.4.1 Rockwool



3.4.2 Potting soil

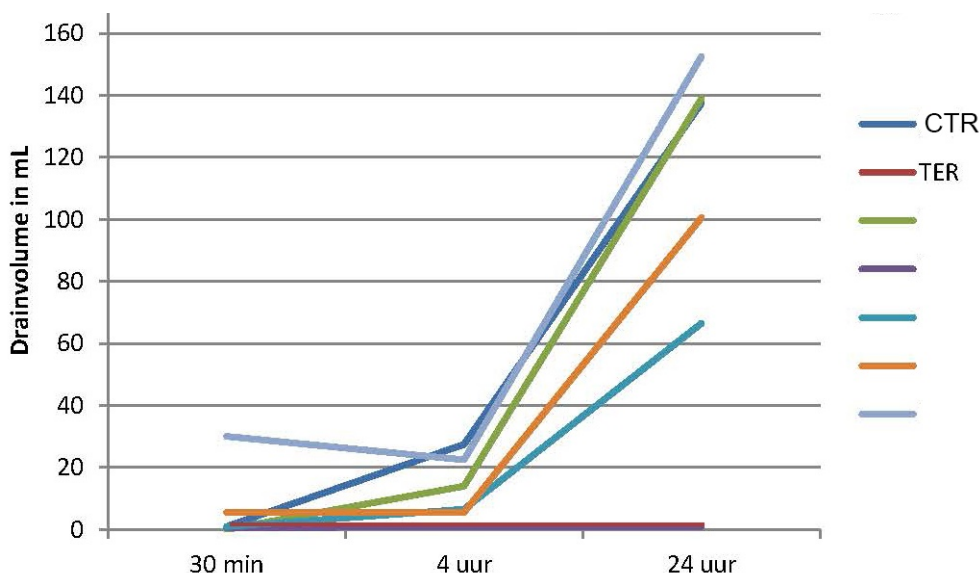
- The potting soil has a higher water retention capacity, resulting in a less expressed effect of the different treatments on the moisture content.
- Nevertheless, a positive effect in the upper part of the tubes was again observed when TCU was present.

3.5 Total water retention

3.5.1 Rockwool

- Overall, more water was retained in the rockwool as compared to the potting soil.
- Especially the polymer-containing-textile scored very well, with the lowest drain volume (and thus the highest water retention).
- The pure polymer and TerraCottem® Universal came in second.

3.5.2 Potting soil



- Both in the TerraCottem® Universal and the diatomaceous earth treated potting soil, the drainage volume was almost equal to zero.

4. Conclusions when adding TerraCottem® Universal to growing media

- ✓ More vital plants, less prone to drought.
- ✓ Highest biomass production observed in rockwool; second best in potting soil.
- ✓ Best root development in rockwool, with the longest root length.
- ✓ Most water retention in rockwool, in the upper part of the structure, with highest resistance against dehydration. An increase in WRC was also observed in the upper part of the potting soil.
- ✓ Increase in total water retention capacity, both in rockwool (2nd highest WRC) and potting soil (highest WRC).

Full report available upon request: info@terracottem.com