



SUMMARY TRIAL REPORT

The effect of TerraCottem[®] on the soil moisture characteristics of sandy soils

Research by:

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Although on the exterior one hydroabsorbant polymer may look similar to another, their chemical construction, the physical structure of the network, and especially the cross linking density can be vastly different and will affect how they absorb, store and release their contents, and will determine their toxicity, longevity and suitability for use in growing plants. This report however proves that there are significant differences in the behaviour of the various hydroabsorbant polymers that are available on the market. The polymers within the TerraCottem[®] soil conditioner belong to the propenamide and propenamide-propanoate families. They are potassium-based and non-toxic.

1. Set-up

In this study the effect on the soil moisture characteristics of 3 Spanish soil types is studied, using 3 hydroabsorbant polymer types or mixtures in 2 application rates:

| Soil type | polymers / soil conditioner | application rates |
|-----------------|---|-------------------|
| Chiva (clay) | Aquaspong [®] (H1) | 0.01% p/p (D1) |
| La Hunde (loam) | Stockosorb [®] (H2) | 0.1% p/p (D2) |
| Tous (sand) | TerraCottem [®] Universal (H3) | |

=> 6 treatments²: H1D1, H1D2, H2D1, H2D2, H3D1 and H3D2

2. Results

Figure 1 shows the 'pF – curves' of the 6 treatments.

A 'pF – curve' is the relationship between the soil moisture content and the water suction (pressure head). Suppose a heavy rain shower (or irrigation) saturates a draining soil. At this moment the soil reaches its maximum water storage capacity: the pressure head is high (pF or $10\log[-h \text{ cm water head}]$ approaches '0'). When the rain stops, the water will drain away because of the presence of the hydraulostatic pressure gradient (mainly because of gravitational forces). After a while, the water no longer drains away (compare this with a sponge saturated with water: after a while there will be no longer be water coming out of the bottom). This situation is called 'field capacity'. The 'macropores' are now free of water and filled with air. The water that is still present in the soil is absorbed against gravity in 'micropores'. The pF is now ≈ 2 . Because of evapotranspiration, the water content in the soil will further decrease (or the pF will further rise). At a certain point, the pressure head becomes so low that the plant starts to wilt

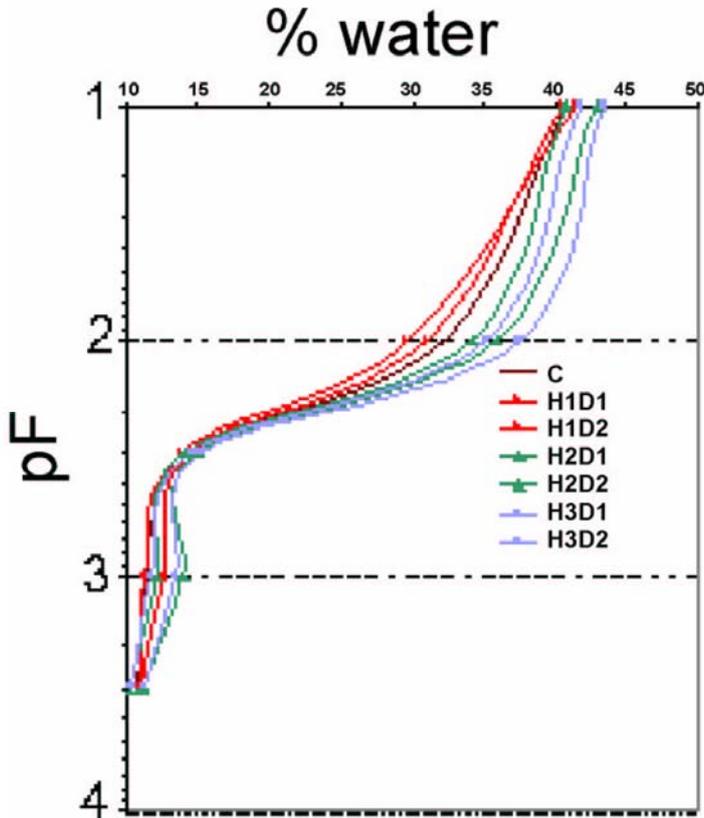
¹ Extract of the study " Influence of the type and application of hydrogel on the hydro-physical properties of three forest soils of different textures" (*Influencia del tipo y dosis de hidrogel en las propiedades hidrofísicas de tres suelos forestales de distinta textura*)

² Hydroabsorbant polymers are mainly used to increase the water retention in soils with low water retention capacity (sand). The focus in this summary is therefore on the 'Tous' soil.

and dies. The remaining soil water is absorbed so strongly, that it is no longer available for the plants. This happens at $pF \approx 4.2$ or 'wilting point'. The amount of water between $pF 2$ and $pF 4.2$ = plant available water.

| | | |
|-------|--|---|
| Thus: | $pF \approx 0$ $pF \approx 2$ $pF \approx 4.2$ | soil saturated field capacity wilting point |
|-------|--|---|

=> plant available water between $pF 2 - 4.2$



- The Aquaspong[®] polymers (red lines) have a negative effect on the amount of soil water at $pF = 2$ (field capacity) and thus on the volume of plant available water. This is the reason why great caution must be exercised when buying cheap and low quality polymers available on the market.
- The Stockosorb[®] polymers increase the volume of plant available water (green lines).
- The best results are achieved when applying TerraCottem[®] Universal (blue lines).

Figure 1. Water retention curves in the Tous soil for the 6 tested treatments

3. Conclusion

There are significant differences in the behaviour of the various hydroabsorbant polymers that are available on the market.

This trial confirms that the TerraCottem[®] soil conditioner is an effective tool to increase both the water retention of a sandy soil as well as the plant available water.

The hydroabsorbant polymers present in the TerraCottem[®] mixture do not compete with the plant for water, since the polymers release the water within the range of suction tensions that the plants can support.

Remark:

It is important to note, as mentioned in the title of this report, that it is a study on the influence of hydroabsorbant polymers' rates on hydro-physical properties of different soil types and it does not take the products' effects on plant growth into consideration. This would make the subject of another study.