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The effect of fine and coarse Perlite growing medium on the vegetative stage of English cucumber seedlings

In an experiment being conducted in Randfontein, English Cucumber (Bowing variety- Hygrotech) was sown in three tunnels. The first was sown in Cultiperl (fine perlite), the second was sown in Groperl (coarse perlite) and the third was sown in sawdust as a control tunnel. All seeds were sown directly in the respective growing mediums.

Bags of 13L were used as the growing containers and all were connected to drip irrigation: Two arrows per bag, two seeds per bag. The germination rate across the three mediums was excellent (over 90%) and seedlings were irrigated regularly allowing an average of 400cc per irrigation cession four times a day. Seedlings developed equally in the first ten days but started showing differences in growth between perlite mediums and the sawdust with no significant differences between the fine and coarse perlite medium. At four weeks from germination the seedlings in fine and coarse perlite displayed excellent vegetative uniform growth throughout the tunnels (800 plants in each tunnel).

The sawdust bags on the other hand displayed non-uniformity in vegetative growth with variations of leaf size and height of more than 20-40% amongst the seedlings throughout the tunnel lines.

The vegetative state of English cucumber is vital to the plant's overall performance in terms of production and healthy development in size. Also, the proper ratio between vegetative performance and fruit production is what causes that cultivar's success or not. The differences and variations were examined carefully to determine the cause thereof.

The plants were sown of February 18th and the following analysis information (diagram 1) shows that the best vegetative growth occurred with seedlings in fine perlite (13-14 nodes), in coarse perlite (12-13 nodes) and in sawdust (9-10 nodes). This analysis was produced on March 29th, at seedlings age of 39-40 days. The significance of early healthy vegetative growth translated into early production and probably longer growth and extended production across the growing cycle.

Another important parameter related to English cucumber analysis is the thickness of the main stem – the seedlings in both perlite mediums developed average stem of 13-14mm diameter in comparison with the sawdust seedlings stems of 9-10mm. Leaf size which is another important indication (at 5th node) developed almost the same: 30 x 30 cm (there was a slight difference in fine perlite of 35 x 30 cm.

Interim conclusions:

The differences in vegetative growth across the mediums can be related or directly affected by the ability of the medium to hold water (holding capacity). Since all mediums were irrigated at the same rate it can be concluded that seedlings in sawdust suffered from dry periods between irrigation cessions due to the sawdust nature of loosing water rapidly by evaporation (an issue that can be corrected as described later).The dry sessions are enough to cause the seedling to stunt, holding back continuance in cell build up and food production by photosynthesis.

(Diagram 1)

In simple comparison – if the sawdust seedlings were irrigated at twice the capacity they could have developed the same. The conclusion of this exercise shows that the seedling in perlite required half the amount of water and nutrients to develop to a mature producing plant versus seedlings in sawdust, which is an important economic saving.

Another significant difference was noticed at the plant's root system development. Seedlings in sawdust developed across the volume of the bag and filled it entirely within 30 days of growth. A short gap in irrigation cases such a seedling to wilt rapidly since the amount of water needed by the plant is reduced dramatically. Roots trying to expand through the bag holes dry quickly and the plants stunts until the next irrigation cession remedy the situation for a while.

We added perlite (coarse) around the sawdust bags to allow the excess drained water to be absorbed by the perlite. The result was a massive increased root system development which boosted the plant's performance significantly. The seedlings in both perlite mediums enjoyed better moist at root level and therefore developed more concentrated root systems resulting in less moist excess drain water after the plant has developed.

For more information please contact:
Ben Safronovitz on 074 134 3023 ben.safronovitz@infigro.co.za
Anita Mulqueeny on 082 370 2219 anita.mulqueeny@infigro.co.za