

Experience With Steam-Treated Peat

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MICROORGANISMS IN PEAT

Traditionally peat has been considered to be an almost sterile medium. However, it still contains microbiological activity and the conditions in the raised bog influences the composition of the microflora. Fungi thrive in the acid environment where primarily *Penicillium* dominates. Furthermore, genera such as *Aspergillus*, *Trichoderma*, *Pullularia*, *Alcurisma*, *Cladosporium*, *Cephalosporium*, and mycorrhiza-forming fungi are present. Bacteria demand more adaptation and are dominated by *Bacillus* and *Pseudomonas*, but *Micrococcus*, *Arthrobacter*, *Achromobacter*, *Chromobacter*, and *Mycobacterium* are also present. Although the microbiological growth in the raised bogs is small and very slow it should not be neglected (Küster, 1990).

PLANT PATHOLOGICAL ANALYSES

Occurrence of root pathogens is of course of special interest in plant production. Samples sent to the Danish Grower's Association laboratory for analysis during recent years show that the traditional pathogens, such as *Pythium*, *Phytophthora*, and *Fusarium* do not constitute a problem in peat. On the contrary, *Trichoderma* is found in more than half of the samples fluctuating between weak growth and very strong growth.

WHY APPLY STEAM TREATMENT?

Pindstrup Mosebrug A/S started steam treatment of peat in the production of a niche product, Fibremin Mikro, to prevent diarrhoea in young pigs. During heat treatment of this product *Mycobacterium* is removed which may cause mycobacterioses in slaughter hogs. Because the method is at our disposal we have also tested the effect of steam treatment on growth media for plants. Can, e.g., the problem with sciarid flies be solved by heat treatment? The answer is no, the nurseries themselves are contributing to the problem and during testing we could not see any difference between steam-treated and untreated peat. The problem has to be solved by other means.

The propagation of seed potatoes demands a high degree of security in order to prevent the material from being reinfected with viruses. So now the Danish Plant Directorate demands that after meristem propagation only steam-treated growth medium is used.

Recently, increasing problems with root-rot fungi resulting from a reduction in the use of effective pesticides have led to use of steam treatment as part of a possible solution.

HOW DO WE STEAM TREAT?

Steam treatment is carried out by means of high-pressure steam — a steam type with a very high energy content and high efficiency. In addition, high-pressure steam contains very little water and this means that the water content only rises 5

to 10 kg m^{-3} . During steam treatment all the peat is heated to a temperature of 100°C for a minimum period of 30 min. After treatment the peat is not sterile, but a large part of the natural microorganisms is removed. Steam-treated peat can either be delivered as it is, or *Trichoderma* may be added when the peat has cooled down. Fertilizers and limestone can be added as required before or after the steam treatment.

RESULTS

After steam treatment we have observed that native *Trichoderma* and *Penicillium* fungi strongly multiply and become dominant in the medium. The reason is probably that carbohydrates released during the heat treatment are digested by these microorganisms and that the competition from other microorganisms is very limited. In order to control the microbiological activity as much as possible you can add commercially available *Trichoderma* strains with a more aggressive behaviour to root pathogens.

The steam-treated products have primarily been tested in connection with propagation of plants and the results fall into two categories:

- 1) Appreciably healthier young plants resulting in a reduced use of chemicals.
- 2) No difference in comparison with normal practice. At present no problems with root fungi.

PEAT CHANGES AFTER STEAM TREATMENT

When using steam treated peat the following changes may be noted:

- Steam treatment will lower the pH value by 0.5. Therefore, extra limestone has to be added to get the pH value of normal practice.
- There may be a very high reproduction rate of added *Trichoderma* strains. So strong that *Trichoderma* may use all available nitrogen during peat storage. Therefore, extra nitrogen must be added.
- The increased microbiological activity in steam-treated peat will cause the peat to decompose faster, so steam-treated peat is only suitable for short growth periods, e.g. for propagation.

CONCLUSION

Steam-treated peat can be used together with biological agents for propagation of plants. In this way the application of chemical agents may be reduced considerably.

LITERATURE CITED

Küster, E. 1990. The microbiology of peat, pp. 311-324. In: A.L. Heathwaite and Kh. Güttlich (eds.). Mires: Process, exploitation, and conservation. John Wiley and Sons. Chichester.