Peat and Substrate Production: An Overview

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INTRODUCTION

As a substrate producer one is often asked whether there will we be peat enough for the next century or not. The answer is a clear yes, but we will see a bigger part of the peat coming from the eastern parts of Europe.

The area covered by peat bogs or mires worldwide is estimated to approximately 400 million ha of which about 80,000 ha are harvested as horticultural peat. Main peat reserves are in Russia (150 million ha) and Canada (111 million ha). Europe produces ca. 70% of the worlds horticultural peat, while 25% is produced in Canada.

Some years back, environmental discussions focused on the local exploitation of mires in Germany and Great Britain which have lead to a search for alternatives to peat, e.g., bark compost, wood fibres, etc. The search for alternatives will continue in the coming years. I do, however, not expect that alternative substrates without peat can provide satisfactory media for the greater part of the I.P.P.S. member's productions. At least not in the near future.

Peat bogs have their origin in wetlands or lakes. Over the centuries the peat mosses have grown more and more widely, eventually covering all of the now former lakes. The growth of peat moss is approximately 1 mm per year. When opening new areas/bogs for peat harvesting it typically takes a couple of years before the bog actually is in production. The bogs have to be drained, the vegetation has to be removed, and the surface planed before production starts. Hundreds of different mosses are found in mires and the quality of the peat for horticultural usage depends widely on the type, the variation, and homogeneity of the peat mosses which are actually found in a mire. Besides, a great difference between the top and bottom layers is seen. The bottom layer is older and hence more decomposed and generally has less structure.

Horticultural peat is generally harvested by vertically digging of peat blocks or horizontally harrowing or milling. Block peat, where blocks are cut in a layer of 80 to 120 cm per cut and stacked, generally gives the best opportunities for production of high-quality peat substrates. By harvesting and transporting in blocks the amount of small fibres or dust is minimised. Production of block peat is more laborious than milled peat, hence block peat is more expensive.

Milled peat is produced by milling/harrowing the surface of the bog. When loosened, the peat is left to dry and at a certain humidity it is collected and stored in stock piles waiting to be transported to the peat/substrate factory nearby or thousands of kilometres away. The collection of milled peat is often done with big "vacuum cleaners" (vacuum peat).

Peat has been used intensively during the last 30 to 40 years in the horticultural business. Why is peat actually used? Peat is a natural raw material which is abundantly available at a reasonable price. It has good structural stability and other characteristics which makes it superb for growing plants. The perfect relation between air and water capacity also contributes to a safer plant growth.

Peat mosses live in conditions with low nutrient/salt contents and low pH. Therefore, decomposed peat mosses constitute an ideal basis for production of horticultural substrates. You simply add what is needed of fertilisers and lime, until the appropriate level for growth of the actual plant. At the substrate-producers factory the peat is screened in various fractions, depending on what the substrate has to be used for. Often, and to a greater extend than earlier, peat from different bogs and different types of peat are mixed in the substrate, e.g., dark and white peat. After screening and mixing of the peat various other materials can be added. The amount depends on the requirements of the growers:

- Lime: Limestone and/or dolomitic lime, for adjusting the pH.
- Fertilisers: Full macro- and microelements, with immediate or slow release.
- Clay: Powder or granulate form to increase the buffer capacity and changing the wilting limit.
- Structure-keeping additives as perlite, rockwool granulates, coir, etc. The purpose is to change the air/water relations in short and/or long term.
- Wetting agents: To improve the initial water uptake of the substrate.
- Biological or chemical plant-protecting agents, e.g., against sciarid flies.

When deciding upon what type of substrate one has to use for a specific purpose many important factors must be considered: type of plant (pH, nutritional needs, healthiness of top and roots); irrigation techniques and practices; type of potting machine; pot size; and the growth period. Often it is necessary to compromise in one or more of these factors to be able to have a successful day-to-day operation.

Peat and substrates are sensitive to mechanical handling. At the factories producers are doing their best to handle the peat/substrate carefully to prevent excessive amounts of particles in the substrate. This is also very important in the nurseries. The growers have to handle their substrates carefully:

- Potting machines: Let the conveyors run as slowly as possible. If not the substrate will be milled.
- In dry substrates: Add some water to make the peat expand in the potting machines and not in the pots. Too much water will make the substrate collapse.
- Potting techniques: Press lightly when potting, to prevent compacting of the substrate.
- Transport of filled pots: If too many pots are placed on top of each other the substrate will compact.
- Initial irrigation: Lower the pressure when using overhead irrigation and give small amounts several times.

Unfortunately it is not unusual to see the structure of substrates ruined in the nurseries. Modern growing techniques are industrial and often with monoculture. Modern irrigation systems like ebb and flood often result in poor root air conditions. The reduced usage of fungicides today makes the crop more sensible to diseases. These and other factors provide a demand for higher quality growing media, which ensure a safe growth. This will be followed by the needs for better product specifications and documentation, and last but not least, a closer relationship between the substrate producers on one side and the users of substrates on the other.

Only by joint forces are we able to improve. Much of the research in the past has focused on physical aspects of the substrates. I believe that more focus will be put into the biological aspects of the growing media of which peat will still constitute a big part, since we still do have enough peat, and because the amount and knowledge of other alternatives is still very limited.

Peat Control in Nurseries and Peat Declaration

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When nurseries receive peat products for use as growing media, these should be controlled and tested to ensure quality. By doing so the nurseries can avoid any problems with low quality before they use it in plant production. Special assays and a form made for this purpose can be of great help (Hodnebrog and Selmer-Olsen, 1998). The companies who produce and sell growing media are responsible for their products and still have to control and test their own products.

ORDERING AND RECEIVING GROWING MEDIA

Always write down what you have ordered, the quantity, from whom you ordered, juncture of delivery, etc. Control the confirmation note of your order and keep it. The same person who ordered the growing media should control and do the tests when it is delivered in the nursery. That person should ask if this is what was ordered. That person should look for damaged bags and especially for dirt outside the packs, asking whether the weight is normal. Each delivery of peat should have an identification number, which follows the peat during the whole growing period. In case of reclamation this would be of great help.

QUALITY CONTROL

Take samples of the peat; the smell must be fresh. If this is not the case there can be biological activity leading to loss of nitrogen or toxic elements like sulphite and nitrite. Under special circumstances such conditions also can arise when peat is stored in the nursery. A clever nurseryman can look and feel if the peat has a light, good colour, the right fibre size, and the degree of humidification expected compared to his order and to labelling. If the peat has problems with absorbing water and holding it, it may indicate that the peat has gone through a self-heating cycle caused by microbiological activity (Timenes and Hodnebrog, 1998). Such peat has to be returned and should not be used as growing medium.

CONTROL OF CONDUCTIVITY, PH, AND NITRATE

The nurseryman can easily test conductivity, pH, and nitrate content (with nitrate sticks) in the peat before use. One extract can be used for all these tests. The water content in the peat has a great influence on conductivity, so a standardised procedure has to be used every time.