Conference 2003 Scandinavian Region©

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The conference was held in Skåne, the southern part of Sweden with its base in the folk high school in Östra Grevie. Several excursions with built in lectures were undertaken to points and industries of importance for the subject of the conference: **Rooting Substrates**. Following is a resume of the lectures and discussions.
Throughout the conference a main theme overshadowed most other concerns: Quality of the main substrate (medium) component — Sphagnum peat moss.

This concern seems to be an unending and difficult task for researchers and media producers alike, as it has been for the past 50 years, since this natural product came into general use as the sole medium component for potted plants and nursery stock. **Finn Rehnström** gave an excellent overview of the developments during the last 50 years in the use of Sphagnum peat moss and other materials for growing plants in pots and containers.

Several reports covered recent research and ongoing projects concerned with potting substrates and the problems that seem to have been a fact of life for years and still are. The central point is to establish good and reliable evaluation tests and procedures for alleviating the poor quality that sometimes is experienced by dissatisfied growers.

Anne Clemensen from the Danish Agricultural Research Institute participates in a project where advanced chemical and biochemical test methods are implemented in order to establish which parameters can be of value. Her preliminary findings indicate that the use of particle scanning gives a better result than the usual sieve method and that particle size is changed during the so-called self-heating of sphagnum peat moss batches. Self-heating is perceived as the main contributor to poor sphagnum peat moss quality. The method is, however, slow and expensive. Particle size affects the water holding and drainage capacity of a substrate but whether this alone can explain the poor growth of plants is doubtful; therefore the search continues for specific chemical or biological changes. So far the project has examined a number of suspected chemicals like glycerols, phenolic acids, and other polar compounds with known growth inhibiting effect. None of these could be related to the problems. A difficulty in this type of investigation is to produce a reliable comparison sample, since working with an organic material involves the changes that occur naturally during storage and utilization of sphagnum as a medium. Work continues with search for the culprit(s).

Sissel Ranneklev from the Norwegian Agricultural University had used a different approach; she had produced "problem sphagnum" by heating up samples and storing them for different lengths of time. This resulted in selective changes in the microbiological flora from mesophile to thermophile bacteria (*Alicyclobacillus*) and a subsequent accumulation of certain fatty acids and phospholipids which are not troublesome per se, but can serve as bio-indicators of self-heating in a stock pile. It is possible to detect these acids long time after the damage has occurred.

The bacteria disappear when temperature drops, they are aerobic, heterotrophic, and spore forming. The phospholipids formed are detected by high-pressure liquid chromatography and belong to a group called cycloheptyl or -hexyl phospholipids. The method has been successfully applied to a batch of problem sphagnum giving a several million kroner compensation to a Danish grower after being admitted as evidence in court.

During the discussion it was pointed out that the method is expensive and not suited for general use in production or crop control, but that the detection of the bacteria is not so difficult and relies on standard microbiological methods. Also it was claimed by **Göran Larsson** from the peat producer, Kronmull, that the industry had used a simple method to check for self-heating by determining whether there is sufite present. There was no explanation for why this had not alleviated the problem a long time ago.

A panel debate among chemists from soil analysis labs, advisors and growers focussed on the many different (national) standards for soil (peat) analysis and the possibilities for more uniform and meaningful information. This is becoming more and more necessary when substrates and plants are travelling around the globe, but there seemed to be many obstacles to standardization: national pride and legal restrictions, expenses and tradition.

Participants in this panel were: **Kai Ove Andersen** and **Lene Petersen** from the Danish Growers Association Laboratory, **Thomas Olsson** from a chain of labs operating in many countries across northern Europe, **Inge Magnusson** from LMI Plant and Soil Analysis Laboratory, **A.R. Selmer-Olsen** from The Norwegian State Soil Laboratory, and **Kai Lønne Nielsen** from Knud Jepsen Nurseries.

An in-depth discussion of the different standard methods occurred, and the meeting room was filled with cryptic abbreviations and acronyms — CAT, VANN-CEN, CEN-TC, Spurway, and Lakanen. Some of these methods are basically 50 or 60 years old and newer technology has been introduced, but the methods are fixed as cannon law through state regulations. Also the newest procedure (CAT) has some drawbacks since it is not optimal for determining molybdenum and aluminium. Calcium must still be determined by the older methods if great accuracy is required. The grower representative was worried about the cost and time required for the new CAT method. The EU approves both CAT and the Dutch VANN methods as standards for declarations of nutrient contents of plant growth substrates, but the translations between these are not simple. An attempt at such comparisons has been published for those who understand Norwegian (Hodnebrog, 2002).

The importance was stressed of taking samples of each new batch of sphagnum received in a nursery, sending part of it to analysis, and keeping another part as long as the particular crop stays in the greenhouse in case problems should arise that require further analysis, perhaps for litigation purposes. It is also valuable to keep a running check on the substrate during production, larger nurseries may be able to carry out the necessary analyses in house, but others will have to resort to outside commercial or state labs. Leaf and plant analysis can also be helpful in securing the well being of any crop.

Many pieces of good advice were offered by growers and experts: (1) Addition of composted bark, but be aware of manganese poisoning if pH changes too much; (2) Addition of pulverized clay 20 to 40 $kg \cdot m^{-3}$ alleviate many sphagnum peat moss problems; (3) Compalox® the phosphate complex binder used for height reduction can also fix some of the toxic substances mentioned above; and (4) Finally the good old cure-all: give a dose of calcium nitrate.

Some of these additives were more thoroughly treated in other lectures and during visits to a clay pulverising factory — Bara Minerals.

This special clay found in southern Sweden is a so-called plateau deposit from the ice age about 30,000 years ago. It is a very uniform mineral, which is free of organic matter. No weed seeds or fungi contaminate the deposits and should some come flying in during excavation they are promptly killed during the processing of the clay, which involves heating to 80 °C in large ovens. The dry clay is pulverized and separated into four uniform particle grades: 0-1 mm, 1-2 mm, 0-2.6 mm, or 2-6 mm.

Chemically this clay is composed of the minerals illit (35%), feldspar (10%), smecit and vermiculite (25%), a little kaolinit (5%). The rest is non-clay minerals such as quartz and mica. The clay has very low contents of calcium, sulphur, sodium chloride, and similar elements due to the location of the deposits very close to the surface. This has caused depletion of the soluble salts and ions; in deeper clay deposits such processes do not occurred.

Addition of the clay to potting mixes confers better water holding capacity as well as cation exchange capacity. More details about this product can be found at the address: <www.baramineraler.se>.

The Scandinavian region also includes Iceland and for the first time we had a speaker (**Anna Maria Palsdottir**) from the far north and she told us about the use of pumice in propagation and potting media. Pumice is a volcanic mineral that is produced each time the volcano Hekla erupts, so it is a renewable resource, but the deposits, which are excavated now, are about 1500 years old. Icelandic growers and nursery people would not think of growing plants without pumice either alone or in mixes.

Pumice consists of spongy, glass-like lightweight rock and has very good water holding capacity; it has been used and is presently sold as the sole medium for easy to maintain indoor plant containers.

A special paper was presented by the exchange propagator, **Ms. Stephanie Solt,** from the Eastern Region, North America. The subject of her presentation was about the collection and germination of *Trillium* seeds — *Trillium* is a native American native woodland plant Genus. The subject of this paper has previously been published in the *Combined Proceedings* and will not be further elaborated on here.

LITERATURE CITED

Hodnebrog, T., T. Krogstad, and **A.R. Selmer-Olsen.** 2002. Nye analysemetoder for dyrkingsmedier!. Gartneryrket 100(7): 15-18.