From natural peat moss to a commercial growing media constituent

Dr. Jan Köbbing, Dorothea Rammes, Gerald Schmielewski | 28th September 2017

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Agenda

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02 Sphagnum farming project at Klasmann-Deilmann

03 From peat moss to growing media

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Introduction
Amount of different growing media constituents used

**EU 16 - 2013***

- Peat: 34.552.000 m³ (75%)
- Organic: 5.020.000 m³ (11%)
- Compost: 2.420.000 m³ (6%)
- Mineral: 3.486.000 m³ (8%)

**Germany - 2013***

- Peat: 8.373.000 m³ (81%)
- Organic: 733.000 m³ (9%)
- Compost: 510.000 m³ (6%)
- Mineral: 310.000 m³ (3%)

**Klasmann-Deilmann - 2016***

- Peat: 3.486.000 m³ (83%)
- Organic: 178.000 m³ (5%)
- Compost: 110.000 m³ (2%)
- Mineral: 76.000 m³ (10%)

*Data from: Schmilewski, G. 2017.

EU 16 = Austria, Belgium, Denmark, Estonia, Finland, France, Germany, Ireland, Italy, Latvia, Lithuania, Netherlands, Poland, Portugal, Sweden, UK
**SUBSTRATES**

Growing media constituents at Klasmann-Deilmann

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**Alternative Raw Materials**

- Share of total production 2016: 6.8%
- Our target: Obtaining 15% of our raw materials from alternative sources

**Food Industry**

- Share of total sales 2016: 43.5%
- A growing share of our substrates contributes to food production
Introduction
Professional gardening today
In 2013 already 8,000 m³ Sphagnum were imported by The Netherlands, France and Germany

Schmiedewski, 2017
EU Sphagnum imports

- **Sphagnum** is imported from:
  - Finland: Harvest from unprofitable, drained peatlands (Silvan et al. 2017)
  - Chile: Manual harvest from *Sphagnum*-dominated wetlands (Díaz & Silva 2012)
  - Australia/ New Zealand: Harvest from natural sites
  - USA: Harvest from marsh sites

- Sphagnum is imported to:
  - The Netherlands, France, Germany and so on
  - In 2013 around 8,000 m³ (Schmielewski 2017).

- Sphagnum so far is mainly used for:
  - Orchids, gardening or terrarium
02

*Sphagnum* farming project at Klasmann-Deilmann
**Sphagnum farming project at Klasmann-Deilmann**

- Cultivation of hummock peatmosses (*Sphagnum* species), harvesting and processing to obtain a growing media constituent
- Establishment of two 5 ha large test sides following peat depletion. Residual peat layer of strongly decomposed (black) peat
- Investigation on animals (invertebrates), plants and greenhouse gas emissions by the University of Hannover (Dr. Martha Graf) and the Thünen-Institute Braunschweig (Dr. Bärbel Tiemeyer)
- Co-Funded by the Ministry of Food, Agriculture and Consumer Protection of Lower-Saxony and the German Foundation Environment (DBU)
Project sites

*Sphagnum* farming site

'*Sphagnum-Bank‘' - growing new donor material
Establishment of sites

- Harvest of donor material
- Inoculation of fields with mosses and protection with straw
- Established Sphagnum lawn after 1 year
03

From peat moss to growing media
Donor material
Procurement of donor material is difficult!

- Harvesting inoculation material from natural/near-natural bog sites.
  → High bureaucracy, most sites are protected.

- Other methods of propagation needed for scaling up Sphagnum farming.
  → We set up a „Sphagnum-Bank“ for growing new donor material.
Farming sites
Where to grow in Germany?

- On grassland bogs
  - High contamination with weeds -> excavation
  - High nutrient occurrence in soil and water
  - But lower land price compared to farmed bogs
- On cut-over bogs
  - Are either designated as conversation sites
  - Or have a high price

→ subsidies are needed
Cultivation & Harvesting

- Low productivity of mosses → test of different species & species selection
- Colonization with weeds → regularly mowing until lawn established
- Challenging hydro management (irrigation, drainage, availability, quality)
Contaminations (impurities)

- 90-98% of the donor material contains of *Sphagnum*
- RHP quantity threshold: <15 plants per m²
- Untreated *Sphagnum* material showed partly >600 plants per m²

→ *Hygenization is indispensable when Sphagnum is processed to horticultural substrate!*
Hygenization methods

By hand

Weed out all visible parts of vascular plants and other non Sphagnum pieces.

→ not practicable

Gamma radiation

6 KGray

Waste heat biogas plant

60°C dry heat for 5 days, thickness 20cm

Vapour

90°C wet hot steam in existing facilities for 20min
Processing

- Chopping
- Drying
  - Air drying
  - Using waste heat (biogas plant, etc.)
  - Other methods?
- Determination of volume weight
  - The dry material is more difficult to handle
  - Different methods are used to determine volume
  - *Sphagnum* can vary widely in moisture content
  - Long fibres have a higher volume/weight ratio than chopped *Sphagnum*
  - Volume/weight depends on *Sphagnum* species

Moisture reduction from 90% to 20%
Creating a growing media constituent

- Hygenised and dried *Sphagnum* is mixed with (white) peat to create growing substrate.

- Depending on *Sphagnum* species and culture grown in the substrate, *Sphagnum* can replace peat up to 100%.

- Still under research:
  - Which *Sphagnum* species can be used for which culture and in which amounts?
Cultivation

- First trials show outstanding results as growing media!

**Impatiens Neu-Guinea**

**Sainpaulia ionantha**

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<thead>
<tr>
<th>Substrates</th>
<th>Fresh weight [g/plant]</th>
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<tr>
<td>Mix 1</td>
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<td>30</td>
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<tr>
<td>Mix 10</td>
<td>20</td>
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</tbody>
</table>

Peat 25% 50% 75% 100%
Conclusion
Conclusion

- Fresh Sphagnum moss has shown its suitability as a growing media several times

- The peat industry would be highly interest if its available in required quantity, quality and price

- But:
  - Natural sites are limited
  - And artificial sites still have to overcome a number of obstacles.
Thank you for your attention!

Dr. rer. nat.

Jan Felix Köbbing
Head of Sustainability Management
Land Use and Sustainability Management

Klasmann-Deilmann GmbH
Georg-Klasmann-Straße 2-10 | 49744 Geeste | Germany

www.klasmann-deilmann.com
References


Mossman381. 2014.Moss Harvesting at The Marsh Pulling Wet Sphagnum Moss. https://www.youtube.com/watch?v=gLxIgaxQ7WM