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PHASING OUT PEAT AS GROWING MEDIA – IS IT POSSIBLE?

Kirsty Mckinnon* [1]

[1]Norwegian Centre for Organic Agriculture, Tingvoll, Norway

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Abstract: In areas with a limited outdoor growing season, pre-cultivation is an option. Pre-cultivation may also be an advantage in organic growing in order to give vegetables and herbs a head start on weeds. Good quality seed and transplanting media suitable for organic growing is of utmost importance for a satisfactory economic outcome. There is also an increasing demand for peat free or peat reduced products. In tests conducted by The Norwegian Centre for Organic Agriculture (NORSØK) it was shown that commercial products, both peat based and peat free, don't always perform as intended resulting in low quality transplants. Some self-made products based on horse manure and leaf mould were tested, a few of them produced transplants of good quality. Some modifications need to be done, especially in order to reduce weed seeds.

Introduction: Pre-cultivation of vegetables and herbs is often required for field production due to short growing season. Good quality soil products that are adapted to the needs of transplants of various species, are of great importance for satisfactory plant development and thus economic outcome. Products of poor quality can have major financial consequences for plant producers. The demand for peat free or peat reduced potting media is increasing and governments in several countries are implementing strategies in order to reduce or replace the use of peat in horticulture. A main reason is that peat mining is questioned both because wetlands are fragile ecosystems with several endangered species and because mining causes greenhouse gas emissions. Peat free potting mixtures need to meet satisfactory physical, biological and chemical qualities and the substitutes need to be free from soilborne pathogens and weed seeds. The Norwegian Centre for Organic Agriculture (NORSØK) has conducted research on the topic, also in cooperation with the project *Pathways to phase-out contentious inputs from organic agriculture in Europe*, (EU Horizon 2020), where peat-free media for organic plant production is a highlighted project issue. New soil products are constantly being introduced to the market. Several of these can be used in organic production. Based on product declaration and descriptions of use, commercial plant producers as well as small-scale gardeners should be able to expect the products to meet desired quality criteria.

Material and methods: The Norwegian Centre for Organic Agriculture in Tingvoll, Norway, conducted a test in 2016 (Test-1) on eight selected commercial transplant/potting media, permitted for use in organic farming, both peat based and peat-

free in addition to three self-made mixtures. The commercial products were Organic soil, peat free, produced by Farmergødning in Denmark (1), Hasselfors Garden, peat based, produced by Hasselfors Garden AB, Sweden (2), Hasselfors Ecojord, peat based, Hasselfors Garden AB, Sweden (3), Weibulls så- og kaktusjord, peat based, produced by Econova , Sweden (4), Simontorp blomsterjord, peat based, produced by Nordic Garden, Norway (5), Øko pluggtorv, peat based, produced by Degernes torvstrøfabrikk, Norway (6), Økotorv grov, peat based, produced by Degernes torvstrøfabrikk, Norway (7), Wool compost, peat free, produced by Dalefoot composts, England (11). The self-made mixtures were leaf mould, peat free, developed by NORSØK, Norway (8), horse manure compost, peat free, developed by NORSØK, Norway (9), Mix of 8 and 9, 2:1 by volume (10). Horse manure was collected with as little wood shavings as possible before composting, composted for 2 years and turned and mixed twice during the process. Autumn fallen leaves of birch were gathered in heaps and left to decay for three years and turned three times during the process. The heaps of leaves and horse manure were covered with TopTex compost fleece. Iceberg lettuce, variety 'Diamantinas', cauliflower variety 'Goodman' and squash, variety 'Uchiki Kuri' were used as test plants as they have different nutritional requirements. The trial was conducted with three replicates. Plants were raised in modules (Vefi 54 for cauliflower, Vefi 96 for iceberg lettuce) and pots (75 mm x 60 mm for squash) 40 days for cauliflower and lettuce, 26 days for squash with artificial lighting and ebb/ flow watering system. Seed germination was recorded on day 3, 6 and 26 after sowing in Test 1 and on day 3,4, 6 and 40 in Test 2. Due to an error the recordings for cauliflower and lettuce germination in Test 1 are not evaluated. Under and over ground plant development and occurrence of weeds was assessed visually and fresh and dry weight was measured.

In September and October 2019, the experiment was continued with self-made mixtures (Test 2), in this trial based on autumn leaves decayed for 1 year (L1), 2 years (L2), 3 years (L3) and horse manure composted for 1 year (H1), 2 years (H2) and 3 years (H3). A commercial peat reduced media (Bio-Herb Substrat from Klasmann-Deilmann) was used as a reference (0). The same setup as in Test 1 was used, except squash was not includes in the test. Composts and plant material will be analysed for plant nutrients and fresh manure and newly fallen leaves for heavy metals. These results will be presented later.

Results: There were major differences in the development and growth of the transplants in Test 1. Based on visual assessment of plant and root development and results of wet and dry weight measurements of transplants after 40 days, the quality of four commercial products (2,4,5 and 6) were evaluated as unsatisfactory. Two of them (2 and 5) were considered completely unsuitable for the purpose. The self-made soil mixtures yielded good quality plants but contained too many weed seeds. Only one of the commercial products (1) contained weeds. Test 2 showed that horse manure compost, H1, produced iceberg and cauliflower plants of satisfactory quality. Leaf mould, L1, produced poor transplants, the quality of transplants increasing with age of the leaf mould, L2 and L3. Seed germination for squash in Test 1 was quickest and most even in product 2 followed by product 8. There was a tendency towards delayed germination in product 1 and reduced germination in product 11. In Test 2 there was a slight delay in germination in treatment 0 and H1 and a slightly reduced germination overall in treatment 0 for both cauliflower and lettuce, probably caused by the higher levels of ammonium-N in both product 0 and H1 compared to the other products.

Discussion: Plant producers should be able to trust that commercial seed- and growing media perform as claimed. Test 1 indicates that this is not the situation. Quick and even germination combined with good plant development are important requirements, likewise that the products are weed free. Weed content can cause major additional costs for commercial plant producers. For small-scale producers, this is of less importance. In order to ensure that growing media are of good

quality before introducing them to the market, germination tests should be mandatory, and results presented on the product declaration. As soil or compost products are “living” materials their properties might change over time and should therefore be regarded as fresh stock. For that reason, it is desirable that the production date is stated. Product quality may also vary from batch to batch and the composition of a given product might change over time. The results from Test 1 are therefore only of value to state the possibility that some commercial growing media might be of unsatisfactory quality and are not valid to claim that a special product in general is of bad quality. Even though peat products have been dominant in horticulture for decades due to their appropriate properties, results from Test 1 and Test 2 show that peat might be replaced by other materials. Composted horse manure and leaf mould are possible substitutes, so also several other materials as described by e.g. Barret et. al. (2016). There is, however, a need for further development of products, both regarding nutrient content and supply as well as physical properties to meet the needs of different plant species and a varying nutrient demand through the pre-cultivation stages.

References:

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Image:

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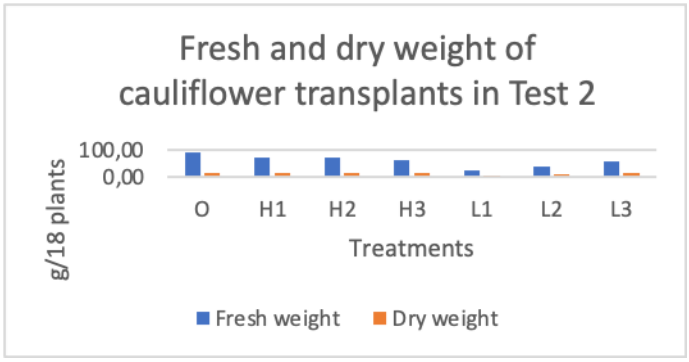
Fresh and dry weight of cauliflower transplants in Test 2
100,00
0,00
g/18 plants
O
H1
H2
H3
L1
L2
L3
Treatments
Fresh weight
Dry weight