SPHAGNUM MOSS AS A ROOT MEDIA COMPONENT

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Sphagnum moss has been used for many years for germinating seeds, air layering of plants and for growing plants (or wrapping them) for shipment. Creech et. al. (1955) gives a good description of these practices. The moss has also been added to soil mixes or other root media on some occasions but, since it has been more expensive than other components, it has not been widely accepted.

Sphagnum moss grows in acid bogs. The accumulation of moss in these bogs over the centuries partially decomposes and forms the sphagnum peat so widely used in root media. Millions of bales are imported every year. In some countries the peat is burned as fuel in large quantities. Even so, the peat resources of the world are still increasing.

Harvesting the moss from the surface of the bog is practiced principally in Wisconsin in the area which was Glacial Lake Wisconsin. These are shallow bogs where the moss is harvested about every seven years. As such, it is a renewable resource harvested much like any other agricultural crop. With efficient mechanical harvesting, it may be possible to market it in competition with other root media components.

There are several advantages to using sphagnum moss in root media. One reason for using it in seed germination is to reduce loss from damping-off organisms (Creech et. al. 1955). The leaves and stems are principally made up of specially constructed water-holding cells which continue to function in a root medium. This provides increased water holding capacity at the same time that it increases aeration. If the moss is chopped into pieces approximately 3/4" in length, it also increases "bridging"

in the medium, increasing aeration further. In comparison with a mix of 2 soil:2 peat: 1 vermiculite:1 perlite, substituting moss for the peat increased air space from 11.4% to 18.5% while increasing water holding capacity from 50.1% to 54.3%.

A series of nine experiments were conducted to test the efficiency of incorporating moss in the soil.

1. In a preliminary trial, root rot (possibly Pythium) in pot mums did not occur in moss amended medium. Subsequent attempts to test pathogen control were unsuccessful since no disease was found in the controls.

2. Seeds of broccoli, tomato and marigold (two cultivars) were planted in triplicate in three root media [2:2:1:1 soil-peat (or moss, or half each)-vermiculite-perlite]. This was amended with dolomitic limestone (12 Kg)*, 0-20-0 (3 Kg), Osmocote 14-14-14 (1.7 Kg) and Electra 5-10-3 (1.7 Kg per cubic meter).

The plants were thinned to one per pot about five weeks after planting. The seedlings which were removed became Experiment 3.

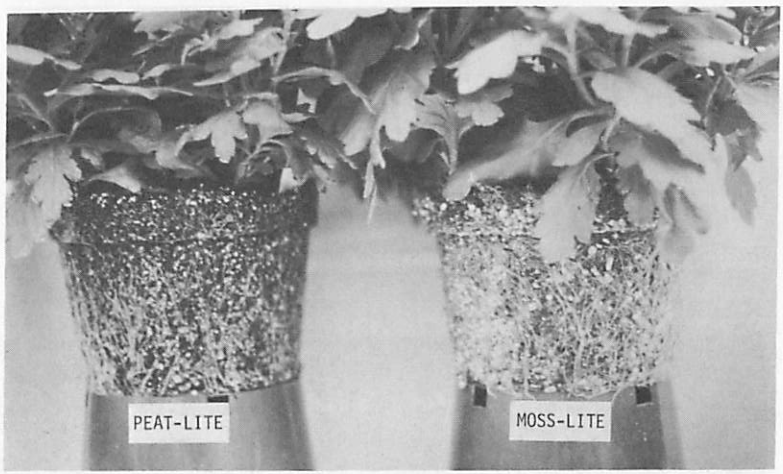
Fertilizer (19-4-24 at 345 ppm N) was applied at weeks four and five. Plants harvested at weeks 10 and 11 indicated insufficient fertility in the mixes that contained sphagnum.

3. A 1:1 peat-vermiculite or moss-vermiculite was compared with the 2:2:1:1 soil mix described above and with 100% moss. The moss-lite mix produced better plants (same plants as in experiment #2) than the soil mix control. The 100% moss did not provide sufficient nutrition.

**To change Kg/cubic meter to lbs/cubic yard, multiply by 12/3.*

4. 'Glowing Mandalay' pot mums were planted in 15 cm plastic pots on 1/27/81. Root media were 2P:1:1 (peat:vermiculite: perlite) and 2M:1:1 (moss:vermiculite:perlite) with 10 replications and fertilizers as in Experiment 2. Liquid fertilization (19-4-24 at 345 ppm N) was begun immediately at 10 day intervals.

The average height in both media was 29 cm (no growth regulators were used). Both treatments had equal numbers of branches and were of equal commercial quality. Root growth was obviously better in moss-lite (Figure 1).



5. Six media were used as follows:

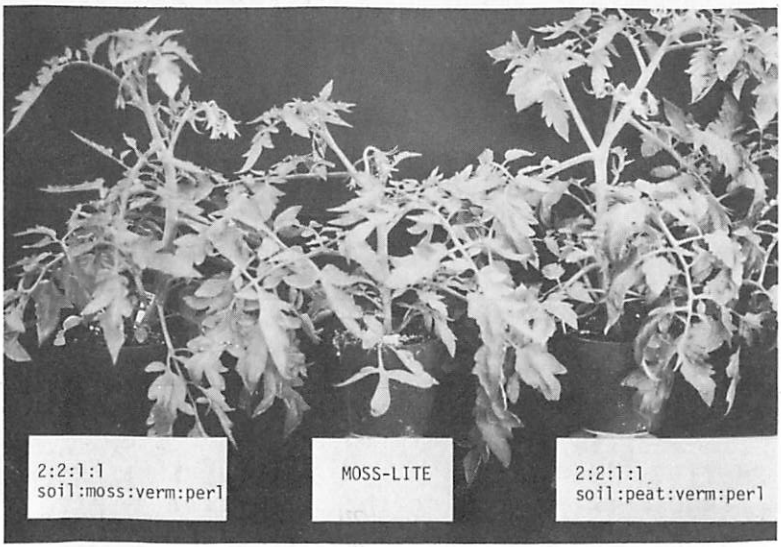
	Soil	Peat	Moss	Vermiculite	Perlite	Limestone
2:2P:1:1	2	2		1	1	15 Kg/m^3
2:2M:1:1	2		2	1	1	12
2:1P:1M:1:1	2	1	1	1	1	15
2P:1:1 (Peat-lite)		2		1	1	15
2M:1:1 (Moss-lite)			2	1	1	12
Pro-Gro 300	commercial product					

In addition to the variable limestone rates listed above, 3 Kg 0-20-0 and 1 Kg each Osmocote 14-14-14 and Electra 5-10-3 were incorporated per cubic meter of medium. The moss in this experiment was chopped to a finer consistancy than in previous experiments. Weekly liquid fertilization (19-4-24 at 345 ppm N) was begun when plants were a couple of inches tall.

Seeds of tomato 'Long Keeper' were sown 3/1/81 with five replications. Germination was slow and erratic. Moss chopped to this consistancy (pieces up to 1 1/2" long, average length 1/2") does not provide a good substrate for seed germination.

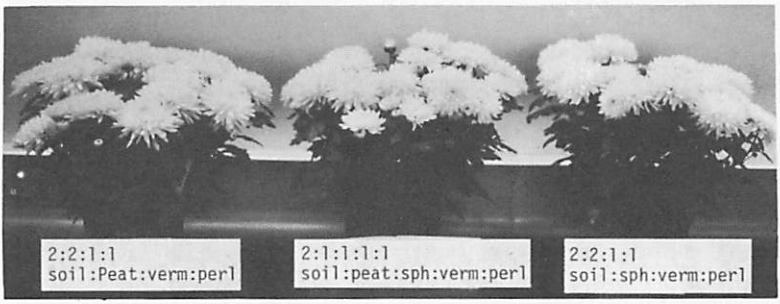
Tomato growth was excellent in 2:2P:1:1 and 2:1P:1M:1:1; less in 2:2M:1:1, 2P:1:1 and Pro-Gro; least in 2M:1:1 (Figure 2). This indicates that moss may be substituted for perhaps half of the peat but should not be used to replace all of the peat.

Marigold growth followed a similar pattern.

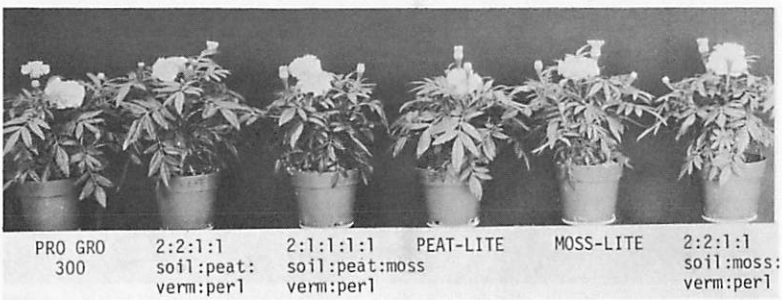


6. 'Sunny Mandalay' chrysanthemum rooted cuttings* were planted on 3/2/81 in media as outlined in Experiment 5 with the same nutrients. They were planted, five cuttings per 15 cm pot with three replications and fertilized weekly with 19-4-24 at 345 ppm N.

Root growth was more extensive in media containing moss. Nutrition appeared to be better than in previous experiments and the fresh weight at harvest in moss-lite was the same as in the soil-peat-vermiculite-perlite standard mix. All plants were of excellent commercial quality.



7. Root media were as in Experiment 5. 'Moonshot' marigolds, about 5 cm tall (previously transplanted), were potted (six replications) on 3/26/81. Pictures taken 5/4/81 show that growth was similar in all media. But fresh weight at harvest (4/30/81) was less in media containing moss.



(Supplied through the courtesy of Stafford Conservatories, Stafford Springs, CT.)

8. Twelve cuttings of 'Sunny Mandalay' were planted in soil suspected to be infested with Rhizoctonia solani. No disease developed on the plants in moss amended media or the control soil.

9. Broccoli and lettuce seedlings were planted in 11 cm pots on 5/10/81, two replications in each of the six mixes of Experiment 5 except that about 11% soil obtained from diseased flats of pepper seedlings was incorporated.

Damping off occurred sporadically. There was an indication but no conclusive evidence that sphagnum moss provided protection for these seedlings against damping off.

SUMMARY:

1. A series of nine experiments indicates that sphagnum moss improves root media more than sphagnum peat by increasing water holding capacity at the same time that it increases aeration.

2. There is a good probability that the therapeutic properties of sphagnum moss may suppress soil-borne pathogens.

3. Heavy soil mixes should be improved more by sphagnum moss than by peat.

4. Adjustments in nutrition may be necessary but minimal.

5. Sphagnum moss is suggested for trial as a substitute for half the peat in root media.