CULTIVATION OF SPRUCE SEEDLINGS IN MIXTURES OF PERLITE AND SPHAGNUM PEAT IN NORWAY

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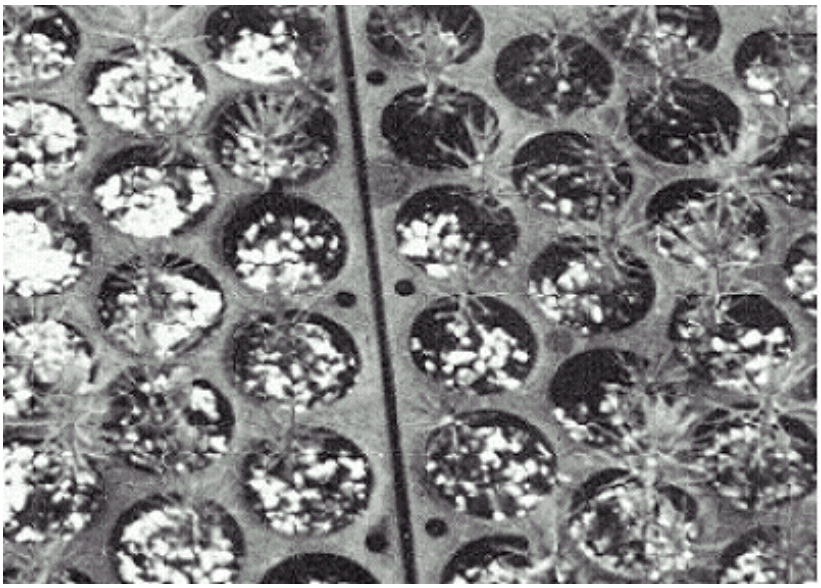
Norwegian forest plant nurseries began to change from bare root transplant production to plugplant productions in 1971. This trend will continue until virtually all forest plants grown in Norway will be produced in some form of container with a growth substrate which is more or less artificial.

Perlite as a Seedcover
In commercial plugplant production in greenhouses, spruce seed is initially sown on the surface of 100% sphagnum peat of the least degraded type. A perlite seedcover is applied over the sown seed. This procedure is particularly effective with spring seedlings because of the sharp sun with high radiant energy and high daytime temperatures.



Indirect Effect of Perlite Seedcovers
In areas of Norway with moist and cold weather, a common problem in the development of mosses and algae on the surface of growth substrates. This can create a poor growing environment for seedlings - especially in the initial stages of plant development as the algae seal the substrate surface and do not allow water to penetrate nor gas exchange to occur. Seedlings are not as adversely affected when perlite seedcovers are used.

Perlite in the Growth Substrate

A great disadvantage of using peat as a growth substrate since the latter part of the 70's has been the tremendous variations in peat quality. These variations in quality have caused inconsistencies in the amount of air that peat can retain at full water saturation. In addition, as seedling growth usually takes place through two seasons, there is additional degradation of peat which leads to further reduction of the substrate quality. This is particularly important as the second year of growth is outdoors and is of decisive importance.

Effect of Perlite

Growth substrates used today in Norway contain 25-30% perlite. Previous studies indicate that peat alone is a risky growth substrate and that a mixture of 75% peat and 25% perlite reduces this risk to an acceptable level. Properties of several peat/perlite substrates are summarized in the Table.

Properties of Several Peat/Perlite Substrates				
	Mix, %	Volume Space	Percentage, Water	% Air
Peat	100	96.9	82.3	14.6
Peat/Perlite	75/25	96.3	72.3	24.0
Peat/Perlite	50/50	95.9	66.5	29.4
Perlite	100	94.3	51.0	43.6

Evaporation rate studies with different substrates indicate that the evaporation rate in perlite/peat substrates is less than that for 100% peat substrates when the water content decreases.

Side Effects of Perlite

Work by the Norwegian Forestry Society with 75% peat, 25% perlite substrates indicates that the filling of containers is much more predictable than when peat alone is used. Filling is less dependent on the water content of the peat and the peat particle size. In the latter stages of seedling growth it is also clear that peat/perlite substrates do not sink in the container as does peat alone.

Other Materials Studied

Polystyrene Beads - Our studies have indicated that polystyrene beads do reduce the water content in growth substrates but that they do not increase air content. **Rockwool -** Another material studied was granulated rockwool. This material provides good air content but, with 100% rockwool, total water content is less than satisfactory during transport, storage in the forest and after planting. In addition, mixtures of peat and rockwool do not permit consistent container filling with equipment available today. Another consideration with rockwool is that Ca cations may be leached out during production. This can have two distinct effects on the growing substrate. Firstly, pre-treatment with dolomite limestone can be avoided if few Ca cations are leached, the spruce seedlings may suffer from nutrient deficiency. In addition, excess calcium will speed up the degradation of the peat.