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Experience Using Controlling Seed Moisture Content During Stratification to Improve Germination on the Nursery[©]

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INTRODUCTION

My business offers seeds and seed treatment services to the large number of tree nurseries in the Zundert area of The Netherlands and produces plug-grown nursery stock seedlings. We use a seed stratification technique based on controlling the moisture content in the seeds. The aim is to reduce premature germination while increasing the proportion of seeds which go on to break dormancy and germinate after sowing.

This paper explains how the technique is applied to *Acer platanoides* and *Fagus sylvatica*, with reference to the traditional stratification treatments for each species. The treatments and germination results shown are based on our own trials and experience.

SPECIES

Norway Maple (*Acer platanoides*).

Traditional Treatment. Seeds are dipped twice in 24 h in water, mixed with sand or peat, and kept at 4 °C for 8 weeks, moistening lightly once a week.

The disadvantage of traditional stratification is that it is difficult to control. It can result in the premature germination of a proportion of the seeds during the stratification period but does not bring all the seeds out of dormancy after sowing.

Moisture-Controlled Stratification.

- Weigh seeds into bags (a large number of smaller bags makes it easier to take samples for moisture checking during the stratification period).
- Take a sample of each batch of seeds to calculate the initial moisture percentage.
- Weigh the sample and then place in an oven for 17 h at 105 °C to remove all moisture but not the oils. Weigh the sample again. The difference in weights is used to calculate the moisture content as a percentage of weight for the seed batch. This figure is used to work out the amount of water to add to the batch to maintain a given moisture content.
- The optimum moisture content to maintain for *A. platanoides* is 36%. This does need to be strictly controlled because 34% is too low, causing the seeds to dry out, while 38% is too high, sufficient to trigger premature germination.

- Add the required weight of water and mix with the seeds in the bag.
- Place the bag of seeds in a refrigerator or cold store at 4 °C for 16 to 20 weeks.
- Re-mix and check the moisture content of the seeds being treated every week.

The advantages of moisture-controlled stratification are:

- Seeds can be kept under the cold treatment for twice as long as in traditional stratification. This allows time for a higher proportion of the seeds to break dormancy, resulting in faster and higher percentage germination of the batch after sowing and enables the seeds to germinate over a wider temperature range.
- All viable seeds will break dormancy because of the longer cold treatment period.
- Controlling the moisture content prevents germination during stratification.

One disadvantage is that the treatment takes up more space in cold storage because of the small number of seeds per bag, especially with winged-seeded species such as *A. platanoides*. The other is the need for precise measurements and accurate calculations required to maintain the moisture content of the seeds within tight limits.

Germination Results. Fifteen weeks of cold treatment results in 34% germination; 19 weeks results in 78%.

European Beech (*Fagus sylvatica*).

Traditional Treatment. As for *A. platanoides* above, except that seeds are stratified for 8 to 12 weeks, at which point the first seeds may start to germinate.

This type of stratification has the same disadvantages as when used with *A. platanoides*. In addition, premature germination is particularly likely if the seeds are kept in stratification beyond 12 weeks. Seeds sown from this treatment may exhibit low germination rates if soil temperatures are high.

Moisture-Controlled Stratification. Seeds are weighed and bagged and moisture content determined as for *A. platanoides*.

The optimum moisture content for *F. sylvatica* is 30%; 28% is too low and will result in the seeds drying, while 32% is too high and will lead to premature germination. This should be maintained as described for *A. platanoides*.

Stratify at 4 °C for 16 to 18 weeks, checking moisture content and re-mixing weekly.

The advantages are the same as for *A. platanoides*. The disadvantage is the precision required to maintain the correct moisture level.

Germination Results. Ten weeks of cold treatment gives 54% germination; 16 weeks gives 82%.