

Experiment Design

Material: 20 SE clones × ramets 5~25 = 195 trees (potted), 3 treatments (open air, shade medium and shade high), and 3 blocks. All 195 trees were infested with adelgids for twigs. 13 trees dead in 2022 due to the water pipe slipping out from growing pots.

Location: Kirstineberg A/S



Open-air

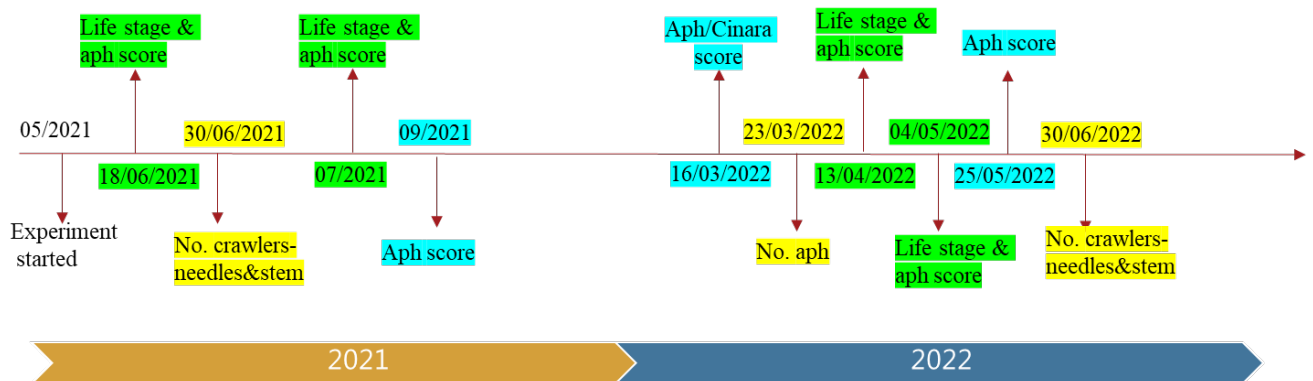


Shade-medium



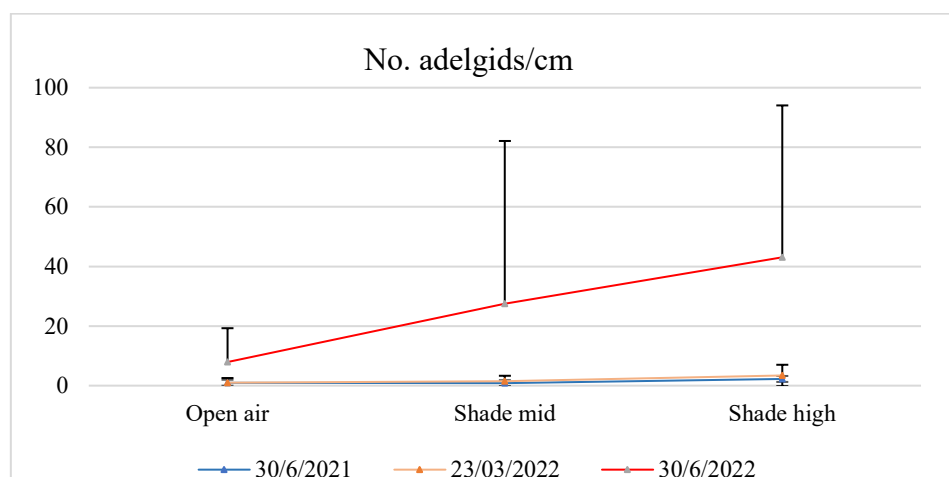
Shade-high

Timeline and activities



Results

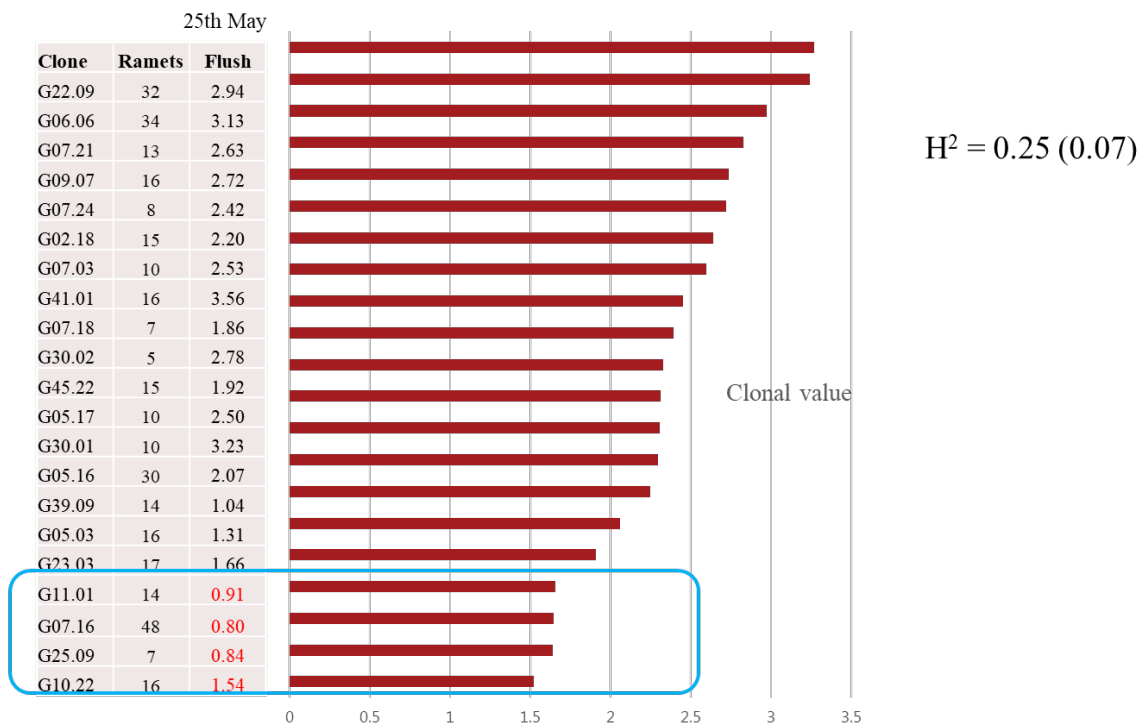
The number of adelgids per cm is significantly different between treatments, shade high has the highest amount of adelgids on infested twigs, while open air has the least amount of adelgids. The number of adelgids increased significantly from 2021 to 2022 for all treatments.



Genetic variation

There is a significant difference in the predicted clone value for adelgids score (0-4, 4 =highest score).

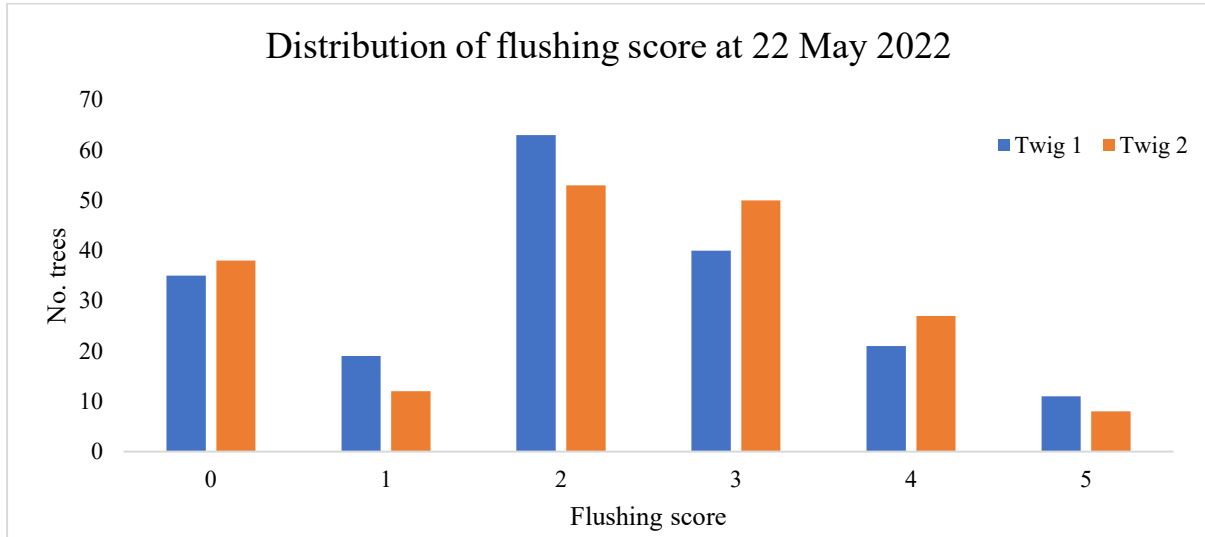
Genetic makeup explains 25% of the observed variation. The most resistant clones flush late.



Escaping or resistance?

For adelgids, the life stage is active from March, the earliest already start to lay eggs at end of March (very few), the majority start to lay eggs in the middle of April, and all the adelgids finished lay eggs at end of May. The eggs will become crawlers to move to new needles.

For Nordmann fir, it starts to flush from the beginning of May to June.



Score 2

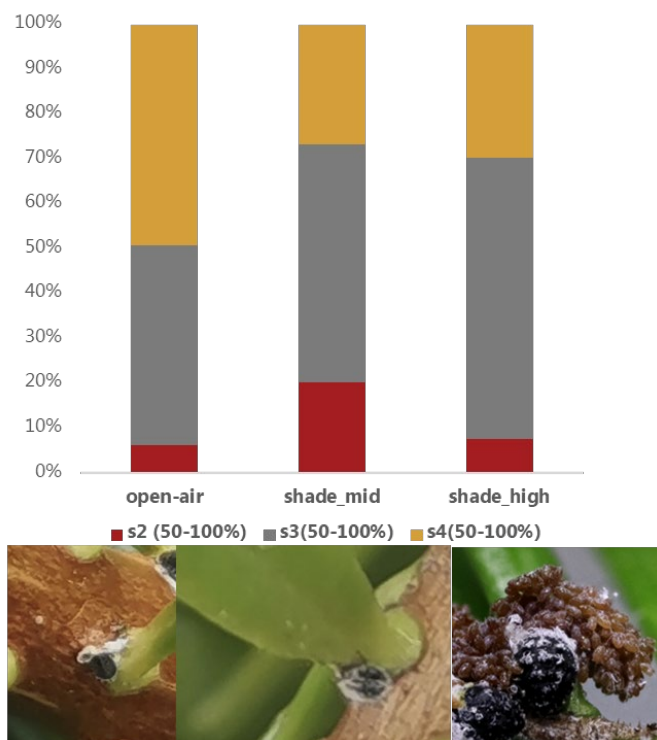


Score 5

Shade delay adelgids development

We followed the life stage of adelgids intensively and noticed that adelgids develop earlier in open-air than in shade treatment. Take 13th April 2022 as an example, **in the open-air treatment, on average more than 50% of adelgids in infested trees are at stage laying eggs (S4)**, however, on the same day, most adelgids at shade treatments (both mid and high) are about to lay eggs (S3). Shade has no impact on clone flushing time. So, trees flush as normal time, however, adelgids at shade treatment delayed their life stage slightly, increasing their survival rate in the late flushed trees.

13th April 2022 Adelgids development stage



Does rain also matter?

There is a significant difference in the rainfall under the three treatments.

