Trees: on your marks, get set, grow!

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Göttingen University researchers show size matters from the start for beech seedlings.

The fight for survival in the forest is fierce: light, water and nutrients are all limited. This is particularly true in “mast years” – times when trees and shrubs produce an unusually large crop of fruits, nuts, or seeds. Then the race for growth is really on. But can differences in height between trees in their first year of life make a difference to their future, even if these differences are just one or two centimetres? Researchers at the University of Göttingen have now shown that beech seedlings which are slightly taller than their immediate neighbours at the end of their first year of life have a higher chance of survival two decades later. The results were published in the *Journal of Ecology*.

In the study, which ran for over 25 years, scientists monitored over 2,000 beech seedlings at two research sites in Southern Germany. Of the 2,214 seedlings observed, just 679 survived – meaning less than a third made it, a consequence of competition within the same species. The initial differences in size became increasingly apparent over time. The seedlings that were slightly larger than their immediate neighbours in the year of germination usually maintained their position in terms of size. In fact, it was very rare for the smaller trees to catch up. An experiment carried out in parallel in a greenhouse showed that the seedlings which grew from heavier beech nuts were larger with greater biomass. This means that even the size of the seed appears to contribute to the initial advantage in growth and is important in the long-term.

“It has been known for decades that groups of trees of the same age and species thin out over time in nature – that is, even without any human intervention. This process follows mathematical laws. However, we didn’t know which of the many seedlings that appear in one year would win out in the end,” said Professor Christian Ammer at Göttingen University’s Faculty of Forest Sciences and Forest Ecology, who led the research. “It remains to be seen how these trees, which are now 15 metres tall, will develop in the ongoing climate change.” The study shows that competitive and survival advantages in trees become apparent surprisingly early on. Whether these growth advantages will persist despite extreme weather conditions, however, needs to be researched and understood for the future.

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