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Összefoglalás

Tree regeneration is a key process in forest dynamics, particularly in the context of forest resilience and climate change. Models are pivotal for assessing long-term forest dynamics, and they have been in use for more than 50 years. However, there is a need to evaluate their capacity to accurately represent tree regeneration. We assess how well current models capture the overall abundance, species composition, and mortality of tree regeneration. Using 15 models built to capture long-term forest dynamics at the stand, landscape, and global levels, we simulate tree regeneration at 200 sites representing large environmental gradients across Central Europe. The results are evaluated against extensive data from unmanaged forests. Most of the models overestimate recruitment levels, which is compensated only in some models by high simulated mortality rates in the early stages of individual-tree dynamics. Simulated species diversity of recruitment generally matches observed ranges. Models simulating higher stand-level species diversity do not feature higher species diversity in the recruitment layer. The effect of light availability on recruitment levels is captured better than the effects of temperature and soil moisture, but patterns are not consistent across models. Increasing complexity in the tree regeneration modules is not related to higher accuracy of simulated tree recruitment. Furthermore, individual model design
is more important than scale (stand, landscape, and global) and approach (empirical and process-based) for accurately capturing tree regeneration. Despite

the mismatches between simulation results and data, it is remarkable that most models capture the essential features of the highly complex process of tree regeneration, while not having been parameterized with such data. We conclude that much can be gained by evaluating and refining the modeling of tree regeneration processes. This has the potential to render long-term projections of forest dynamics under changing environmental conditions much more robust.

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módszertan: modellezés
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Horváth Ferenc
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