Morphological traits influence competition among forest trees

A group of researchers from various parts of the globe has investigated on the factors influencing individual's growth during competition between neighbouring trees in forest ecosystems. The results revealed that three functional traits such as wood density, specific leaf area and maximum height affect the tree establishment in predictable ways across all forested biomes worldwide. The research work has been published in the journal Nature recently. Further, it is also evident that the functional traits can provide a foundation for predicting dynamics and interactions between plant species on earth.

In general, trees exhibit different strategies to compete with their neighbours for getting well established in forest ecosystem. Few trees grow fast and taller, overshadowing the others, but may die early. Few others grow more slowly, but outlive the fast growing ones and cast shade on them over a longer period. These interactions have a strong influence on the dynamics of forests and their functioning as ecosystems. Hence, plant ecologists are very much interested in elucidating the complex nature of traditionally associated traits of tree species and the relationships between them as the tree competes with neighbouring individuals for establishment.

Competition between individuals is a key driver of community assembly, especially in tropical forest ecosystems, which has to be perceived clearly. Some of the most significant morphological traits (also referred to as functional traits) of trees determine the extent by which a central tree is affected by neighbouring trees and to what limit it exerts a pressure on growth and survivability of neighbourhood trees. "These traits affect competition independent of the ecosystem, region or species identity," explains the WSL's Niklaus Zimmermann, one of the authors of the research article. According to the new research, functional traits can provide a foundation for predicting dynamics and interactions between plant species on earth.

The work has been carried out by an international team comprising of 40 researchers all over the world. The team utilized the growth data from more than 3 million trees spread across 1,40,000 forest inventory plots located in various parts of the world. Marc Hanewinkel and Niklaus Zimmermann from the Swiss Federal Institute for Forest, Snow and Landscape Research WSL contributed data from the Swiss National Forest Inventory NFI, which surveys changes of Swiss forest on roughly 6500 plots. The work has been published in *Nature* journal.

From the current study, the researchers identified three functional traits namely wood density, specific leaf area (SLA) and maximum height found affect competition in predictable ways across all forested biomes worldwide. "This is the first time that we were able to verify key drivers of forest succession globally," explains co-author Niklaus Zimmermann from the Swiss Federal Institute for Forest, Snow and Landscape Research WSL. Trees differ in these traits in a consistent way. Poplar and birch trees are light demanding species and exhibit comparably high SLA, meaning that their leaves let a lot of light shine through, while beech trees possess thicker leaves, exhibit lower SLA and are thus more shade tolerant. Poplar and birch grow fast, tall and have lower wood density, while beech trees grow more slowly and with higher wood density.

In other words, the competition within species was stronger than between species, but an increase in trait dissimilarity between species had little influence in weakening competition. No benefit of dissimilarity was detected for specific leaf area or wood density, and only a weak benefit for maximum height. To conclude, traits generate trade-offs between performance with

competition versus performance without competition, a fundamental ingredient in the classical hypothesis that the coexistence of plant species is enabled via differentiation in their successional strategies.

Source:

http://www.sciencedaily.com/releases/2015/12/151223221755.htm