



Caution needed with the EU forest plantation strategy for offsetting carbon emissions

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Abstract

As part of the 2015 Paris climate agreement and under its Green Deal, the EU proposes to strongly rely on forests for offsetting its carbon footprint. However, planting trees should be avoided in wildfire prone and drought prone habitats, which are expanding significantly as climate warms across Europe. In favorable habitats, tree planting remains a controversial solution and the risk of using inappropriate material is high in the absence of long-term planning, unfortunately typical of the forest seed and nursery sector. The EU forest tree planting strategy should pay close attention to local land-use issues, to within- and among-species genetic diversity and should adopt relevant, pluri-annual funding schemes and planting contracts rather than letting market opportunities govern the future of forest tree plantations.

Keywords Mitigation · Plantation · Genetic diversity · Seed market · Forest nursery market · Adaptation

As part of the 2015 Paris climate agreement and under its Green Deal, the EU proposes to strongly rely on forests for offsetting its carbon footprint. The EU Biodiversity Strategy for 2030 sets the target at 3 billion planted trees, thus approx. 4 million hectares, almost the size of the Netherlands (European Commission 2020). Following suit, France recently welcomed a parliamentary report advocating the plantation of 1 million hectares of forests over a 30-year period (<https://www.actu-environnement.com/media/pdf/news-36125-rapport-foret-cattelot.pdf>). Inconsiderate deployment could make this strategy backfire.

Planting trees should be avoided in at least two types of habitats that are expanding as climate warms across Europe. Wildfire-prone areas at the rural/urban interface should be maintained as open, sparsely wooded habitats to reduce exposure to fire risk, e.g. using sustainable agricultural practice (Moreira et al. 2011). In drought-prone areas, production-oriented plantations will be increasingly vulnerable, compromising carbon storage because of die-back and associated disturbances (Anderegg et al. 2020; McDowell et al. 2020).

In favorable habitats, tree planting remains a controversial solution (Holl and Brancalion 2020) and success depends on material adaptability and diversity (Bozzano et al. 2014;

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Fig. 1 A common garden in southern France where different geographic origins (provenances) of *Abies cephalonica* Loud. and other *Abies* species are compared for phenology, resistance and growth traits. Common gardens yield predictions of phenotypic and functional trait differences within-species that help select well-adapted provenances performing desirable ecosystem services such storing carbon

Gaitán-Espitia and Hobday 2020). The EU Council Directive 1999/105/EC on marketing forest reproductive material makes tracking the origin of planting material straightforward. However, natural seed production is notoriously variable and more regularly-producing seed orchards contain too few species and rarely include material bred for drought resistance (Fady et al. 2016). Thus, with such large areas to be planted, the risk of using inappropriate material is significant without long-term planning, unfortunately typical of the forest seed and nursery sector (Whittet et al. 2016).

Forest plantations are one of the possible nature-based solutions for offsetting carbon emissions. However, the ambitious EU forest tree planting strategy should be implemented with caution, paying close attention to local land-use issues, making best use of the existing within- and among-species diversity (Fig. 1) and adopting relevant, pluri-annual funding schemes and planting contracts rather than letting market opportunities govern what will be planted.

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