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An Assessment of the Environmental Impacts of Transgenic Triploid *Populus tomentosa* in Field Condition

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Abstract: *Populus tomentosa* grow rapidly, but are salt susceptible. To quickly and efficiently gain new poplar breeds with better salt resistance, a *DREB* transcription factor derived from *Atriplex hortensis* was transformed into triploid *Populus tomentosa* by our lab, which significantly improved the salt tolerance of host plants. However, environmental impacts of transgenic plants must be assessed before large-scale cultivation in China. Here, we conducted a field trial of *AhDREB1* transgenic and non-transgenic triploid *Populus tomentosa* to assess the impact of transgenic trees on rhizospheric soil microbial communities and allelopathic activity of leaves. No significant differences in the number of soil microbes present were detected between the transgenic lines and the non-transgenic controls. The allelopathic activity of leaves from both the transgenic and non-transgenic lines varied with sampling time, but did not differ significantly between the transgenic and non-transgenic lines. These results indicate that the impact on the environment of *AhDREB1* transgenic *P. tomentosa* did not differ significantly from that of the non-transformed controls for the variables observed in this field trial. We also investigated the persistence of *AhDREB1* genes in decomposing transgenic poplar leaf on the soil under natural conditions for five months, and our data indicated that fragments of the genetically modified DNA were not detectable in the field after more than two months. We used a triphenyl tetrazolium chloride test (TTC) (or pollen germination method) and hybridization to test the pollen viability and fertility, respectively, of the transgenic and non-transgenic trees and the results showed that the pollen viability of both the transgenic and non-transgenic trees was extremely low in 2016; the receptor plant may have been sterile.

Keywords: *Populus*; field trial; environmental risk assessment (ERA); dehydration responsive element (DRE) binding protein