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| **Project Summary** | |
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| **Title:** Efficacy and ecological impacts of transgenic containment technologies in poplar | |
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| The dispersal of transgenes from genetically engineered plants presents substantial challenges to biotechnology regulatory bodies. Because forest trees are weakly domesticated, have wild relatives, and pollen or seeds can spread widely, they are especially problematic. However, plantation trees are often vegetatively propagated, making fertile flowers unnecessary for commercial use. Thus, genes that induce complete sterility could provide strong and simple mitigation of dispersal, simplifying regulatory decisions. We propose to study the efficacy, stability, and ecological impacts of floral developmental genes as tools for mitigating or preventing transgene spread. We established a plantation of transgenic poplars that contain 19 different constructs that modify the expression of poplar orthologs of conserved floral development genes, including *LEAFY*, *AGAMOUS,* and *APETALA1*. Some constructs should modify two to three genes simultaneously. We will: 1) study the spectrum of vegetative, floral, and seed capsule morphology in a population of 311 insertion events in early flowering poplar genotype 6K10; 2) identify constructs and/or gene targets which lead to strong sterility or floral modification; 3) analyze the stability of transgene expression or target gene suppression (RNAi) over years; 4) assess stability of observed vegetative, floral, and seed development phenotypes; and 5) through intensive literature review, evaluate the likely ecological impacts of floral modification on biological diversity in relation to plantation establishment effects. The transgenic constructs were produced, transformed into poplar, transgene integrity confirmed, plants propagated, and an APHIS-approved, flowering plantation established in prior work. Our results will inform a variety of developing containment technologies, including directed mutagenesis methods. | |