

Breeding Success and Range of Incompatibility among *Populus* Hybrids in Sections *Aigeiros* Duby and *Tacamahaca* Spach

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Interspecific hybrids within the genus *Populus* have resulted from natural hybridization and planned breeding efforts. Heterosis (i.e. hybrid vigor) of interspecific hybrids, along with traits such as disease/pest resistance and elevated rooting ability, has supported their use in a variety of applications. Nevertheless, difficulties in producing such hybrids have resulted from pre- and post-fertilization barriers, along with hybrid inviability. Incompatibility often precludes successful hybridization. Compatible crosses in our previous breeding between *P. maximowiczii* A. Henry 'M' (Japanese poplar) and *P. deltoides* Bartr. ex Marsh 'D' (eastern cottonwood) that did not require embryo rescue corroborated the potential of such hybrids, despite low seed set. Our objective was to test the range of incompatibility among intraspecific and interspecific crosses using parental germplasm from the sections *Aigeiros* Duby [D and *P. nigra* L. 'N' {European black poplar}] and *Tacamahaca* Spach [M and *P. trichocarpa* Torr. & Gray 'T' {western black poplar}]. We determined the success rate of crosses, along with seed production and seedling viability. The D × M (100%) and D × D (83%) crosses were compatible, exhibiting the greatest number of seeds per capsule (33, 31, respectively). The M × N crosses (50%) produced significantly ($P < 0.0001$) fewer seeds (two), but the seeds were viable. The M × D crosses exhibited 31% success. Some M × D crosses produced 2 to 4 viable seeds not requiring embryo rescue, while others produced two nonviable seeds or were completely incompatible. The NM × D crosses were incompatible (0%), while NM × N (50%) and NM × T (100%) produced viable seedlings. From a practical standpoint, it is possible to exploit the benefits of interspecific crosses involving M and D. Selection of favorable genotypes within such crosses may greatly increase the success of deployment for a variety of applications.



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