

Breeding Program History

The American chestnut once reigned over 200 million acres of woodlands from Maine to Florida. A blight introduced in 1900, resulting in the loss of an estimated 4 billion American chestnut trees by 1950. This loss was an economic and ecological disaster for eastern U.S. forests.

The seven species of chestnut vary in their susceptibility to blight. The resistance exhibited by the Asiatic species made them an early focus for breeding efforts. However, the results of these efforts failed to produce the intended results and most state and Federal programs were abandoned by 1960.

Advances in the genetic research of successful corn and soybean breeders informed the concept of The American Chestnut Foundation's backcross breeding program, which began in 1989. Working to transfer the resistance of the Chinese chestnut into the American chestnut, researchers hope to achieve a diverse lot of progeny with blight resistance of the Asiatic species, growth and timber form of the American chestnut species, and enough diversity for the population to survive in the eastern United States in perpetuity.

Breeding Program Process

TACF's backcross breeding program begins by crossing an American chestnut and a Chinese chestnut. This is followed by three successive generations of crossing back to American chestnut trees to restore American characteristics. In between each breeding step, the trees are inoculated with blight fungus (*Cryphonectria parasitica*) and only those trees showing strong blight resistance and American characteristics are chosen to breed additional generations. For the final two generations, trees with proven blight resistance are intercrossed with each other to eliminate genes for susceptibility to blight introduced from the American parents. This is a six generation process.

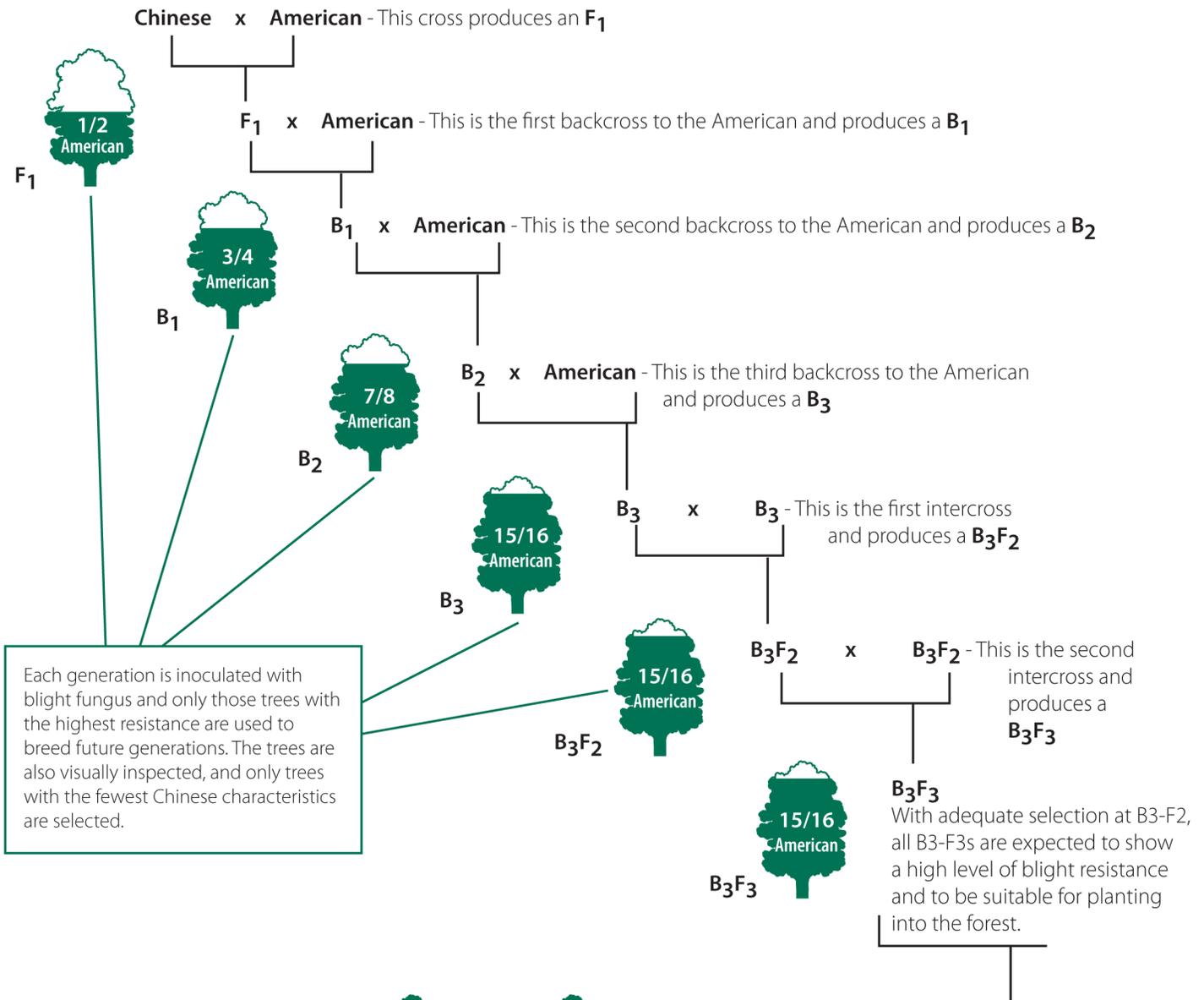
A Quick Guide to Chestnut Breeding Terminology

American x Chinese	= F ₁
F ₁ x F ₁	= F ₂
F ₂ x F ₂	= F ₃
F ₁ x American (also known as BC ₁ F ₁)	= BC ₁
BC ₁ x BC ₁	= BC ₁ F ₂
BC ₁ F ₂ x BC ₁ F ₂	= BC ₁ F ₃
BC ₁ x American	= BC ₂
BC ₂ x BC ₂	= BC ₂ F ₂
BC ₂ F ₂ x BC ₂ F ₂	= BC ₂ F ₃
BC ₂ x American	= BC ₃
BC ₃ x BC ₃	= BC ₃ F ₂
BC ₃ F ₂ x BC ₃ F ₂	= BC ₃ F ₃

BC (often written as B) indicates the offspring of a backcross; the breeding of of a pure American chestnut with a tree that is a genetic mixture of blight resistant and pure American stock.

F indicates the offspring of an intercross; the breeding of two genetically "pure" trees or two trees of the same generation that are already a genetic mixture of blight resistant and pure American stock. Lower numbers indicate the number of times a breeding procedure has occurred in a tree's lineage.

TACF Breeding Program Generational Crosses



Each generation is inoculated with blight fungus and only those trees with the highest resistance are used to breed future generations. The trees are also visually inspected, and only trees with the fewest Chinese characteristics are selected.

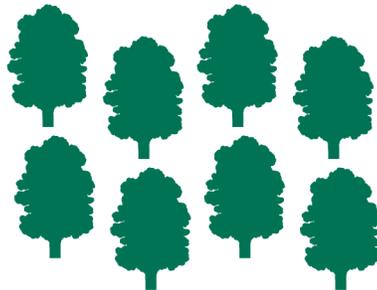
Breeding, testing and evaluation continues.

TACF's breeding program will continue to integrate additional sources of blight resistance into the breeding populations. For more information on TACF's breeding and restoration programs call 1-(828)- 281-0047 or visit our website at www.acf.org.



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