

Bud Union (Graft) Incompatibility among Red Maples and Silver Maples

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Red maples (*Acer rubrum*) are one of the most popular trees in Tennessee nurseries and landscapes. Their ability to tolerate a range of environmental conditions, grow quickly, and develop spectacular fall color has made them a superior shade tree. Red maples are often propagated by rooted cuttings and by budding. However, budding can cause growth problems – they often form an incompatible and weak bud union. This may occur quickly or not be evident for a couple of years. One of those broken bud unions is sitting on my shelf at work, always reminding me to address this issue. Why does bud incompatibility happen more often among red maples but less often in other tree species?

In one study by the U.S. National Arboretum¹, bud union incompatibility among red maples was the result of an enzyme imbalance between two enzymes. These two enzymes can influence how the plant cells interact with one another which is critical for a bud union to develop normally. In other words, we can think of the enzymes as the language spoken by the plant. If both the rootstock and scion are speaking the same language, then the rootstock and scion can communicate with each other and establish a strong working bud union. But if the rootstock is speaking a different language than the scion, then there will be limited communication and a weak bud union could develop.

These two enzymes responsible for forming a compatible bud union can be referred to as “enzyme A” and “enzyme B”. All of the red maples studied contained enzyme A but only some of the trees contained enzyme B. Also, the trees that contained enzyme B had anywhere between very low to very high levels of it. This means that even if both enzymes are present in the rootstock and scion, incompatibility may still develop and lead to the bud union breaking or failing.

Among the silver maples (*A. saccharinum*) evaluated, every tree lacked enzyme B. All of the silver maples also contained the same number of chromosomes (unlike the red maples) so we can assume any silver maple budded to any silver maple would result in a compatible bud union.

In conclusion, it is possible to bud red maples but it is extremely risky in the long term. For a strong and reliable bud union to develop, you would need to know not only which enzymes are present but how many chromosomes are present. Even if we knew all of this, uncertainty remains about what enzymes and chromosomes are present in the seeds used for rootstock. To be safe, it's best to propagate red maple cultivars from cuttings.

¹ Frank S. Santamor, Jr. 1989. Cambial Peroxidase Enzymes Related to Graft Incompatibility in Red Maple. U.S. National Arboretum. Agriculture Research Service. U.S. Department of Agriculture. Washington DC 20002. J. Environ. Hort. 7(1):8-14. March.