Friedman, J.M., Roelle, J.E., Gaskin J.F., and Roth, J. Evolution of cold hardiness in North American *Tamarix ramosissima*. Native woody plants often demonstrate inherited latitudinal variation in cold hardiness. How long does it take for such variation to evolve in introduced species? We compared cold hardiness in the native *Populus deltoides* subsp. *monilifera* (plains cottonwood) and the introduced *Tamarix ramosissima* (saltcedar). In February and March 2005, we collected cuttings of 25 individuals of each species from 15 sites in the central US ranging in latitude from 29°N to 48°N. Cuttings were rooted in a greenhouse beginning on March 17 and then moved to a shadehouse in Fort Collins, CO, latitude 41°N, on May 31. Sixteen times between September 2005 and June 2006, we exposed stem sections of northern and southern individuals of both species to a range of cold temperatures and determined the killing temperature by measuring freeze-induced electrolyte leakage. Although *Tamarix* was slightly more cold hardy in the early fall and late spring, *Populus* hardened off more rapidly and deeply. In midwinter, *Populus* was unharmed by cooling to -70°C, while *Tamarix* was killed at -30 to -40°C. There is strong inherited latitudinal variation in both the timing and extent of cold hardiness for both species. Northern individuals survive colder temperatures earlier in the season than southern individuals. Analysis of 9 microsatellite DNA loci shows a north-south genetic gradient in *Tamarix* in the central United States; southern *Tamarix* is more closely related to *T. chinensis* and northern *Tamarix* is more closely related to *T. ramosissima*. Hybridization between these two *Tamarix* species has apparently introduced the genetic variability necessary for rapid evolution of the latitudinal gradient in cold hardiness.