



High levels of S-RNase expression are not required for unilateral incongruity in the tomato clade.

Paul A. Covey¹, Ashley Denney, Dyllan Martini, and Patricia Bedinger¹

¹Biology Department, Colorado State University, Fort Collins, CO

Pollen rejection by pistils can occur if the pollen is too closely related to the pistil (self-incompatibility, SI) or if it is too distantly related, for example from a different species. Many plant families exhibit interspecific incongruity in one direction, i.e. the pistils of one species will accept pollen of another species but not vice versa, a phenomenon known as unilateral incongruity (UI). In the tomato clade, pistils of the domesticated species *Solanum lycopersicum* can accept pollen from eight closely related wild species, but in many cases the pistils of these wild species will reject pollen from *S. lycopersicum*. SI in tomato is based on two S-locus genes; pistil expressed cytotoxic S-RNase genes and pollen expressed F-box genes. The purpose of our experiments was to determine whether S-RNases are also required for pollen rejection in UI. We tested pistil extracts from both self compatible (SC) and self incompatible (SI) accessions of *S. pennellii*, *S. habrochaites*, and *S. chmielewskii* for S-RNase activity, and we examined *S. lycopersicum* pollen tube growth in pistils of the same species. We found high levels of S-RNase activity in pistils of all SI accessions, as expected. In SC accessions of wild species, S-RNase was not detected. Pistils of all accessions of *S. pennellii*, *S. habrochaites*, and *S. chmielewskii* were able to reject *S. lycopersicum* pollen, regardless of whether the accessions were SI or SC. In *S. pennellii* and *S. habrochaites* pistils, pollen rejection occurred in the upper ¼ of the pistil, whereas in *S. chmielewskii* pollen tubes grew to about ¾ of the length of the pistil. Our results indicate that interspecific barriers to reproduction in the tomato clade are not dependent on high levels of S-RNase expression in pistils. Thus, the mechanisms of pollen rejection in self-incompatibility and unilateral incongruity are likely to be different.