Cool Fusion
How fusing plant cells allows disease resistance trait to be moved from a wild relative to domestic potato

Work done in the laboratory of Prof. John P. Helgeson, USDA/ARS, University of Wisconsin-Madison Department of Plant Pathology, jph@plantpath.wisc.edu, (608) 262-0649

The process is called "Somatic Hybridization. Starting with plants which normally could not be cross-bred by normal pollination, it is sometimes possible to combine them by somatic hybridization. In this process:
1. You make "protoplasts" or individual cells isolated from the leaves of the two different species. Plant cells have cell walls so you have to dissolve the cell walls without killing the cells.
2. Fuse the protoplasts by electrical or chemical means. In this case, an electric current causes the protoplasts to fuse.
3. Using well-known plant hormones, fused protoplasts are regenerated into whole plants, which combine the genomes of the two species.

The resulting plants contain twice as many chromosomes as the parent plants. These Somatic Hybrids can then be cross-pollinated with domestic varieties, allowing desirable traits such as disease resistance to be transferred from a wild species to a domestic species.

The resistance to late blight is effective in Toluca Mexico, where the variation in the late blight organisms is the greatest in the world.

Recently the Helgeson group has been able to capture late blight resistance from the wild potato species, Solanum bulbocastanum and, using sexual crosses of the somatic hybrid, have developed a number of highly resistant potato breeding lines.