

Cool Fusion

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

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Potato leaves suspended in wall-dissolving enzyme solution

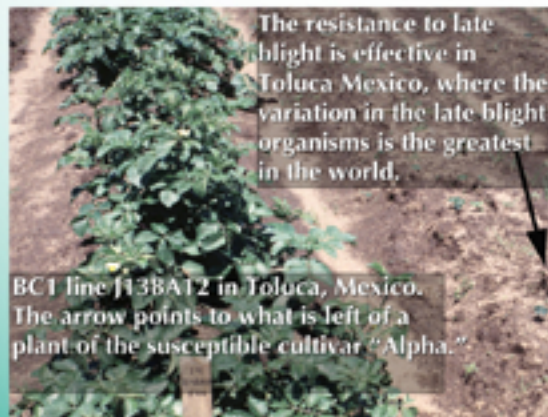


S. bulbocastanum in the field at Hancock, Wisconsin

Solanum bulbocastanum is a wild potato relative which resists plant diseases which kill unprotected potato plants



View of test field - Hancock Research Station. The green plants are those with the new resistance genes

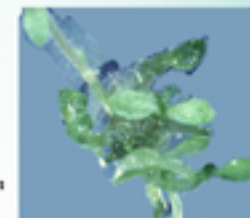


BCI line H3BA12 in Toluca, Mexico. The arrow points to what is left of a plant of the susceptible cultivar "Alpha."

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



Backcross 1 line (J101-K27) in Hancock, WI. The field received no fungicide and the dead plants are from the cultivar Russet Burbank, killed by late blight.



Tiny plants growing in a culture dish. Eventually these can be grown into full-scale plants, which then can be crossed with regular potato cultivars.



leaf and flower of *S. bulbocastanum* leaf and flower of Somatic Hybrid leaf and flower of potato

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.

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.