Advances in the Development of Sunflower Germplasm with Resistance to Both Sclerotinia Stalk Rot and Head Rot - 2005

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ABSTRACT

The inheritance of Sclerotinia head rot resistance of three maintainer and three restorer lines crossed to create NuSun and traditional sunflower hybrids was studied using a factorial mating design. The General variance than Specific Combining Ability (SCA) effects, indicating that additive gene effects were more important than dominance gene effects controlling resistance to Sclerotinia head rot. NuSun hybrids with high levels of resistance were created by using specific combinations of lines. Field and greenhouse evaluation of annual and perennial wild Helianthus species with artificial inoculation again produced peduncle necrosis and mummified heads rather than the typical rot symptoms observed on large heads of cultivated sunflower. This suggests that identification of head rot resistance in wild sunflower may be appropriately done with F1 interspecific crosses with cultivated sunflower, where more typical head rot symptoms would be produced.

Gerald Seiler collecting seeds of Helianthus exilis in northern CA. This species has potential for Sclerotinia resistance based on its adaptation of serpentine soils, low in Ca and high in Mg.

Seventy-two commercial hybrids were tested for resistance to Sclerotinia stalk rot at five locations in North Dakota, South Dakota and Minnesota using artificial inoculation. Three locations generated no data due to natural disasters (hail, herbicide injury, and seedling loss due to downy mildew), but the remaining two locations generated data allowing statistical separation of the disease response of the hybrids. Stalk rot severity on confection hybrids ranged from 32 to 85% infection, and on NuSun hybrids, from 15 to 75% infection. Four NuSun or high oleic hybrids had less infection than the resistant check (21%), indicating that commercial hybrids in a NuSun background exist with disease resistance superior to the highest levels observed on conventional oilseed hybrids.

Comparison of head rot and stalk rot ratings from inoculated trials show that high levels of resistance to both diseases is currently not found in any currently available commercial hybrids.

Gerald Seiler, research botanist, & Tom Gulya, pathologist, inoculating wild sunflowers with Sclerotinia inoculum on a granite rock outcrop in North Carolina. Helianthus porterii. This species had received little attention before our 2003 collecting trip, as no seed was available in the USDA PI collection.

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