

Wide Hybridization: Transfer of Disease Resistance from *Glycine tomentella* to Soybean (Primary Investigators: Ram J. Singh, Randall Nelson and Glen Hartman)

The team of Ram Singh, Randall Nelson, and Glen Hartman have been intensively involved with collection and screening of soybean germplasm maintained in the USDA Soybean Germplasm Collection at the University of Illinois at Urbana-Champaign. Soybean rust resistant accessions of *G. tomentella* are being re-screened at Ft. Detrick. *Glycine tomentella* accessions resistant to soybean rust and with multiple resistances are growing in greenhouse and are near to the flowering stage. Ram Singh has successfully produced germplasm lines using wide hybridization technology.

The primary objective of this research is to transfer resistance to soybean rust, soybean cyst nematode and bean pod mottle virus from *Glycine tomentella* to soybean and to make these novel genes available to soybean breeders to use in developing disease resistant commercial cultivars. We will transfer the selected disease resistance traits from aneutetraploid ($2n=78$) *G. tomentella* accessions to soybean using procedures that have already been successful. PI 441001 has been identified to carry a single dominant gene for resistance to Asiatic soybean rust. PI 483218 is known to be partially resistant to soybean rust, soybean cyst nematode, and bean pod mottle virus. Hartman et al. (1992) identified PI 441008 as resistant to the rust fungus but mode of inheritance was not determined. More recent testing of perennial accessions at Ft. Detrick that we have done with current strains of rust has confirmed the resistance reported from the testing in Taiwan. All of these accessions will be retested for resistance to all three diseases. Hybridizations will be made between these *G. tomentella* accessions and *G. max*. The pollinated gynoecia will be sprayed with a growth hormone solution (100 mg GA₃+25 mg NAA+5 mg kinetin/L distilled water), which facilitates pod retention, 24 hour post pollination and continue once a day for 10 to 21 days. The developing pods will then be removed and the immature seeds and embryos will be cultured in artificial medium to produce plants. The F₁ plants will be examined cytologically and we will double the chromosomes of the true hybrids with 0.1% colchicine in order to restore fertility. These plants will be backcrossed to *G. max* plants and the process repeated through the BC₃ to BC₆ or until monosomic alien addition lines (MAALs; $2n=40$ soybean + 1 *G. tomentella* chromosomes) are obtained. In each BC generation, we will follow the trail of alien chromosomes by counting chromosomes and testing the plants for resistance to all three diseases. This will ensure that the desired traits are not being lost in the backcrossing process. It is improbable that resistance to all three diseases will be transfer to a single line but maintaining resistance to all three diseases in the population is achievable. Our goal is to isolate all (39) possible monosomic alien addition ($2n=40+1$) lines (MAALs) and produce diploid ($2n=40$) plants after selfing MAALs.