POTENTIAL FOR USING *VERTICILLIUM ALBO-ATRUM* AS A BIOCONTROL AGENT FOR TREE-OF-HEAVEN (*AILANTHUS ALTISSIMA*)

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ABSTRACT

Extensive, unprecedented wilt and mortality of the highly invasive, exotic tree-of-heaven (*Ailanthus altissima*) occurred recently within mixed hardwood forests in south-central Pennsylvania. Until this study, the cause of the epidemic was unknown. *Verticillium albo-atrum* was consistently isolated from symptomatic *Ailanthus* seedlings and trees in areas having high levels of mortality, whereas *V. dahliae* was isolated from small scattered patches of diseased *Ailanthus*. Inoculations of potted *Ailanthus* seedlings in the greenhouse, as well as canopy trees in the field, revealed that both *V. albo-atrum* and *V. dahliae* were capable of infecting *Ailanthus.* However, *V. albo-atrum* was much more pathogenic. *Ailanthus* seedlings and canopy trees inoculated with *V. albo-atrum* usually died within 3 months. In contrast, *Ailanthus* seedlings and canopy trees inoculated with *V. dahliae* became symptomatic, but most were still living 1 or more years following inoculation. We conclude that the major cause of *Ailanthus* wilt and mortality within forests of south-central Pennsylvania is *V. albo-atrum*.

Regarding the host range of our isolate of *V. albo-atrum,* stem inoculation of potted *Ailanthus* seedlings in the greenhouse and canopy *Ailanthus* trees in the field with *V. albo-atrum* resulted in 100 percent mortality. In these same studies, stem inoculation of understory striped maple saplings in the field also resulted in 100 percent mortality. However, the high susceptibility of striped maple was not observed in naturally infected stands, where only 1 percent of striped maple saplings exhibited *Verticillium* wilt. Inoculation of chestnut oak, northern red oak, red maple, sugar maple, white ash, and yellow-poplar seedlings and/or canopy trees with *V. albo-atrum* did not result in *Verticillium* wilt symptoms. Non-*Ailanthus* tree species growing adjacent to dead and dying *Ailanthus* in the field were asymptomatic.

Current studies at Penn State include conducting a greatly expanded host range study, as well as dissemination studies involving transmission of *V. albo-atrum* by root grafts, infected wind-blown leaflets, infested ambrosia beetles, and infected or infested seeds. Various isolates of *V. albo-atrum* are being identified molecularly using PCR and DNA sequencing. Research results to date indicate that *V. albo-atrum* should receive serious consideration as a potential biocontrol agent for the invasive *Ailanthus altissima*.