

Management information: *Cryphonectria parasitica*

Biological:

Fink (2001) states that, "The Virginia Department of Forestry maintains a hybrid chestnut plantation at the Lesesne State Forest in Nelson County, Virginia. Scientists have hybridised American chestnuts with blight-resistant Chinese chestnuts, and are backcrossing the hybrids to pure American trees. Offspring with phenotypic characteristics of American chestnuts plus blight resistance are selected for further breeding." If the hybridising is successful, scientists hope to be, according to Fink (2001), "producing blight-resistant trees with predominantly American chestnut characteristics." Liu *et al.* (2003) state that, "Viruses in the chestnut blight fungus, *C. parasitica*, have received considerable attention because of their potential for biological control, especially in Europe (Heiniger and Rigling, 1994)." Liu *et al.* (2002) state that, "Hypovirulence is a phenomenon caused by the infection of the chestnut blight fungus, *C. parasitica*, by double-stranded RNA (dsRNA) viruses primarily in the family Hypoviridae. Hypovirus-infected strains of *C. parasitica* are less virulent, as indicated by their reduced sporulation and canker growth rates when inoculated on chestnuts. Typically, infected strains form superficial cankers that do not kill trees. Four hypovirus species have been described from *C. parasitica*. *Cryphonectria* hypovirus 1 (CHV-1) was originally found in Italy and France and has since been found throughout southern and eastern Europe. *Cryphonectria* hypovirus 1 has also been found in populations of *C. parasitica* in Japan and China, where this fungus is native and more recently in Korea. CHV-2 has been detected in New Jersey, USA and in one population in China, while CHV-3 occurs primarily in Michigan, USA and in a few isolated locations in eastern USA. Recently, dsRNA, originally found in *C. parasitica* isolate SR2 from Maryland, USA, was characterised as a hypovirus and named CHV-4. CHV-4 has been found in *C. parasitica* in six states in the eastern USA. Unlike the other hypoviruses, CHV-4 has little or no detectable effect on the phenotype of *C. parasitica*." Liu *et al.* (2002) add that, "The apparent success of hypovirulence in Europe prompted numerous releases of

hypoviruses in the USA; most have failed to control chestnut blight adequately. *Cryphonectria* hypovirus 1 from Europe and CHV-3 from Michigan, USA, were deployed most commonly. Despite a few apparent limited successes, hypoviruses do not appear to spread more than a few metres from their original release sites. Hypovirus-infected isolates of *C. parasitica* were recovered from surviving American chestnut trees in Virginia, USA, 15-16 years after inoculation with hypovirulent strains. However, the persistence of hypoviruses (or lack thereof) has not been documented in the areas where biological control appears not to have been successful."

Davelos and Jarosz (2004) state that, "Several scientists have proposed that dsRNA can be used as a biological control agent to dampen the effects of *C. parasitica* infections and restore *C. dentata* to its former position of dominance in the eastern hardwood forest (Van Alfen *et al.*, 1975; MacDonald and Fulbright, 1991; Nuss, 1992). Our data indicate that dsRNAs can have a positive influence on the population structure of *C. dentata*. In recovering populations, the transition matrices do change in a manner indicating that the effects of disease are reduced.