Session Biological control

Biological control of Dutch elm disease

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Elm trees play an important role in western cultural history, surviving harsh conditions such as flooding, wind, salt and narrow space in urban environments. Monumental trees are present along the canals of old cities such as Utrecht and Amsterdam. Dutch elm disease (*Ophiostoma ulmi*) was first identified in Europe during the 1920s and in North America by 1930. The disease is transmitted mainly by the elm bark beetle (*Scolytus scolytus* and *S. multistriatus*). At first, sanitation by eradication of diseased trees, as well as breeding for resistance have been practiced, but these were not sufficiently effective. Nowadays, the disease is controlled by a 'vaccination' procedure. A biological control agent, Dutch Trig®, has been developed in the Netherlands (WCS-Laboratory Baarn, later University of Amsterdam) containing conidiospores of the fungus *Verticillium albo-atrum* strain WCS850. This strain is a natural hyaline form of *V. albo-atrum,* lacking the ability to produce resting structures. After inoculation of the vaccine into the tree's current growth ring (xylem) in spring, by germination of the conidiospores, a response from the immune system of the tree is induced, activating the tree's natural defence mechanisms and as a consequence protecting the tree against Dutch elm disease. The inoculant neither moves within the tree nor survives for a prolonged period. Healthy trees are injected every year with the biocontrol product using a specific inoculation tool, inflicting as little damage to the tree as possible. Vaccination is performed every 10 cm of trunk circumference at breast height, in spring as soon as leaves have started to sprout, preferable before any beetle infection of Dutch elm disease occurs.

The product has been registered and used in Europe since 1992 and was fully registered in the USA since 2005. The vaccine is being used on 35000 trees in the Netherlands and 2500 trees in the USA every year. Ninety-nine % of the injected trees are protected against infection by Dutch elm disease. From the infected vaccinated trees, 50 % is due to root contact with previously infected trees.

References

Scheffer RJ, Voeten JGWF & Guries RP (2008) Biological Control of Dutch Elm Disease. Plant Disease 92: 192-200.
Website: http://www.dutchtrig.com/