

**Comparison of the wood-microbiome from Grapevine Trunk Disease-plants, treated or not with sodium arsenite.**

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Before its ban in the early 2000s, sodium arsenite had been used in many European vineyards for decades to control Esca and Botryosphaeria dieback. Although this fungicide was frequently described as very effective in controlling these diseases, its mode of action is relatively unknown.

The present experiment has been carried out to address this puzzling question by studying its effect on the wood-microbiome. Grapevines that had previously shown GTD-foliar symptoms from three cultivars planted in Alsace (Gewurztraminer), Champagne (Chardonnay) and Languedoc-Roussillon (Merlot) were treated with sodium arsenite in 2014 and 2015. All the plants were free of GTD-foliar symptoms after sodium arsenite application. In the treated- and control-plants, the microflora of the plants sampled in September 2014 and 2015, which colonised these wood-tissues (non-necrotic, white-rot, sectorial necrotic and border necrotic tissues) were compared.

For the three cultivars, the fingerprinting method (Single Strand Conformation Polymorphism, SSCP) confirmed that the fungal and bacterial communities were specific to each type of tissue. Using classical-microbiology, GTD-pathogenic fungi were isolated from all the tissues. However, Botryosphaeriaceae spp. were more isolated in the border of the necroses, *Phaeomoniella chlamydospora* in the non-necrotic and necrotic tissues, and *Fomitiporia mediterranea* in white-rot. Microbiological results also showed that sodium arsenite applications significantly modified the wood-inhabiting fungal communities. For instance, fewer Esca-pathogenic fungi (*P. chlamydospora*, *F. mediterranea*) were isolated in the treated plants but potential plant-beneficial fungal species, such as *Trichoderma* spp., were more frequently isolated. Mi-Seq results also showed differences in the microbiome after sodium arsenite application. For instance, in the border of necrotic tissue and white-rot, more genera were identified in the treated grapevines. Finally, it was hypothesized that, while sodium arsenite modified the pathogenic microflora, potential plant-beneficial fungi took advantage of that situation to colonize the woody tissues.