

Association of symptom development with the migration speed of *Bursaphelenchus xylophilus* and the control effect of an ordinary temperature trunk-injection agent in the field

Min Li¹, Zhe Zheng¹, Mengyao Wang¹, Ying Pei¹, Ting Yang¹, Xiaolei Ding¹, Lichao Wang¹, Jingen Tang¹, Ming Xu¹, Die Zhu¹, Yuan Gong¹, Min Chen¹, Huan Li^{1,2*}, Fengmao Chen^{1*}

¹Co-Innovation Centre for Sustainable Forestry in Southern China, Forestry and Grassland, College of Soil and Water Conservation, Nanjing Forestry University, Nanjing 210037, China

²Key Laboratory of National Forestry and Grassland Administration on Prevention and Control Technology of Pine Wilt Disease, Anhui Academy of Forestry, Anhui 230031, China)

*Correspondence:

Fengmao Chen, email: cfengmao@njfu.edu.cn

Huan Li, email: lhuan@njfu.edu.cn

Abstract: Pine wilt disease (PWD) is a destructive forest disease caused by *Bursaphelenchus xylophilus*. In the early stage of infection, *B. xylophilus* disperses throughout the cortical and wood resin canals of host tree branches, which provides a basis for detection. Trunk injection is an effective method for controlling this disease. To further understand the optimal time to apply the trunk-injection agent, we evaluated the application of an ordinary temperature trunk-injection agent (OTTIA) to pine trees infected with pine wilt disease. In this study, the migration speed of *B. xylophilus* in the lateral twigs of *Pinus massoniana* and the pathogenesis of inoculated pine trees were determined by inoculating the trees with different numbers of *B. xylophilus*. After inoculation with 1000-2000 nematodes, the twigs near the inoculation point exhibited mild yellowing symptoms after 32-36 days, and the migration speed of the nematodes in the twigs was approximately 2.38-2.56 cm/day. By applying OTTIA in the field, it was found that the agent could not only be injected into the trunk at high temperatures in the summer but also had a therapeutic effect even when the pine trees were suffering from PWD at the level 1 stage. In this study, by combining the migration speed of *B. xylophilus* on twigs, the change in visible symptoms and the treatment effectiveness of OTTIA, a foundation is provided for the golden rescue period of pine trees infected with PWD.

Key words: Pine wilt disease; ordinary temperature trunk-injection agent; migration speed; incidence dynamics