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New Strategies for pine wilt disease (PWD) management in Portugal: preventive methods to reduce the spread of the disease to new areas

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Despite the importance of the pine wood nematode *Bursaphelenchus xylophilus*, the casual agent of pine wilt disease, and its insect vector *Monochamus galloprovincialis* in Portugal, there are few available options to control these organisms and to prevent the spread of the disease to new areas. Some new strategies were developed in Portugal: (i) Preventive trunk injection of Emamectin Benzoate (EB), (ii) Preventive dissemination of the disease by application of an insecticide net with alpha-cypermethrin to wood transport. Concerning the first trial (i), trunk-injections with EB were performed in a maritime pine (*Pinus pinaster*) forest in Portugal, testing three dose-rates: 0.032 g a.i./cm diameter at breast height (DBH), 0.064 g a.i./cm DBH and 0.128 g a.i./cm DBH, along with an untreated control plot. EB was successfully injected and translocated in pines, resulting in low mortality for the inoculated trees several months after inoculation, contrasting with much higher mortality of non-treated pines. Emamectin benzoate was successfully recovered in branches of treated pines during a period of more than three years. Concerning the second trial (ii), two studies were performed with the aim of studying the effectiveness and minimum exposure time of the insecticide-net to the vector and to test the net's efficiency in relation to insects emerging from wood logs during a simulation of a truck transport. Results showed that exposure to the insecticide net proved fatal to *M. galloprovincialis* adults even at very short periods of contact with the net, of just 1 to 5 minutes. These two novel strategies to manage and control wilt disease in Europe offer new possibilities to prevent the spread of wilt disease natural and artificial spread of the disease by the vector.