Effect of Phosphonate Treatments for Sudden Oak Death on Tanoaks in Naturally Infested Forests[1]

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Abstract

Application of phosphonate compounds has been shown to be an effective preventive treatment for sudden oak death (SOD), caused by *Phytophthora ramorum*, in coast live oak (*Quercus agrifolia* Née) and tanoak (*Notholithocarpus densiflorus* Manos, Cannon & S.H. Oh). To test the effectiveness of these treatments in a natural setting, paired 400 m^2 sections of mixed evergreen/tanoak stands were randomly designated as either treatment or control plots, and topically treated with Agri-Fos® systemic fungicide. The experiment included 36 field plots in six California counties, including nearly 700 tanoak trees <8cm dbh. Both tree canopy and trunk conditions were visually assessed and scored for overall health and the presence of SOD symptoms each fall from 2006 until 2012. In the fall of 2009, five injection treatment plots, located near the existing plots, were added to the experiment.

Phosphonate treatments affected both tree mortality and spore production. The treatment plots had significantly lower mortality as well as reduced numbers of infected trees. Likewise, production of *P. ramorum* spores was reduced in the treatment plots. Since tanoaks can serve as a source of inoculum, once a stand is infested, it may be very difficult to prevent subsequent infestation of the entire stand. In general, phosphonate treatments do slow down the infection rate, even if they do not completely prevent infection.

The individual characteristics of the experimental plots also had an effect on the results. Factors such as slope, gradient, and the direction of the disease spread substantially affected disease incidence and mortality. In two cases, the experimental plots were established in areas that were already infested with *P. ramorum*, significantly reducing the effectiveness of the treatments. In addition, the results show that disease symptoms appear to advance in a punctuated rather than gradual fashion year to year.

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