Early Host Resistance Selection and Development should have been a Primary Management Response to the Sudden Oak Death Epidemic

Pierluigi (Enrico) Bonello, Department of Plant Pathology, The Ohio State University, Columbus, OH; bonello.2@osu.edu; **Richard Sniezko**, Dorena Genetic Resource Center, USDA Forest Service, Cottage Grove, OR

In this presentation I will illustrate the theoretical foundations for a proposed drastic change in how we respond to invasive alien forest pathogens, like *Phytophthora ramorum*. This new framework is the result of an in-depth analysis of the reasons why effective management of invasive alien phytophagous insects and phytopathogens (PIPs) in forest environments remains an elusive aspiration (Showalter et al. 2018). A fundamental reason for why we continue failing is that such PIPs encounter evolutionarily naïve host trees in their new environments, which are incapable of mounting adequate resistance responses. However, it is also true that even the most undefended host populations almost always include individuals that are capable of resisting attack. Such resistance need not be absolute (immunity), but sufficient to ensure survival and reproduction of the target host, so that either natural selection can act directionally upon the traits conferring such resistance, or modern approaches can be brought to bear towards tree improvement programs that are increasingly capable of rapidly selecting and augmenting tree defenses. In the latter case, improved trees can then be used for plantings that are capable of withstanding such invasive alien PIPs. Both in-field directional selection and tree-for-planting improvement programs can be accelerated tremendously by using non-destructive resistance screening techniques such as those we have developed for the coast live oak-*P. ramorum* pathosystem. In all cases, however, to be a successful management approach, careful target selection, early implementation and sustained support are fundamental. I will illustrate a simplified proposed framework to guide future responses to invasive alien PIPs like *P ramorum*.

References

Showalter, D.N.; Raffa, K.F.; Sniezko, R.A.; Herms, D.A.; Liebhold, A.M.; Smith, J.A. and Bonello, P. 2018. Strategic development of tree resistance against forest pathogen and insect invasions in defense-free space. Frontiers in Ecology and Evolution – Conservation. DOI: 10.3389/fevo.2018.00124.