

# Sensitivity and Specificity of Inspection and Testing Procedures for *Phytophthora ramorum* on Nursery Stock<sup>1</sup>

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## Abstract

Targeted sampling is used to detect defective or hazardous items in populations, but is routinely criticized as a non-probability sampling method with drawbacks, including the inability to make statistically valid inferences about the sampled population. Recent advances in stratified discovery sampling theory have remedied this defect. We apply this new technique to evaluate sampling and testing protocols to detect *Phytophthora ramorum*-infected nursery stock. Stratified discovery sampling relies on identifying sub-populations (with easily identifiable characteristics) that are enriched with the defective items. By incorporating test sensitivity and the relative frequencies of the indicator characteristic in defective and non-defective subpopulations, we can infer the true prevalence in the entire population. The target category is symptomatic plants. Assuming a screening (ELISA) test sensitivity of 0.95 and conditional probabilities of plants showing symptoms of 0.5 for infected and 0.05 for uninfected plants, the resulting target population has a disease prevalence 10 times higher than the entire population. Thus, a sample size of 40 in a targeted population is equivalent to a sample size of 400 in the general population.

*Key words:* *Phytophthora ramorum*, stratified discovery sampling

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