

Organic Disease Control (ODC™): Is This “Stuff” For Real and How Does It Work?

We have received numerous inquires regarding the product Organic Disease Control or ODC™, and its supposed effectiveness against insects and diseases. This product contains chitosan (0.25%) as the active ingredient and is being marketed by AgriHouse Inc., (Berthoud, CO) with claims that the product protects trees from attack by pine beetles and blue stain mold. First of all, it is important to discuss the characteristics of the active ingredient. Chitosan (poly-D-glucosamine) is a common polymer present in nature in the cell walls of certain fungi and insects, and the commercial formulation is prepared from chitin that is found in the shells of crustaceans (e.g., crabs and shrimps). Chitosan is supposed to enhance, stimulate, or boost the plants immune (or defense) response. Well, how does it do this? It has been proposed that chitosan is active on the octadecanoid pathway. What happens in this pathway is that linolenic acid is converted to jasmonic acid resulting in the transcriptional activation of genes associated with defense that “turns on” compounds and/or enzymes such as proteinase inhibitors and polyphenol oxidase. In other words, chitosan may elicit or activate plant defense responses. However, the mechanisms affiliated with this process are not clearly understood.

Currently, there is no quantitative information (based on scientific studies) on the efficacy of ODC™ against the mountain pine beetle (*Dendroctonus ponderosae*) in lodgepole or ponderosa pine. Furthermore, the publications (#672 and #5322) referred to in the in-house blog (<http://agrihouse.wordpress.com/>) do not contain any conclusive data to substantiate the claims being made associated with this product. In fact, one of the publications presented only one years’ worth of data (1996) and did not even test for activity against bark beetles. Additionally, the methodology or procedures used (inoculation) are questionable. I have listed four publications at the end of this article that discuss the potential role of chitosan; however, none of these are studies that have conducted or include evaluations against wood-boring beetles.

There are a number of claims being made regarding ODC™ including: 1) “pre-arm pine trees to resist the mountain pine bark beetle” (Question: how does chitosan do this?); 2) “pine tree resin levels increase within 30 to 45 days when ODC is applied as directed (what is interesting is that there is no information or study cited on how they measured this increase in pine resin levels); 3) “tree resin traps the pine beetle preventing it from laying eggs inside the tree” (Question: where are the studies or information that substantiate this statement? Also, will trees respond similarly if “healthy” or “stressed?”); 4) “ODC will boost the tree’s natural defensive response to beetles by increasing the resin pitch-out by 40 percent” (Question: were is the data to substantiate this claim?); 5) “ODC can increase pine tree pitch-out by 40% and has the potential to destroy 37% of the pine beetle eggs in infected pine trees. This was confirmed by the US Forest Service in a 2008 study (it must be noted that these supposed conclusions are based on only one years’ worth of data); and 6) “ODC elicits a natural defense response in trees that increases pine resin out up to 40% ($P<0.05$). Pine beetles get trapped in the resin pitch-out and never make their way into the tree. (According to the US Forest Service this amount of pine resin has the ability to limit as much as 37% of pine beetle eggs in pine trees)” (Question:

where is the scientifically-reviewed publication that supports this statement? In addition, is the product effective if beetles are already present in trees?).

It is important to understand that the response of plants (e.g., shrubs and trees) to applications of chitosan may be dependent on a number of factors including plant age, plant health, plant type (e.g., dicot vs. monocot), and level of infestation by wood-boring beetles prior to application of the product. Of course, none of these factors has been addressed in the information available. Overall, this appears to be an example of an “aggressive marketing” strategy, which may cause confusion among homeowners/consumers. As such, this supports the value of extension at land-grant universities because it is our responsibility as extension personnel to provide un-biased information to homeowners/consumers so they can make sound pest management decisions based on the results from “sound” science...not mis-information.

Publications:

Klepzig, K. D., and C. H. Walkinshaw. 2003. Cellular response of loblolly pine to wound inoculation with bark beetle-associated fungi and chitosan. Research Paper SRS-30. Asheville, NC. United States Department of Agriculture, Forest Service, Southern Research Station. Pgs. 9.

Mason, M. E., and J. M. Davis. 1997. Defense response in slash pine: Chitosan treatment alters the abundance of specific mRNAs. *Molecular Plant-Microbe Interactions* 10(1): 135-137.

Doares, S. H., T. Syrovets, E. W. Weiler, and C. A. Ryan. 1995. Oligogalacturonides and chitosan activate plant defensive genes through the octadecanoid pathway. *Proceedings of the National Academy of Science* 92: 4095-4098.

Walling, L. L. 2000. The myriad plant responses to herbivores. *Journal of Plant Growth Regulation* 19: 195-216.

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