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Testing Efficiencies of Postharvest Decay Controls

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There are ever increasing numbers of antimicrobial compounds available as treatments to extend shelf-life of minimally processed fruits and to control postharvest decay on fresh market fruit. Most microorganisms are controlled by specific compounds or groups of compounds; to ascertain which compounds would be useful on a specific organism requires screening many different antimicrobials. A small, moist chamber system was developed that allows for rapid evaluation of many compounds and their efficiencies to control a specific organism or group of organisms.

There are ever increasing numbers of antimicrobial compounds available as treatments to extend shelf-life of minimally processed fruits and control postharvest decay on fresh market fruit. However, each of these compounds is not comprehensive enough to control large numbers of organisms; indeed, some cannot even control all members in the same genus. To find the appropriate treatment for a specific microbial problem, often a large number of compounds need to be tested. Usually this is done in a petri dish using the disc assay or the agar diffusion method. However, results collected from laboratory dishes do not often extrapolate into field or packinghouse applications. An intermediate method, where commodities can be tested in a controlled environment without the use of large amounts of produce or experimental compounds, would serve as a bridge between the laboratory and the field. This paper discusses the construction of a chamber which serves as an intermediary method.

Chamber construction. The chamber described is based on the method of inducing growth of microorganisms using a moist chamber. A piece of coarse filter paper is placed in the bottom of a glass dish (e.g., a deep culture dish). The paper is saturated with water and small pieces of compressed sponge (~0.5 inch^2) are placed on the paper around the circumference of the culture dish. The number will vary with sample size. A coverslip is placed on the sponge pieces to serve as a platform for the sample and the glass cover is placed on the dish. The unit is autoclaved and cooled. Sample materials can be plugs of agar to support growth of the test organism or small squares of fruit or vegetables that are inoculated with the test organism. The experimental antimicrobial can be applied topically or as a volatile compound introduced into the chamber on a saturated filter disc. The chambers are incubated at the appropriate temperature and the samples can be viewed closely by removing the coverslip with the sample from the chamber and then replacing it on the sponge to continue with the study or by observing the sample through the glass cover.

The sponge absorbs water from the filter paper, thus keeping the sample hydrated for the duration of the study; sterile water can be added to the filter paper as necessary. By this method, problems can be evaluated before scaling up to a larger study. For example, such a problem might be that components in the peel of the fruit interfere with the activity of the compound. In an agar plate, such interactions would not be evident.

Presently these chambers are used to assess the efficiencies of antimicrobial agents against many pre- and postharvest disease organisms of economic importance in Florida (e.g., citrus canker; gray mold on strawberries). The chambers are versatile and can be used in any number of studies that call for a clean, moist environment and the ability to watch the developing disease and/or reactions between the test organism, the experimental compound, and the sample.

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