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Integrated Management of *Fusarium* in Florists' Crops

Evaluation of Chemical Disinfestation of Styrofoam

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BACKGROUND

Many fungal species can contaminate propagation containers (Fig. 1). Of these fungi, *Fusarium* species cause some of the most common, difficult to control and economically important diseases affecting ornamental production. Production of ornamentals often starts in a transplant or "plug" tray. These containers have a high structural integrity which facilitates their reuse. Therefore, many growers reuse these plug trays, especially those made of Styrofoam. Unless adequate sanitation practices are followed, there is a significant risk of infection associated with the reuse of these containers. Steam disinfestation of trays is highly effective, but may not be economically feasible for all operations. Two experiments were conducted to examine chemical disinfestation procedures for the elimination of *Fusarium* contamination on a Styrofoam substrate using six different treatments.

Fig. 1 Tray showing disease problems

MATERIALS AND METHODS

An isolate of *Fusarium oxysporum* f.sp. *calistephi* from China aster was grown on carnation leaf agar for 7 days to produce conidia. The conidia were harvested in sterile distilled water and the suspension was standardized to 1 x10^1 conidia/ml. Stryofoam sheets 0.5 in. thick were cut into 3.25 in. diameter discs. The discs were dipped for 10 seconds in the conidial suspension, shaken to remove excess water, and blotted dry for 3 seconds using a sterile paper towel. Each disc was then treated with the appropriate chemical and incubated for 5 days at 26 C (79 F) on a culture plate containing Komada's medium, which was developed for recovery of *F. oxysporum*. The resulting *Fusarium* colonies were counted. Each treatment was replicated using 18 Styrofoam discs in each of three tests per experiment. The experiment was conducted twice.

Treatments:

Disinfestation treatments were sprayed on the discs until runoff and then the discs were air-dried. Treatments evaluated included: sterile water, NaOCl (1:9 solution; Clorox household bleach), Zerotol (1:300 solution; Biosafe Systems, L.L.C., East Hartford, CT;), ethanol (70% solution; Fisher Scientific, Pittsburgh, PA), Lysol Disinfectant Spray (full strength; Rickitt Benckiser plc, Berkshire, UK), Physan 20 (1 Tbs/gal; Maril Products Inc., Tustin, CA), and peroxyacetic acid (1:100 solution; Phyton Corporation, Edina, MN). A non-

inoculated control (Styrofoam discs dipped in sterile water then air-dried) and an inoculated control (Styrofoam discs dipped in the conidial suspension of *F. oxysporum* then air-dried) were also included in the experiments.

RESULTS

In Experiment 1, all treatments including the sterile water spray significantly reduced the number of *Fusarium* colonies recovered from the Styrofoam discs compared with the inoculated control (see Fig. 2). However, only bleach, Lysol, and peroxyacetic acid reduced the fungus to an

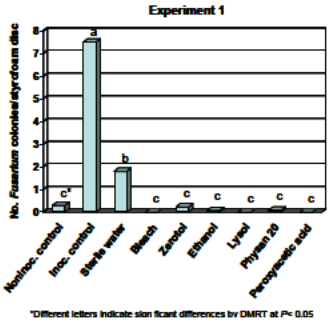

Fig. 2 – Effect of various treatments on Fusarium

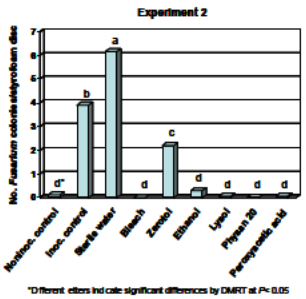

Fig. 3 – Effect of various treatments on Fusarium

treatments except the sterile water spray reduced recovery of Fusarium from the discs (Refer to chart above). However only bleach reduced the fungus to an undetectable level. Zerotol was intermediate in effectiveness compared with the rest of the chemical treatments. The sterile water spray increased the colony count of *Fusarium*. The increase observed in Experiment 2 may have resulted from a combination of less forceful removal and higher residual wetness leading to increased conidial germination.

CONCLUSIONS

Growing containers can represent a significant expense in plant propagation and production. Therefore, container reuse may occur in certain situations. With adequate disinfestation procedures these containers can be reused. This research demonstrated that sprays of certain materials, particularly bleach, were effective in reducing or eliminating *Fusarium* from the surface of Styrofoam.

It should be noted that the architecture of transplant trays may require a longer duration of disinfestation including the use of total immersion. It may also be necessary to remove the disinfestant after treatment through rinsing to prevent plant damage. Disinfestation label recommendations must always be followed.

IMPACT TO THE INDUSTRY

Efforts to reduce costs and increase profits are common goals in all industries. Reduction of costs associated with reuse of propagation trays may positively effect the profit margin. In addition, effective, low cost disinfestation processes can reduce crop losses and increase crop production and also increase profits.
This research identified several materials that are effective in reducing or eliminating *Fusarium* spore survival and growth on the surface of Styrofoam.

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