

Sensitivity of Postharvest Rot Fungi of Bananas to Chlorine

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ABSTRACT

Virtually complete kill of *Cephalosporium* sp., *Fusarium roseum*, *Gloeosporium musarum*, and *Ver-*

ticillium theobromae conidia was obtained with 2 ppm chlorine or less with a 1-minute exposure at pH 7.0. *Botryodiplodia theobromae* and *Deightoniella torulosa* conidia survived a 1-minute exposure to 24 ppm chlorine and required more than 20 minutes to kill at lower chlorine concentrations. Phytopathology 60:344-345.

Most of the fungi responsible for postharvest rots of bananas are carried from the field into the packing station on the surface of the fruit itself or on the trash often associated with the fruit, such as dried bracts, dead banana flowers, pieces of dead leaves, in-

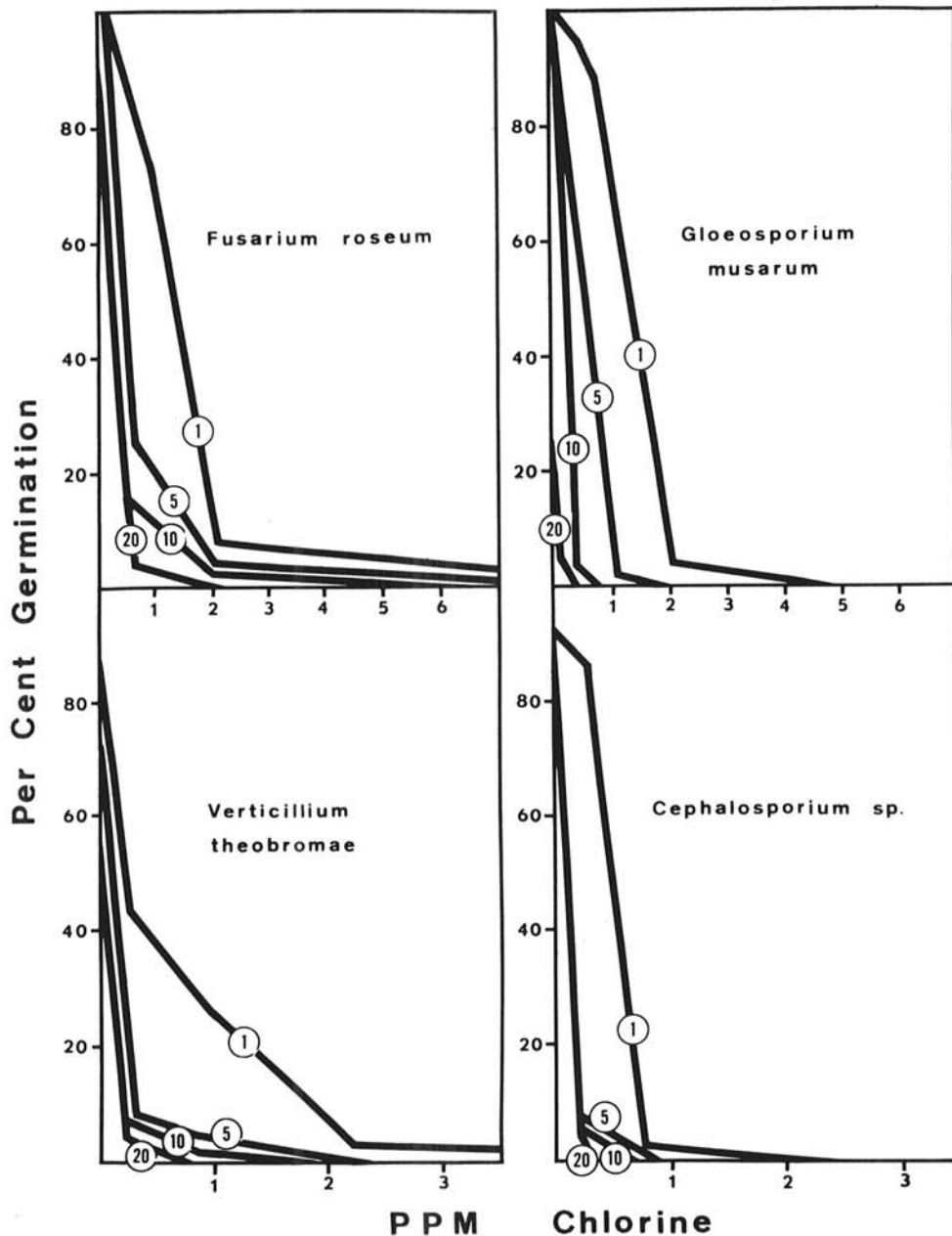


Fig. 1. Chlorine sensitivity of four banana fruit-rot fungi which have thin-walled, hyaline conidia. The four curves represent exposure times of 1, 5, 10, and 20 min.

jured and rotting fruits, bird nests, etc. As the stems of fruit are dehanded, this load of inoculum is introduced into the dehanding tank where the spores, dispersed by the water, come into contact with the fresh-cut crown surface or other wounds caused by the handling of the fruit. Chlorination of the water used to wash, move, or hydrocool fresh produce has proved useful in a number of food packing industries to reduce the amount of viable inoculum which comes into contact with the product (1). Control of anthracnose of bananas by chlorination of the wash water has been suggested (2). This study was undertaken to determine the practicability of controlling other postharvest diseases of banana with chlorine.

Cultures of *Botryodiplodia theobromae*, *Cephalosporium* sp., *Deightoniella torulosa*, *Fusarium roseum*, *Gloeosporium musarum*, and *Verticillium theobromae* isolated from rotting bananas and of proven pathogenicity were induced to sporulate on green banana agar (the filtrate of 250 g of green banana slices boiled gently for 30 min in 1 liter of water, solidified with 2% agar). Heavy spore suspensions were prepared by flooding the cultures with sterile, distilled water, lightly scraping them with a wire loop, and filtering the resulting suspension through two layers of sterile cheese cloth. Serial dilutions of Clorox (5% sodium hypochlorite) were prepared with 0.05 M phosphate buffer, pH 7.0, to yield approx 0.5, 1, 2, 4, 8, 16, and 32 parts/million equivalent Cl_2 . To 490 ml of each of these buffered chlorine solutions, 10 ml of the spore suspension of the fungus being tested was added with vigorous stirring. After intervals of 1, 5, 10, and 20 min, aliquots of about 100 ml were taken and quickly filtered with suction through a Millipore filter, type RA. The filtrate was collected, and the residual chlorine determined by iodometric titration using starch as an indicator. The spores on the filter were quickly rinsed 3 times with about 10 ml distilled water, the filter being sucked dry after each rinse. The spores were then resuspended in 1 ml distilled water, and drops of this suspension were placed on clean microscope slides. The slides were placed in moist chambers to incubate for 12-24 hr, and the per cent germination was determined by microscopic examination.

In Fig. 1 and 2, the per cent germination of the spores is plotted versus parts per million residual chlorine. The four curves for each fungus represent contact times of 1, 5, 10, and 20 min. The six fungi tested fall into two distinct groups with respect to their sensitivity to chlorine. Virtually complete kill of *Cephalosporium* sp., *F. roseum*, *G. musarum*, and *V. theobromae*, all of which have hyaline, thin-walled conidia, was obtained with 2 ppm Cl_2 or less, even

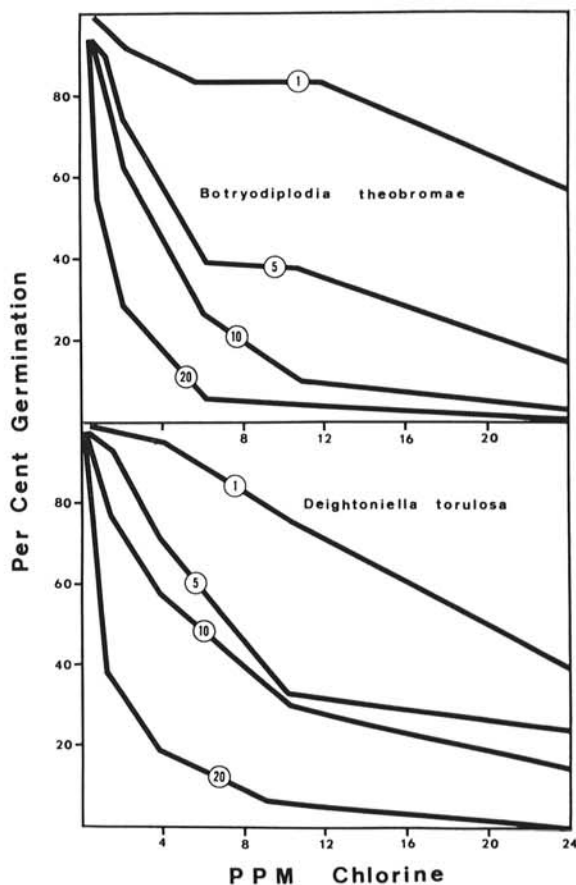


Fig. 2. The chlorine sensitivity of two banana fruit-rot fungi which has brown, thick-walled conidia. The four curves represent exposure times of 1, 5, 10, and 20 min.

with only a 1-min exposure. *Botryodiplodia theobromae* and *D. torulosa*, both of which have brown, thick-walled conidia, survived a 1-min exposure to 24 ppm Cl_2 and required more than 20 min to kill at the lower Cl_2 concn. Control of *B. theobromae* and *D. torulosa* in the banana wash water with chlorine does not appear practical because of the high residual chlorine level required. *Cephalosporium* sp., *F. roseum*, *G. musarum*, and *V. theobromae*, however, should be effectively controlled with 2 ppm Cl_2 .

LITERATURE CITED

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