

**Title** Methodology for determining relationships between inoculum concentration of *Botrytis cinerea* and *Penicillium expansum* and stem end decay of pear fruit

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### Abstract

The objective of this research was to determine quantitative relationships between incidence of stem end decay of pear fruit and inoculum concentration of *Botrytis cinerea* and *Penicillium expansum* using dry conidia applied to pear fruit in a settling tower. Five concentrations of conidia were applied to pear fruit, fruit were stored at  $-1^{\circ}\text{C}$  for 8 months, and stem end decay was evaluated. In addition, conidia were washed from the surface of inoculated fruit, and DNA was extracted and quantified with real-time polymerase chain reaction (PCR). The linear regression relationships between percent stem end gray mold and *B. cinerea* conidia per liter of air or per square centimeter of fruit surface were significant ( $P = 0.01$ ). At the highest inoculum dose introduced into the settling tower, conidia per liter of air, conidia per square centimeter, and percent stem end gray mold at 8 months after inoculation were 12, 31, and 39, respectively for 2000 and 6, 33, and 67, respectively for 2001. Similarly, the linear regression relationships between percent stem end blue mold and *P. expansum* conidia per liter of air or per square centimeter of fruit surface were significant ( $P = 0.01$  and  $0.05$ , respectively). At the highest inoculum dose introduced into the settling tower, conidia per square centimeter and percent stem end blue mold at 8 months after inoculation were 39 and 26, respectively for 2000 and 66 and 23, respectively for 2003. Real-time PCR provided a rapid, quantitative measure of *B. cinerea* and *P. expansum* DNA on pear fruit surfaces. Because of possible year-to-year shifts in susceptibility of fruit to decay, disease incidence:inoculum dose relationships may be of most value compared within years rather than across years. This would facilitate comparison of decay risk among orchards in order to determine which fruit is most suitable for long-term storage.