Title Ethylene produced by *Botrytis cinerea* can affect early fungal development and can be used as a marker for infection during storage of grapes

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Citation Postharvest Biology and Technology, Volume 66, April 2012, Pages 23–29

Keywords Ethylene; Light; *Botrytis cinerea*; Grape

Abstract

Ethylene production *in vitro* by six strains of *Botrytis cinerea* was analyzed, and all were confirmed to produce ethylene at higher rates under light than in the dark, irrespective of the media used. On grape juice agar (GJA) medium, *B. cinerea* produced ethylene without methionine (Met) addition. When Met was added, the fungus produced more ethylene than that on Czapek and potato dextrose agar (PDA) media. Ethylene production by grape berries was very low and was not influenced by light conditions, whereas in the *B. cinerea*–grape pathosystem, rate of ethylene production of the light-treated group was approximately two-fold higher than of that of the dark-treated group. The light-enhanced ethylene production from the *B. cinerea*–grape pathosystem was thus primarily a contribution of the light-promoted ethylene production from the fungus. In addition, increased ethylene release correlated with disease enhancement, and the disease under light was more severe than that in the dark. Ethylene was detected 24 h before general decay symptoms became visible. Therefore, ethylene increase, especially when treated by light, could be a warning signal for grey mould occurrence in grape berries. Exogenous ethylene promoted germ tube elongation and appressoria formation of *B. cinerea*, especially at 10 μL/L, which had little effect on colony growth. Treatment with 100 μL/L ethylene enhanced grey mould severity on grape berries postharvest in the dark compared with in the light. Therefore, ethylene production by *B. cinerea* contributed to ethylene production in the *B. cinerea*–grape system, and ethylene may be involved in modulating both hyphal growth and pathogenesis.