Title The effect of MeJA on ethylene biosynthesis and induced disease resistance to *Botrytis cinerea* in tomato

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Abstract

Methyl jasmonate (MeJA), a major derivative of the plant hormone jasmonic acid, plays a critical role in inducing resistance to fungal pathogen. To study the endurance of MeJA-induced resistance and its cause, green mature tomatoes (*Solanum esculentum* cv. Lichun) were treated with 100 μM MeJA and nordihydroguaiaretic acid (NDGA, LOX inhibitor) at −35 kPa for 0.5 min and incubated at 25 ± 1 °C, 85–90% RH. Treatment with MeJA reduced disease symptoms in tomato fruit soon after being inoculated with *Botrytis cinerea*. Lesion size in MeJA-treated fruit was inhibited by 42.5%, 27.9% and 13.9% respectively ($P < 0.05$) in fruit inoculated 1, 3 and 6 d after treatments. At advanced stages (inoculation carried out 9 and 12 d after treatments), no inhibitory effect of MeJA were found. Ethylene biosynthesis was activated in the response of green mature tomatoes to methyl jasmonate with a rapid (1 d) and enhanced ethylene peak (0.9 ng kg^{-1} FW s^{-1}). However the ethylene level was below that of the control from 6 d to 12 d. This rise was closely related with conversion of ACC to ethylene, especially a rise in ACO activity (6 h), which preceded an increase in ACS (12 h) after MeJA treatment. The development of ethylene biosynthesis was accompanied by a significant increase in LOX activity. Two significant $O_2^{\bullet -}$ peaks ($P < 0.05$) were detected in MeJA-treated fruit during storage (6.18 μmol g^{-1} FW min^{-1} at 6 h and 5.68 μmol g^{-1} FW min^{-1} at 3 d). The correlations between LOX, and $O_2^{\bullet -}$ and ACO activities were 0.75, 0.73 respectively ($P < 0.05$). These results indicate that MeJA-induced resistance against *B. cinerea* is durable, MeJA induces LOX and the superoxide radicals formed by LOX may activate ACO and ethylene biosynthesis.