From Ornamental to Defender: Camellia japonica Flower Extracts Control Erwinia amylovora in Pear Orchards

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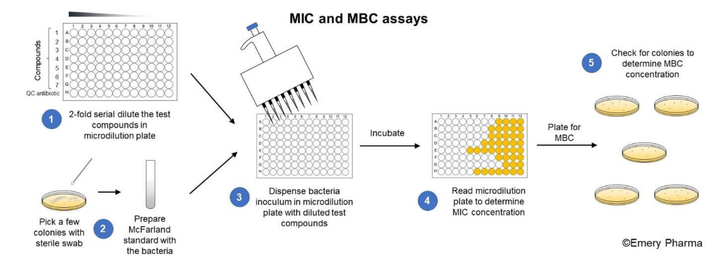
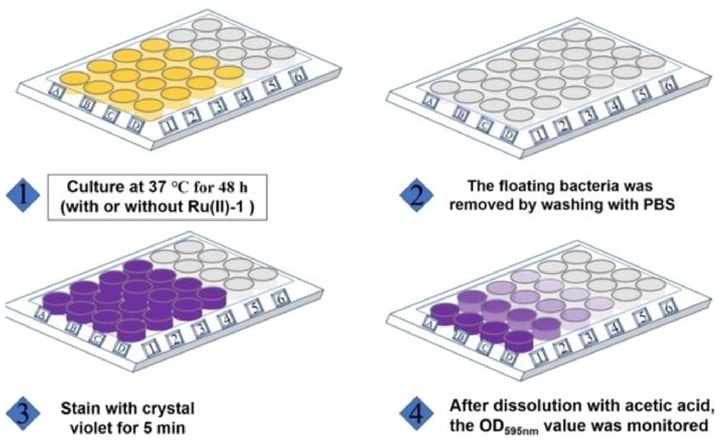
INTRODUCTION

Camellia japonica (common camellia or Japanese camellia) has long been valued in Eastern medicine and cosmetics for its rich bioactive compounds, known for their **antioxidant**, **antimicrobial**, **anti-inflammatory**, and **anticancer** properties. This study investigated the antibacterial potential of hydromethanolic extracts from leaves and flowers of the 'Lipstick' cultivar against two significant phytopathogens: *Erwinia amylovora* (EA) and *Xanthomonas campestris pv. campestris* (Xcc).

METHODS





Schematic diagram of the biofilm formation and removal assay.

Other methods consisted in:

- evaluation of membrane permeability alteration,
- amylovoran production,
- *in planta* activity.

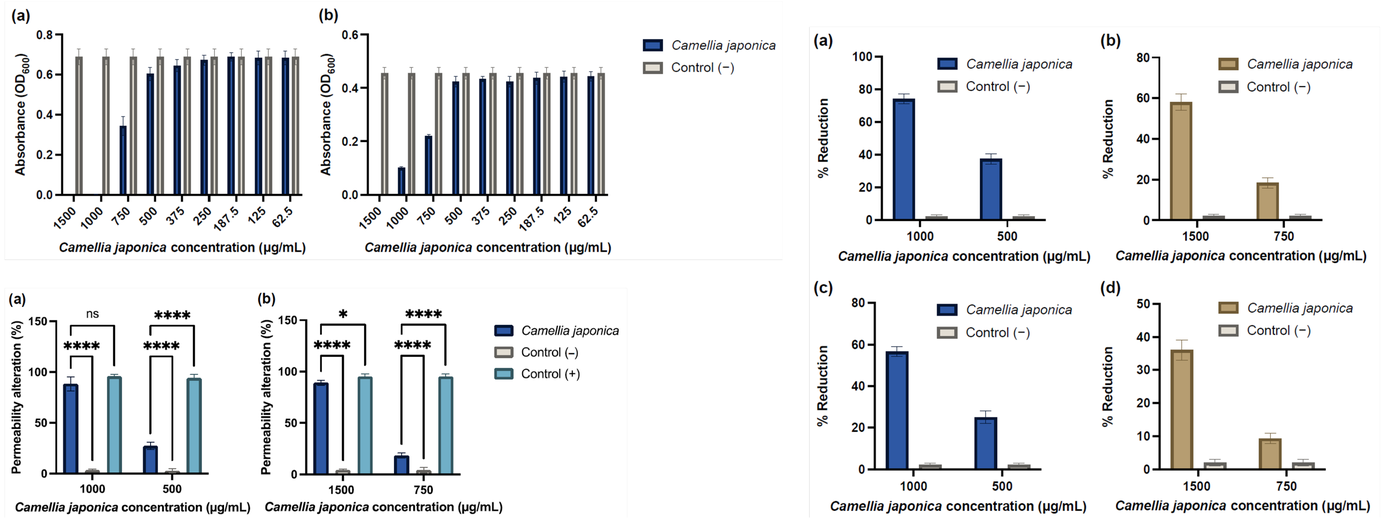
CONCLUSION

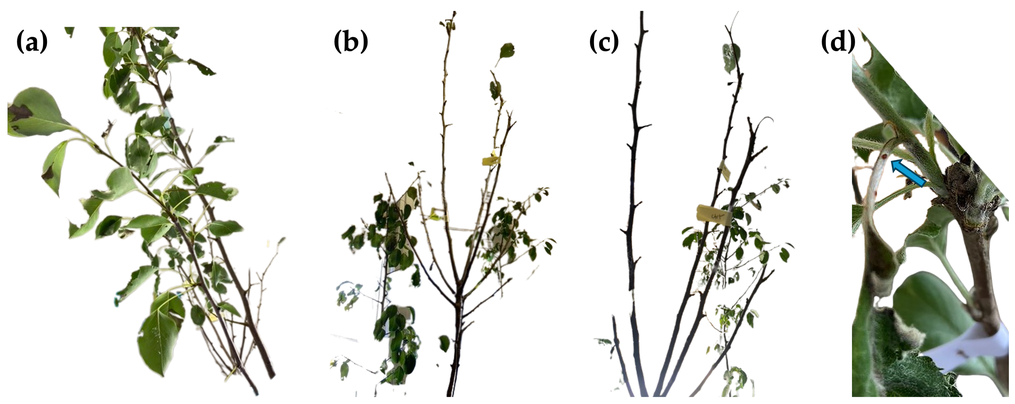
These findings highlight the potential of C. japonica flower extracts as eco-friendly biorationals for protecting crops against bacterial phytopathogens, particularly in the management of fire blight in pear trees.

RESULTS

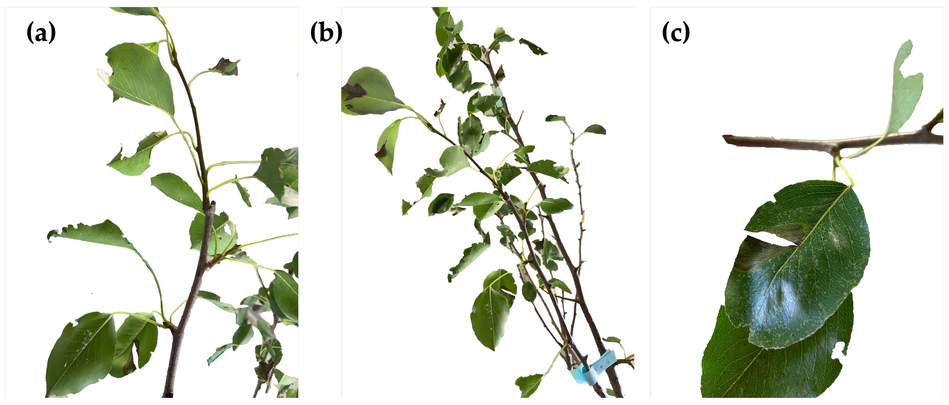
In vitro assays demonstrated **low activity for the leaf extract and minimum inhibitory concentration (MIC) values of 1000 and 1250 µg/mL against Xcc and EA**, respectively, for the flower extract. At these concentrations, the flower extract achieved complete inhibition of biofilm formation and, in the case of EA, substantial reduction in amylovoran production. Moreover, *in vivo* tests on artificially-infected *Pyrus communis* L. branches showed effective control of fire blight at a concentration of 1250 µg/mL.

In vitro antimicrobial activity assays. (**a**) and (**c**) representing the activity on Xcc while (**b**) and (**d**) on EA. From lefto to right, clockwise, the graphs represent the MIC assay, the biofilm removal and biofilm formation activity assay and the permeability alteration assay.

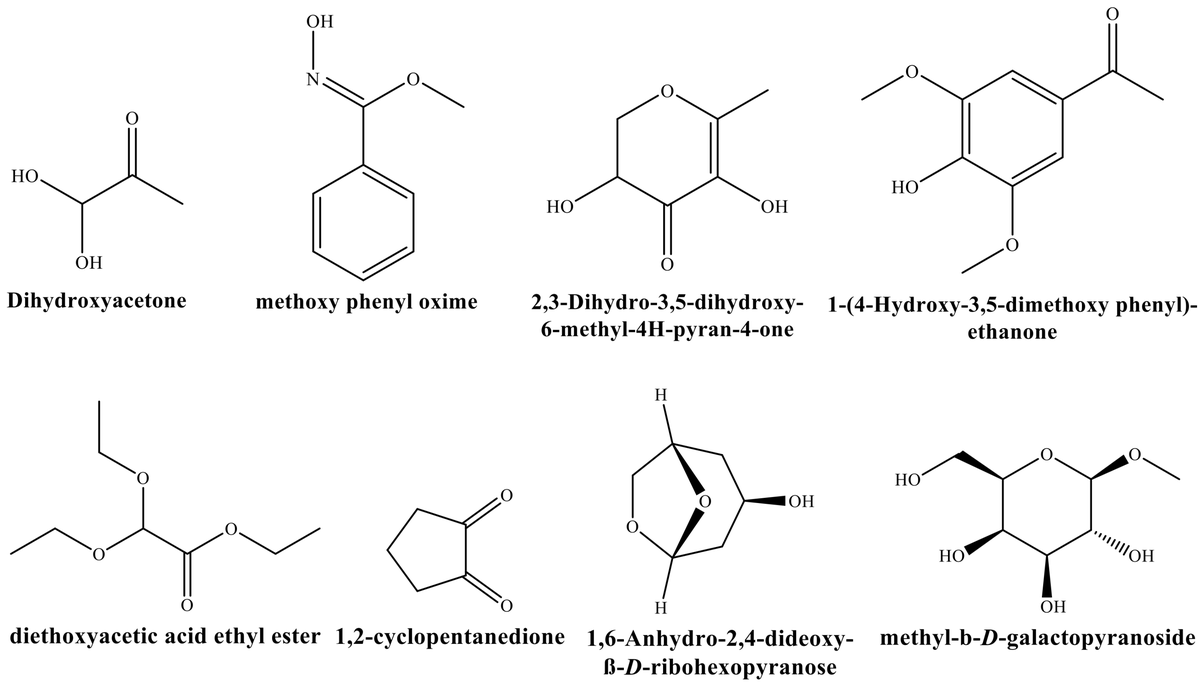




Pear plants, infected and untreated, serving as control (+). A (**a**) control pear tree branch pre-inoculation, (**b**) a control pear tree branch 7 days post-inoculation, (**c**) a control pear tree branch 10 days after inoculation, and (**d**) a control pear tree branch 10 days after inoculation with a focus on single branches.



In planta assay depicting the effect of the *C. japonica* extract against *E. amylovora*. (**a**) A pear tree branch 2 days post-inoculation, (**b**) a pear tree branch 7 days after treatment, and (**c**) a pear branch 7 days after treatment with a focus on individual leaves.



Gas chromatography-mass spectrometry analysis revealed the primary constituents in the leaf extract to include **D-fucose, dihydroxyacetone, methoxy-phenyl-oxime (MPO), 2,3-dihydro-3,5-dihydroxy-6-methyl-4H-pyran-4-one (DDMP), and 1-(4-hydroxy-3,5-dimethoxy phenyl)-ethanone**. The flower extract shared **MPO** and **DDMP** as main phytochemicals, along with **diethoxyacetic acid ethyl ester, nonanoic acid, 1,2-cyclopentanedione,** and **eicosane**

IECAG2024.sciforum.net

We aknowledge the University of Valladolid, Palencia Campus and the Univeristy of Ferrara, laboratory of Microbiology, Biochemistry and Immunology

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