

The microbiome of the Lebanese wild apple, *Malus trilobata*, is a rich source of potential biocontrol agents for fungal post-harvest pathogens of apples

Elie Khoury, Antoine Abou Fayad, Dolla Karam Sarkis, Hala Fahs, Kristin C. Gunsalus and Mireille Kallassy Awad

Current Microbiology 78: 1388–1398. (2021)

Abstract

The widespread use of harmful fungicides in the agricultural sector has led to a demand for safer alternatives to protect against crop pathogens. The domestic apple is the second most highly consumed fruit in the world and encounters several pre- and post-harvest fungal and bacterial phytopathogens. The goal of this study was to explore the uncharacterized microbiome of a wild apple, *Malus trilobata*, as a potential source of novel biocontrol agents for two post-harvest fungi that affect commercial apples: *Botrytis cinerea* and *Penicillium expansum*. We sampled microflora associated with the leaves, bulk soil, and roots of *Malus trilobata* in two regions of Lebanon: Ehden reserve in the north and Dhour EL Choueir near Beirut. The two regions have different soil types Dhour EL Choueir and samples from the two regions showed very different microbial compositions, with greater microbial diversity among those from Ehden reserve. Molecular characterization revealed a wide variety of genera displaying activity against the two fungal pathogens, including several with previously unknown antifungal activity: *Bosea*, *Microlunatus*, *Microbacterium*, *Mycetecola*, *Rhizobium* and *Paraphoma*. In total, 92 strains inhibited *Penicillium expansum* (39%) and 87 strains inhibited *Botrytis cinerea* (38%) out of 237 screened. Further chemical and genetic characterization of one or more selected strains could pave the way for future development of new biocontrol agents for post-harvest applications.