

# Social networking in crop plants: Wire and wireless cross-phytobiome communications

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## Abstract

Plants share the phytobiome with other members of the ecological community by sharing their physiology. The phytobiome is a collective ecological entity that senses external and internal stimuli via its member's sensing apparatus (senome). The activated senome generates intercellular, and intra- and inter-organismal signals that induce genetically and epigenetically dependent modifications of phytobiome member transcriptomes. Ultimately, these genetic modifications alter the phenotypes of the collective phytobiome members. Mycorrhiza, epiphytic fungi, and dodder can physically transfer signals between kin and non-kin plants. Phytobiome members can release infochemicals by themselves, or modify plant volatile emissions and root exudates to act as signals for plant-plant interactions. These signals can change plant physiology and induce holobiont updates in receiver plants via a facilitative or competitive mechanism. Receiver plants eavesdrop on phytobiome cues and signals to anticipate responses to unfolding challenges. An emerging body of information in plant-plant interactions through inter-kingdom communication can be exploited in integrated crop management under field conditions. However, a holistic view is crucial for the manipulation of complex systems, such as the phytobiome, to avoid potential butterfly effects.

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