

Morel

Plant-plant interactions modify disease susceptibility

Aurélie DUCASSE¹, Coline TEMPLE¹, Elsa BALLINI¹, Jean-Benoit MOREL^{1*}

¹ BGPI, INRA, CIRAD, SupAgro, Univ. Montpellier

Campus International de Baillarguet TA A-54 / K 34398 Montpellier cedex 5

Many reports indicate that crop mixtures (either inter or intra-specific), reduce the incidence of microbial diseases. Besides mechanisms operating at the field level like inoculum dilution, there is recent evidence that plant-centered mechanisms with identified plant molecules and pathways are also involved. For instance, molecules produced by one plant, either above or below ground, can directly inhibit pathogens or indirectly trigger resistance through the induction of the plant immune system in neighboring plants. Alternatively, competition for resources like light or nutrients may indirectly modify the expression of the plant immune system (Morel and Zhu, 2018). We evaluated under controlled conditions and in the field if such plant-centered mechanisms were operating, using inter-specific (rice and maize, wheat and pea) and intra-specific mixtures (rice and rice, wheat and wheat). Our results show that the physiology (as measured by gene expression analysis) of a given plant can be modified by the identity of the neighboring plants. This modification can lead to measurable changes in disease susceptibility. We have evidence that several mechanisms are operating: some involve molecules produced by roots exudates while in other cases the trade-off between growth and defense may be involved. We further explored these plant-plant interactions in intra-specific mixtures. We could identify good neighbors that hold new promises for crop protection in intra-specific mixtures.

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