**Rhizobial tolerance to fertilizer leads to modifications of the relationship dynamics in the Medicago lupulina-rhizobium mutualism**

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The stability of mutualisms, such as those between nitrogen-fixing rhizobial bacteria and legumes, depends on a variable ratio of costs and benefits to both partners. Our objective was to determine how the addition of one of the exchanged resources, nitrogen, impacts rhizobial growth rates independent of the host plant. We compared in-culture growth rates of rhizobia at high, low and control fertilizer treatments isolated from the roots of *Medicago lupulina* plants that were harvested from experimentally fertilized and unfertilized plots at the Koffler Scientific Reserve. Rhizobial strains isolated from both fertilized and unfertilized plots had higher in-culture growth rates as concentration of fertilizer increased, with fertilized strains exhibiting the largest increase in growth. We suggest that the trend towards more competitive (higher growth rates) strains in fertilized soil was a result of one of two factors: the decreased dependence on rhizobia by *M. lupulina* for nitrogen, and therefore, minimal resource allocation (carbon) to the bacteria, or, the rhizobial tolerance to fertilizer induced a shift towards less cooperative and more competitive strains, independent of host response. Regardless, as selection for cooperative strains is relaxed in fertile soil, or an abiotic stressor such as fertilizer is present, there exists increased competition among strains or individuals. Preliminary data also suggests that there is a significant trade-off between the fitness of host plants (fruit number) and the competitive ability (growth rates) of strains isolated from those plots, with the relationship being more pronounced in strains isolated from fertilized plots.