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Microbe-Based Plant Defense with a Novel Conprimycin Producing *Streptomyces* Species

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Crops lack genetic resistance to most necrotrophic soil-borne pathogens and parasitic nematodes that are ubiquitous in agroecosystems worldwide. To overcome this disadvantage, plants recruit and nurture specific group of antagonistic microorganisms from the soil microbiome to defend their roots against pathogens and other pests. The best example of this microbe-based defense of roots is observed in disease-suppressive soils in which the suppressiveness is induced by continuously growing crops that are susceptible to a pathogen. Suppressive soils occur globally yet the microbial basis of most is still poorly described. Fusarium wilt, caused by *Fusarium oxysporum* f. sp. *fragariae* is a major disease of strawberry and is naturally suppressed in Korean fields that have undergone continuous strawberry monoculture. Here we show that members of the genus *Streptomyces* are the specific bacterial components of the microbiome responsible for the suppressiveness that controls Fusarium wilt of strawberry. Furthermore, genome sequencing revealed that *Streptomyces griseus,* which produces a novel thiopetide antibiotic, is the principal species involved in the suppressiveness. Finally, chemical-genetic studies demonstrated that *S. griseus* antagonizes *F. oxysporum* by interfering with fungal cell wall synthesis. An attack by *F. oxysporum* initiates a defensive "cry for help" by strawberry root and the mustering of microbial defenses led by *Streptomyces*. These results provide a model for future studies to elucidate the basis of microbially-based defense systems and soil suppressiveness from the field to the molecular level.