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**COS 54-5: Lack of mutualisms as barrier for Pinaceae invasion**

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#### **Background/Question/Methods**

Why particular invasions succeed and others fail is often not well understood. The role of soil biota, mainly pathogens, has recently been proposed to promote colonization by exotic plants, by reducing negative interactions between such plants and the local soil. Conversely, facilitation has been suggested as an important factor governing biological invasions. For example, mycorrhizal symbiosis is often claimed to cause success or failure of plant colonization. However, its role on plant invasion has rarely been explored empirically. We studied the role of ectomycorrhizal (EM) symbiosis on pine invasion on Isla Victoria, Argentina. On this island ca. 80 years ago 135 species of exotic trees, many of them Pinaceae, were introduced, but only a few species have become invasive, and they are found in high densities only near plantations. With a series of field and greenhouse experiments, plus observational and molecular studies, we found that the lack of proper EM fungi could be controlling invasion for at least some of these species.

#### **Results/Conclusions**

Seedling establishment and growth rates are higher near inoculum sources (plantations) than far from the inoculum sources. In the greenhouse experiment, the growth of seedlings with soil from areas far from plantations plus fungal inoculum was three times that of seedlings growing with the same soil but without the inoculum. Results of field experiments accorded with those of the greenhouse study. Fungal richness and EM inoculation probabilities were lower for seedlings growing in soil from areas far from plantations. Uninoculated treatments with soil from areas near plantations had 4 times more colonized seedlings and 5 times the number of EM fungi species that those with soil from further away. Inoculation increased both the number of species and probabilities of successful fungal colonization. Also, the most abundant species near plantations differ from those common far from plantations, probably because of different dispersal abilities. The lack of proper root mutualisms distant from plantation could be evidence of poor dispersal abilities of species of EM fungi, which may be retarding the invasion. This study shows that positive interactions with soil biota could play a crucial role in plant invasion and colonization, and that mycorrhizal interactions could be an important trait explaining plant invasion.

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