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Monitoring tree growth and phenology in restored forests

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Over the last century, the Brazilian Atlantic rainforest has suffered strong impact due to deforestation for agriculture and grazing activity. Natural forest areas that had been damaged are now being restored either naturally, or by means of native species plantations. We gathered 6-year girth increment and phenological (flushing, leaf fall, flowering and fruiting) data of up to 35 species to evaluate radial growth and phenology in successional forests and reforestation areas in the Atlantic Forest, southern Brazil. We investigated whether these patterns can be distinct according to factors such as soil type, ecological group, deciduousness and successional gradient. In a short-term girth increment analysis (12 months), pioneer species had significantly superior growth than non-pioneer species and these two groups were also different when we considered biomass accumulation (non-pioneers: 410 kg and pioneers: 255 kg). In a long-term study of two pioneer species, we found a consistent pattern of distinguished growth between soils along the 4 years. One species had significantly increased growth in Cambisol when compared to Gleysol while the other did not show any distinction between soils. Studying phenology of some species for two years, we also found a tendency of shifts in the phenological patterns of the communities along the successional gradient, especially regarding time of occurrence. The combined results of our studies indicate that restoration actions in the region have been playing an important role to reduce the effects of fragmentation and human activity. Furthermore, monitoring tree growth and phenology in these areas may provide important information about the success of restoration approaches.