

La importancia de esta revisión resulta en brindar una herramienta básica para avanzar en la práctica; abre las puertas a la inspiración y difusión de nuevas ideas, poniendo sobre la mesa las contradicciones en los conocimientos actuales. Este proyecto posibilita la evaluación de las prácticas vigentes y formulación de recomendaciones. Por medio de una recolección de documentos se hará la organización inicial de los mismos de categorías conceptuales con el fin de determinar la saturación teórica en el tiempo, una codificación axial y selectiva de la información y finalmente, estará la generación de una matriz condicionada para delimitar la teoría que ponga en evidencia el vacío de información en el campo de investigación de los sistemas agroforestales con base en un grupo de conceptos de alta abstracción. ■

Volatile monoterpene ‘fingerprints’ of resinous *Protium* tree species in the Amazon Rainforest

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Volatile terpenoid resins represent a diverse group of plant defense chemicals involved in defense against herbivory, abiotic stress, and communication. However, their composition in tropical forests remains poorly characterized. As a part of tree identification, the ‘smell’ of damaged trunks is widely used, but is highly subjective. Here, we analyzed trunk volatile monoterpene emissions from 15 species of the genus *Protium* in the central Amazon. By normalizing the abundances of 28 monoterpenes, 9 monoterpene ‘fingerprint’ patterns emerged, characterized by a distinct dominant monoterpene. While 4 of the ‘fingerprint’ patterns were composed of multiple species, 5 were composed of a single species. Moreover, among individuals of the same species, 6 species had a single ‘fingerprint’ pattern, while 9 species had two or more ‘fingerprint’ patterns among individuals. A comparison of ‘fingerprints’ between 2015 and 2017 from 15 individuals generally showed excellent agreement, demonstrating a strong dependence on species identity, but not time of collection. The results are consistent with a previous study that found multiple divergent copies of monoterpene synthase enzymes in *Protium*. We conclude that the monoterpene ‘fingerprint’ database has important implications for constraining *Protium* species identification, phylogenetic relationships and enhancing understanding of physiological and ecological functions of resins and their potential commercial applications.

Class Insecta as bioindicators of ecological restoration in the Brazilian Ombrophilous Dense Montana forest

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Insects are not a common bioindicators to evaluate ecological restoration in Brazil. However, these organisms have many advantages as bioindicators, and can be used in the characterization of different successional stages during the ecological restoration process. In this study, we investigated leaf litter insect fauna in different degraded areas by pastures submitted to ecological restoration from different techniques. We compared the litter fauna from a preserved forest and a natural regeneration area with our restoration sites to identify insect diversity during this process. Fauna was sampled with pitfall traps in the period of April/2017 until December/2018. The study area is located in Serra do Itajaí National Park in the Santa Catarina state, southern Brazil. To compare the areas, parameters of richness, abundance, diversity, equability, similarity, univariate and multivariate analyzes, species indicators indices and correlations with microclimatic variables and plant community were used. Analysis of taxonomic sufficiency was also performed (Insecta families and Formicidae species). From the results, we conclude that less specific taxonomic levels (family) allow us to observe and interpret the differences resulting from changes in ecological succession during the restoration process. The structure of the insect community was influenced by vegetation structure and microclimate. We identified indicative families and species of the different restoration process stages (for example, Ptiliidae, Staphylinidae and Leiodidae for advanced stages and Cicadellidae and Delphacidae for initial stages). In this context, they are organisms that can be used in the monitoring of the ecological restoration stages and basis for decisions making regarding restoration strategies.

Mixed forests of *Nothofagus pumilio* and *N. betuloides*: are they stable? Approximation based on the study of the first stages of natural regeneration cycle

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Flowering, seeding, seedling are a paramount process for tree regeneration, forest conservation and management. In mixed forests, the impact of limiting (biotic and abiotic) factors on tree reproductive success regulate the maintenance of species in balanced proportions or the conversion towards monospecific forests. Tree reproductive phenology were studied in three forest type (pure deciduous *Nothofagus pumilio*, pure evergreen *Nothofagus betuloides* and mixed forests) considering two location (coast and mountain), during three years in Tierra del Fuego, Argentina. The incidence of different loss factors (e.g., premature abortion, fruit, seed predation) was evaluated. Flowering and seeding varied interannually for both species for forest type. Both species showed advantages in pure forests than in mixed forests. A strong effect of location on seeding and in losses factors were detected. The main limiting factor in flowering results in empty seeds due to the pollen self-incompatibility. Premature abortion was associated with extreme climatic events (e.g., late frosts). *N. pumilio* presented in general higher losses associated with seed foraging and stratification losses in *N. betuloides*. Finish for each cycle, the seedling proportion was higher for *N. pumilio* in the mountains and coast than for *N. betuloides*. *N. pumilio* presents a better probability of transition than *N. betuloides* in the mixed forest. Therefore, in mixed forests the tendency would be to be non-stable forests. This study contributes to an understanding of the possible roles of reproductive phenology for detecting shifts in forest communities between pure and mixed forests under natural dynamics and the current climate change.

Leaf wax abundance and distribution in vegetation and soils from a South American Temperate Forest

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Leaf wax compound classes (i.e long chain alkanolic acids and alkanes) from plants are naturally deposited in soils and sediments, where abundance and