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Macrofauna in different land-use systems in the state of Santa Catarina, Brazil

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Soil macrofauna communities are strongly affected by soil and land-use management, with bidoversity patterns at local and regional levels being dependent from these activities In this study, carried out under the the SisBIOTA project, five land-use systems (LUS) were sampled (forest - MT, eucalyptus plantation - RE, pasture - PA, no-till - PD and crop-livestock integration - ILP) in six counties distributed among two regions at Santa Catarina state, making a total of 30 sites (6 for each LUS). Crop LUS (no-till and crop-livestock integration) presented the lowest abundance and number of taxa, whereas forest sites, particularly the native forest, and pasture showed the highest abundance and richness. Community composition was significantly distinct among the less managed LUS (MT, RE and PA), and between each one of these and the crop areas (PD and ILP). No significant differences were observed between these two last LUS. Groups responsible for differences among the non-crop LUS were mainly Hymenoptera, Coleoptera and Isoptera (explaining over 40% of the dissimilarity between LUS). Separation between crop areas and less managed LUS was also caused by the different abundance of Oligoquetes (higher in crop LUS). A significant relationship between soil macrofauna and soil chemical parameters was observed. Groups dominating in crop LUS (mainly earthworms) were positively related with pH, Ca and P, whereas groups dominating in non crop LUS (e.g., Hemiptera, Hymenoptera, Isoptera and Araneae) were more related to the organic matter content. This relation is conditioned by soil use and soil management. This is corroborated by a multivariate variance partition evaluating the influence of environmental (soil-use and soil chemistry) and spatial variables on the composition of soil macrofauna. Results show a stronger influence of environmental vs. spatial processes (17.7% vs. 4.3%), with a low shared variance (2.8%). Among environmental factors, land-use alone was more responsible in explaining macrofauna communities than chemistry alone (7.3% vs. 3.5%). However the shared variance is high (6.9%) indicating that interdependence of these two groups of parameters. Overall, it is possible to conclude that, for these two regions within Santa Catarina state, the distribution and abundance of soil macrofauna groups are mainly conditioned by soil use, and partially explained by soil chemistry (this last derived not only from the type of soil but mainly from soil management).