Freshwater and marine eutrophication in tobacco cultivation in brazil: a case study

Vanderlise Giongo[1], Adão Da Silva Acosta[1], Álvaro Augusto Dossa[1], Anderson Santi[1], André Júlio Do Amaral[1], Diego Inácio Patrício[1], José Eloir Denardin[1], Maria Cléa Brito De Figueirêdo[1], Marília Ieda Da Silveira Folegatti[1], José Paulo Pereira Das Dores Savioli[1], Amanda De Oliveira Andrade[2], Mônica Da Silva Santana[1,3]

[1]Embrapa, Brazil; [2]Bristish American Tobacco, Cachoeirinha, RS, Brazil; [3]Edmundo Gastal Agricultural Research and Development Support Foundation, Pelotas, RS, Brazil

Growing concerns about eutrophication and its impact on life have intensified global pressure to promote more sustainable agriculture. Tobacco production is a significant global activity, with an estimated production of 6.4 million tons in 2023/2024 across 4 million hectares. Brazil is the third-largest producer, with 683.5 thousand metric tons in 284,184 ha. Life Cycle Assessment (LCA) is a tool for identifying critical environmental impacts and opportunities to reduce pressure on natural resources. This study aimed to analyse freshwater and marine eutrophication resulting from the cultivation of Brazilian tobacco. Data over four years were collected from two farms in the South of Brazil, a region responsible for approximately 95% of country production. The functional unit was the production of 1 kg of dry tobacco. Eutrophication impacts were analysed using the ReCiPe 2016 Endpoint (H) 1.09 method and the SimaPro 9.6.0.1 software. Freshwater eutrophication ranged from 1.28E-04 to 1.37E-04 kg of P eq, while marine eutrophication ranged from 4.57E-03 to 7.04E-03 kg of Neq. Nitrogen and phosphate fertilisers accounted for 58 and 26% of the impacts for the freshwater eutrophication category. In contrast, for marine eutrophication, field emissions were more significant (96 to 98%), mainly due to the transformations that N undergoes in the soil. The impact of field emissions and fertilisers on eutrophication categories is expected, as they are categories that measure the amount of P and N released to water bodies. While fertilisers are essential to achieve productivity targets, their production must become cleaner and their application more efficient to ensure sustainable agriculture. Slow-release fertilisers combined with biological alternatives, such as phosphate-solubilising inoculants and nitrogen-fixing cover crops, can be used as strategies to mitigate eutrophication impacts in Brazilian tobacco cultivation.

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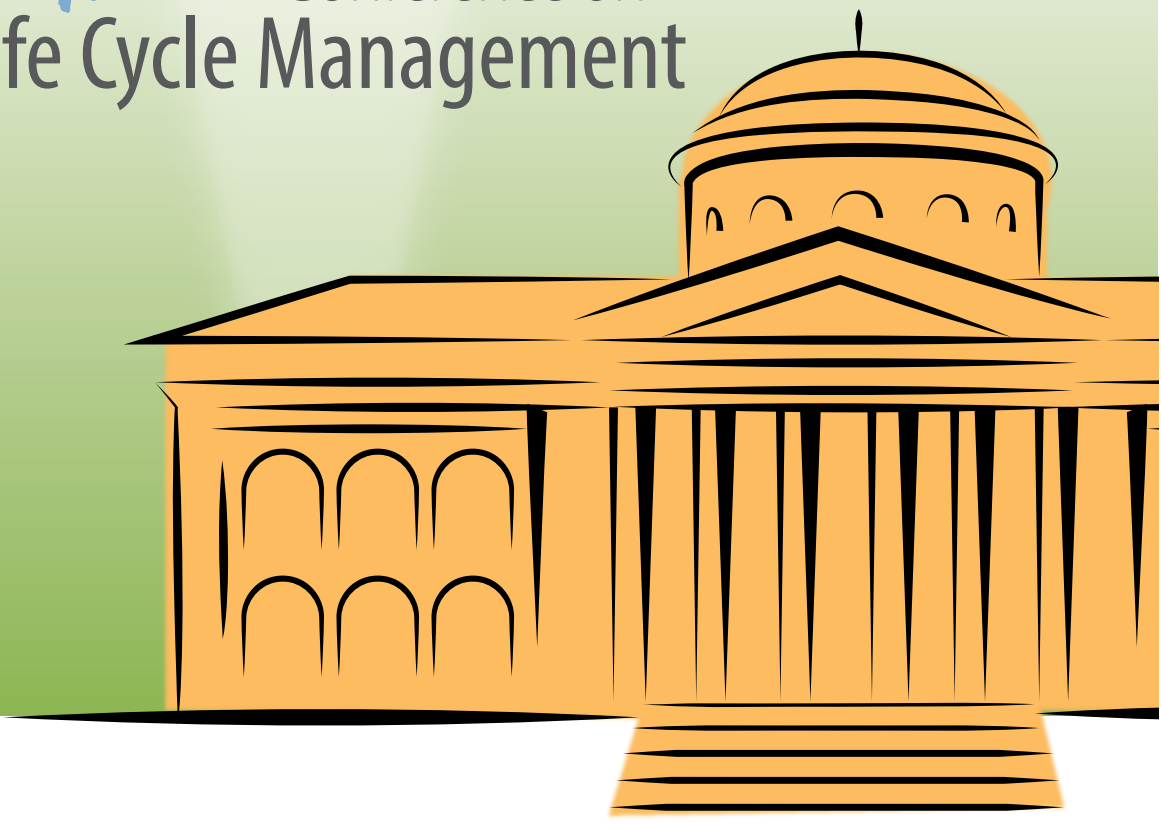

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