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Logging residues promote positive interactions between soil erosion, soil functioning and soil macrofauna diversity in young rubber plantations in Africa.

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Soil erosion causes major problems of land degradation in agricultural systems leading to losses of soil fertility. Rubber tree is one of the main tropical perennial crops with about 13 million hectares of plantations worldwide in 2018. In the early stage of a rubber plantation, soil is especially vulnerable to degradations given the low canopy cover and heavy soil surface disturbance related to clear-cutting of the previous plantation. This study aims at assessing runoff and soil losses as well as understanding the main soil factors influencing soil erosion in a young rubber plantation in Côte d'Ivoire. We intensively measured soil runoff, soil detachment, soil structure maintenance and soil macrofauna for 2.5 years under different managements of logging residues and the use or not of a legume cover crop. The results showed that the restitution of logging residues has reduced runoff by 6 and soil losses by 14 compared to plot without logging residues, over the study period. The planting line where soil is kept bare was by far the most critical area in term of soil erosion. The restitution of logging residues significantly improved soil structure maintenance as well as soil macrofauna diversity. We found strong relationships between runoff, soil losses, soil structure and soil macrofauna diversity. These results evidence that the restitution of logging residues and the sowing of cover crop are appropriate agroecological practices in young rubber plantations. Our results suggest that keeping a cover in the planting line could be the most relevant lever to limit soil erosion in the context of the study.