

Agriculture impairs stream ecosystem functioning in a tropical catchment

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The expansion of agriculture is particularly worrying in tropical regions of the world, where native forests are being replaced by crops at alarming rates, with severe consequences for biodiversity and ecosystems. However, there is little information about the potential effects of agriculture on the functioning of tropical streams, which is essential if we are to assess the condition and ecological integrity of these ecosystems. We conducted a litter decomposition experiment in streams within a tropical catchment, which were subjected to different degrees of agricultural influence: low (protected area, PA), medium (buffer area, BA) and high (agricultural area, AA). We quantified decomposition rates of litter enclosed within coarse-mesh and fine-mesh bags, which allowed the distinction of microbial and detritivore-mediated decomposition pathways. We used litter of three

riparian species representing a gradient in litter quality (*Alnus acuminata* > *Ficus insipida* > *Quercus bumelioides*), and examined detritivore assemblages through the contents of litterbags and benthic samples. We found that the increasing agricultural influence promoted microbial decomposition, probably due to nutrient-mediated stimulation; and inhibited detritivore-mediated and total decomposition because of reduced detritivore numbers, most likely caused by pesticides and sedimentation. Effects were evident for *Alnus* and *Ficus*, but not for *Quercus*, which was barely decomposed across the gradient. Our study provides key evidence about the impact of agriculture on tropical stream ecosystem functioning, which is associated to changes in stream assemblages and may have far-reaching repercussions for global biochemical cycles. © 2020 The Authors

Detritivore assemblages

Ecosystem functional integrity

Land use

Leaf litter breakdown

Nutrient concentrations

Pesticide toxicity

Agricultural robots

Biodiversity

Catchments

Conservation

Forestry

Mesh generation

Runoff

Stream flow

Tropics

Agricultural areas

Decomposition pathway

Decomposition rate

Ecological integrity

Litter decomposition

Microbial decomposition

Potential effects

Stream ecosystems

Ecosystems

pesticide

biodiversity

catchment

flow modeling

hydrological cycle

streamflow

agricultural influence

agricultural procedures

alder

Alnus acuminata

Article

benthos

catchment area (hydrology)

controlled study

detritivore

ecosystem

environmental protection

Ficus

Ficus insipida

litter decomposition

microbial degradation

oak

population abundance

priority journal

Quercus bumelioides

riparian species

sedimentation

species diversity

stream (river)

tropics

Alnus

Alnus acuminata

Ficus insipida

Quercus