

Reference 36

Dorioz, JM; Wang, D; Poulencard, J; Trévisan, D 2006 The effect of grass buffer strips on phosphorus dynamics — a critical review and synthesis as a basis for application in agricultural landscapes in France *AGRICULTURE, ECOSYSTEMS AND ENVIRONMENT*, 117(1), 4-21. 10.1016/j.agee.2006.03.029

Background and objective

Recommending the use of “grass buffer strips” to control diffuse P transfer has become well accepted among extension advisors, agricultural consultants, planners, and other practitioners that influence the structure of the agricultural landscape. These grassed areas are put in place to capture the P contained in runoff from source fields. They are designed to function as a filter and a sediment trap although it is often unclear what the long-term disposition of the accumulated P may be. To evaluate the overall role of grass buffer strips in reducing phosphorus transfers from agricultural soils to surface waters. Specifically: 1) what is a buffer effect and how can it be evaluated; 2) how can the specific biogeochemical behaviour of P in its various forms affect P dynamics under conditions associated with movement across buffer zones; 3) how can we conceptualize and compartmentalize the functioning of grass buffer strips with respect to P storage at different time scales.

Search strategy and selection criteria

Peer-reviewed studies in France on the effect of grass buffer strips on phosphorus dynamics. 1) Papers focused on buffer processes in the context of applicable field experiments, i.e., with field plots of variable size subjected to the action of natural rainfall, simulated rainfall, or a mixture of the two over short periods, from a flash flood to a year; 2) Papers with experiments carried out entirely in the laboratory; 3) Papers with indirect approaches based on measurements of accumulation of nutrients in the vegetation or of sediments estimated using tracers.

Data and analysis

No statistical analyses conducted.

Number of papers	Population	Intervention	Comparator	Outcome	Quality score
11	Cultivated land	Grass buffer strips	No buffer strips and before buffers strips	Metric: 1) Total phosphorus retention; 2) dissolved phosphorus retention; Effect size: Not applicable	31.25

Results

- Grass buffer strips are able to limit significantly (>50% retention) the transfer to surface water of sediment and total-P due to diffuse flow.
- The situation is very different for the dissolved forms of P, whose retention percentage varies from -83 to +95, with the most common values being around 20–30%.

Factors influencing effect sizes

- No factors influencing effect sizes to report

Conclusion

Reviewers’ note: We labelled the results for grassed buffer strips as uncertain due to the lack of statistical testing.