

# **Tracking pesticide peaks**

Comparing sampling methods for monitoring of pesticides in agricultural streams

Pesticide concentrations in aquatic ecosystems can vary considerably throughout the year, showing both seasonal fluctuations and more short-term variations.

The timing and choice of sampling methods are vital for capturing various aspects of contamination, ranging from long-term exposure to more short-term peak concentrations.

During temporal flow peaks, pesticide concentrations in small agricultural streams can increase up to a hundredfold within hours!

### Sampling methods

Used within the Swedish national monitoring program for pesticides

Grab sampling Collecting single water samples at a specific time.

#### Time integrated sampling

Sampler collects water samples at regular time intervals over a longer time period (e.g. a week).

#### Flow proportional sampling

Sampler is triggered by changes in stream flow velocity and collects more samples during high flow events.



Gives an average

measure of chronic

exposure.

concentration over time,

offering a representative

Captures pesticide peak

concentration during

temporal flow peaks.

Provides a snapshot of water quality and can miss variations over time.

Often requires installation and maintenance of sampling equipment, can underestimate temporal peak concentrations.

Often requires installation and maintenance of sampling equipment, gives no information on normal base flow conditions.



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Variations in stream flow (I/s) and concentration of diflufenican (µg/I) captured with time integrated sampling (green and black lines) and flow proportional sampling (black dots), 2016.

Concentration ratios (flow proportional/time integrated) for four commonly detected pesticides in the national monitoring program (2009-2021). A concentration ratio>1 indicates higher concentration in flow peaks.

## Conclusions

- Accurate pesticide monitoring is essential for following trends in aquatic ecosystems and informing environmental policy.
- The choice of sampling method affects how we detect and assess pesticide exposure.
- Flow proportional sampling captures short-term concentration peaks, offering valuable insight into acute toxicity risks.

- Time integrated sampling reflects average conditions, helping to assess chronic exposure.
- Combining both methods can provide a more complete and reliable picture of pesticide dynamics in streams.
- To improve risk assessment and management strategies, monitoring programs should consider not just what is measured but also how and when.



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