

# Effects of plant protection products application on the quality of vineyard soils from Douro Region

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## Introduction

### Plant Protection Products (PPPs)

- |   |                                     |
|---|-------------------------------------|
| ✓ Protects crops from disease vectors or agents | ✓ Human health                      |
| ✓ Increases productivity and product quality    | ✓ Non-target organisms              |
|   | ✓ Water, air and soil contamination |

## Main Goal

1. Evaluate if PPPs application compromises soil quality in terms of soil functions;
2. Evaluate if the soil can recover after an annual cycle of PPPs application.

## Experimental Design

Soil samples were collected (0-10 cm deep) in two vineyards from Douro Region:

- QA - Quinta dos Aciprestes;
- QG – Quinta da Granja.

Sampling periods:

1. February 2018 – herbicide application;
2. April 2018 – 2 months after herbicide application;
3. June 2018 – fungicide application;
4. January 2019 – before herbicide application in the new agricultural year.

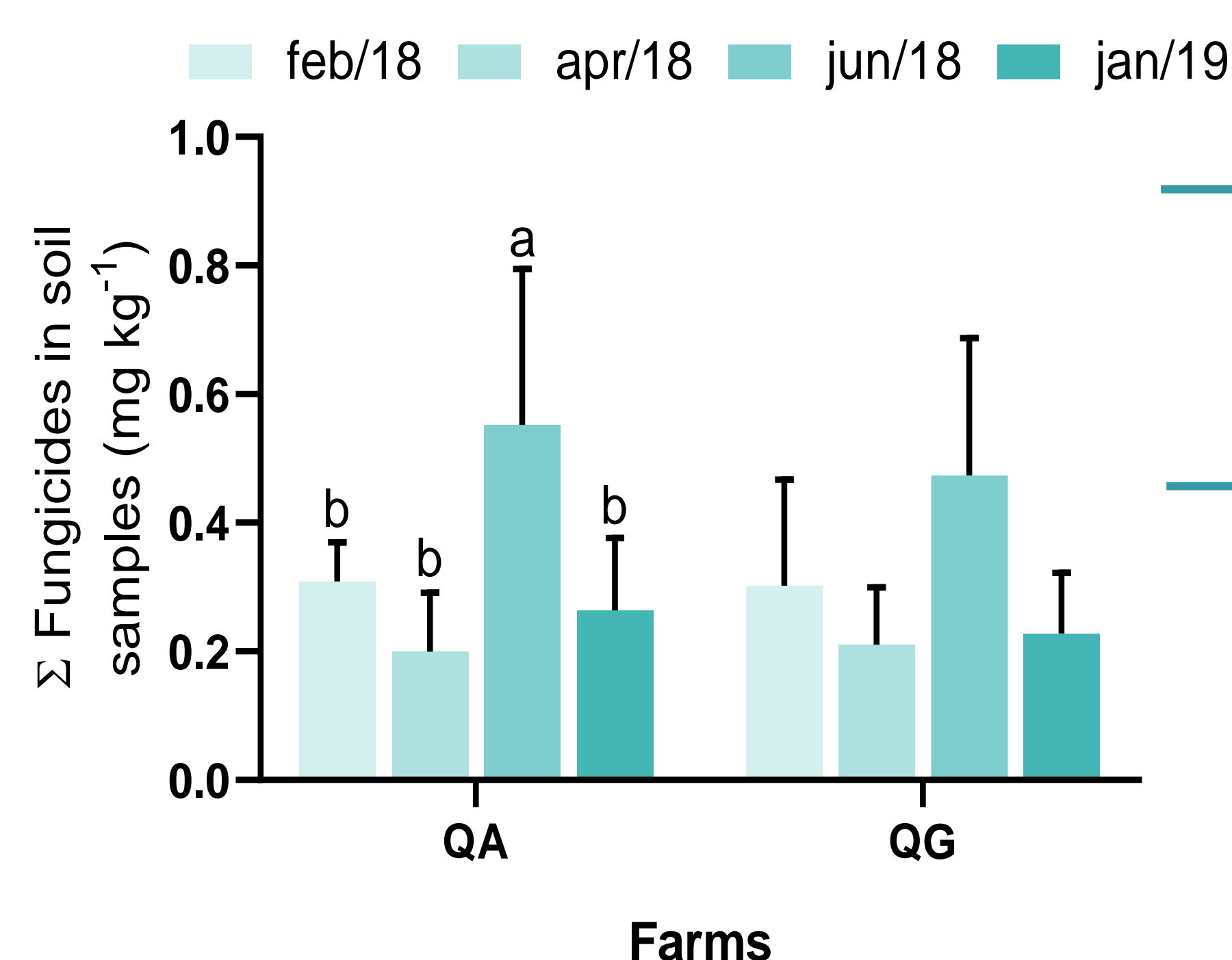
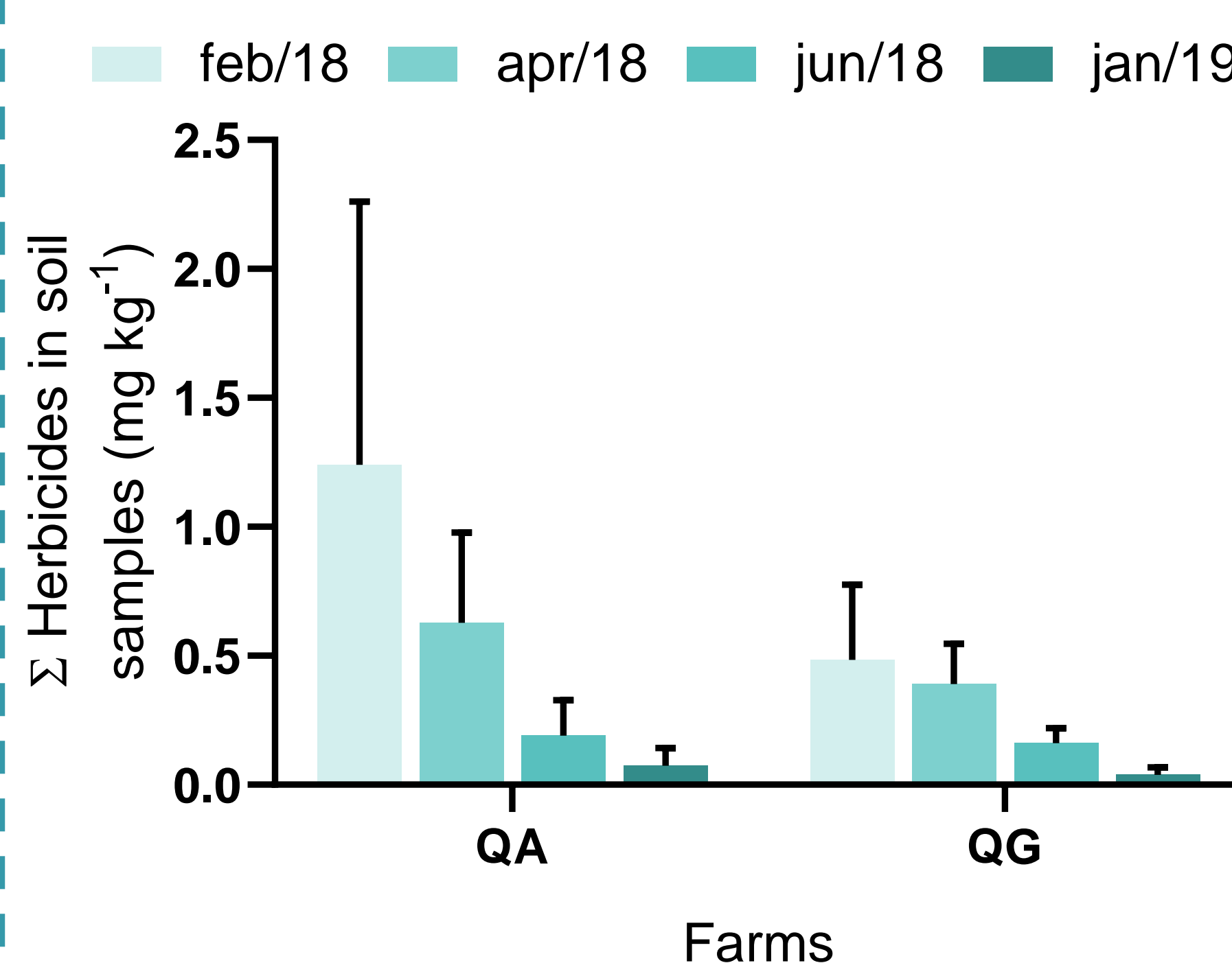
Evaluation of PPP concentrations in the soil samples;

Ecotoxicological assays with aquatic organisms:

1. Growth inhibition assay with *Raphidocelis subcapitata* (OECD 201, 2006);
2. Growth inhibition assay with *Lemna minor* (OECD 221, 2006);
3. Bioluminescence inhibition assay with *Allivibrio fischeri* (ISO 11348-2, 2007).

## Results and Discussion

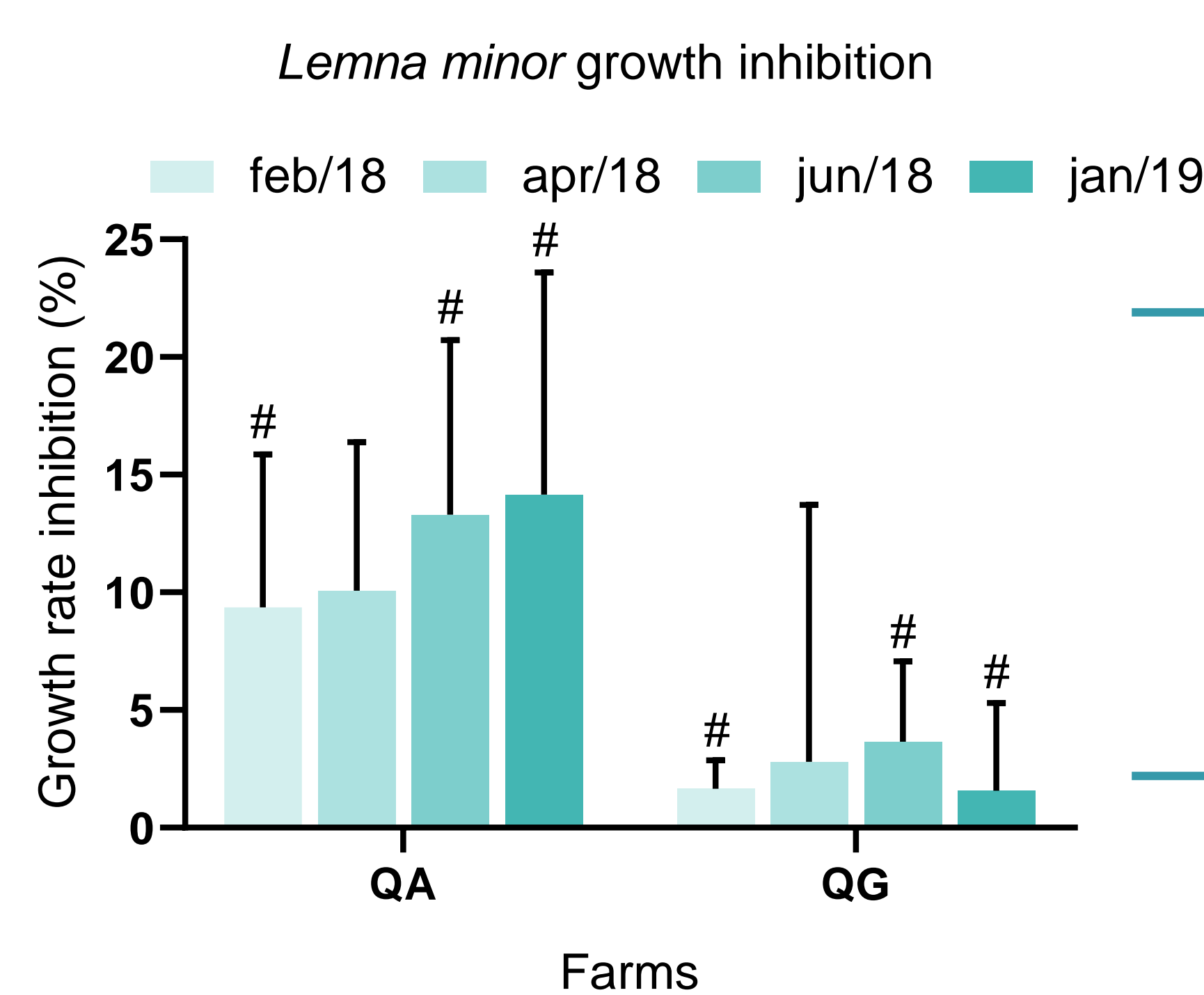
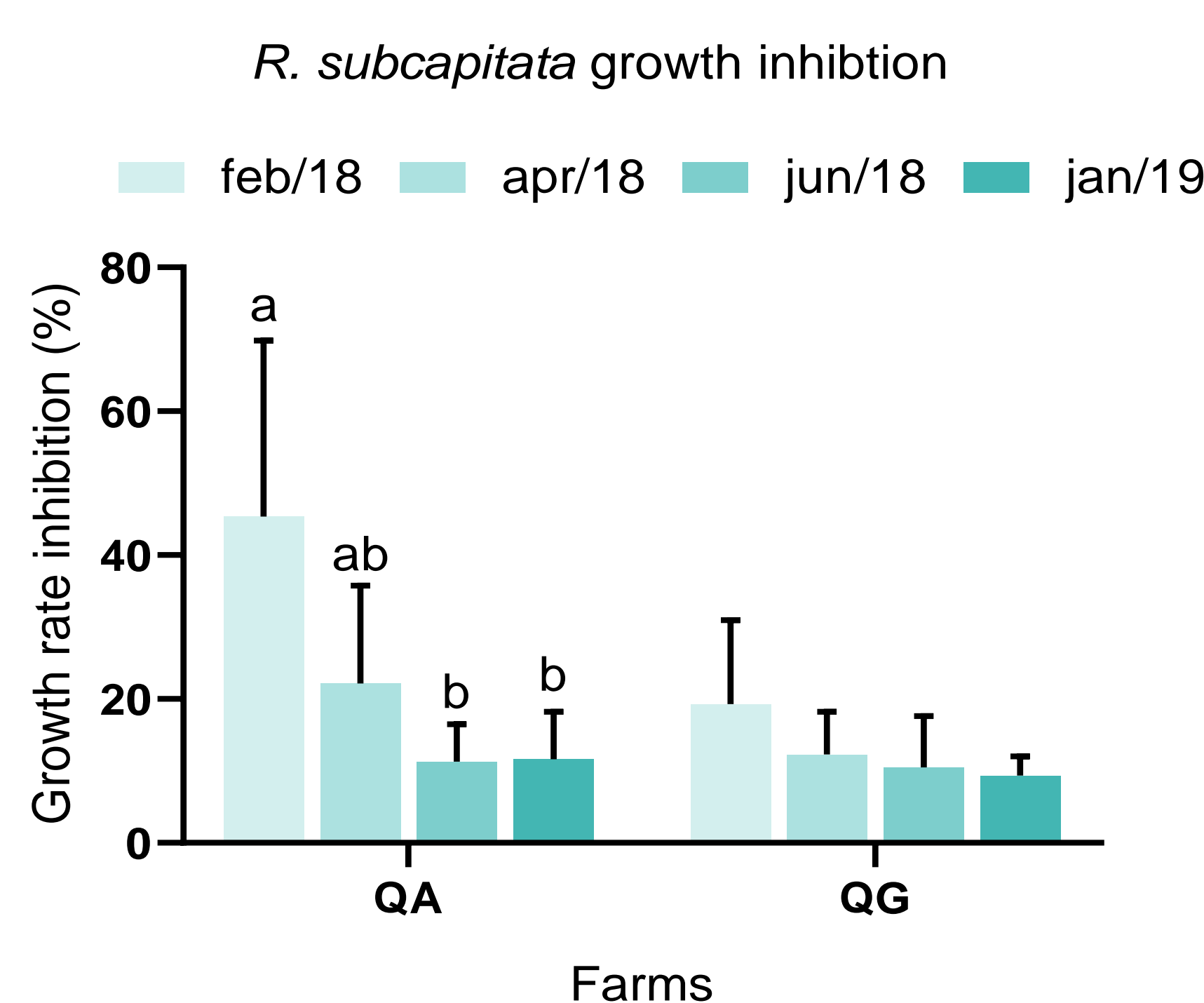
a,b Significant statistical differences between sampling periods;  $p < 0.05$   
# Significant statistical differences between farms;  $p < 0.05$



Higher herbicide concentration in February 2018 when herbicides were applied.

Higher fungicide's concentration in June 2018.

Results from the bioluminescence assay with *A. fischeri* did not allow to draw conclusions.



*R. subcapitata* growth rate more affected in the months coincident with herbicides application. The phytotoxicity of soil elutriates to the microalga is significantly reduced throughout the year.

*L. minor* growth rate was significantly reduced in QA farm where high concentrations of fungicides and herbicides were applied.

## Conclusions

Even though PPPs seemed to negatively affect soil quality in the moment of application, the system seems to be able to recover over time.

## Acknowledgments

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