



From agricultural landscapes to domestic gardens: wild passerines as bio-sentinels of environmental pesticide contamination

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CONTEXT

- Agricultural intensification has led to the use of a range of pesticides to control specific pests.
- Pesticides have unintentionally affected **non-target wildlife** with lethal and sublethal effects.¹
- **Organic farming (OF)** bans the use of pesticides: a solution to reduce pesticide pollution?
- Traditional **avian ecotoxicology studies** examine the effects of pesticides under controlled experimental conditions, using model species and excluding **cocktail effects**.¹

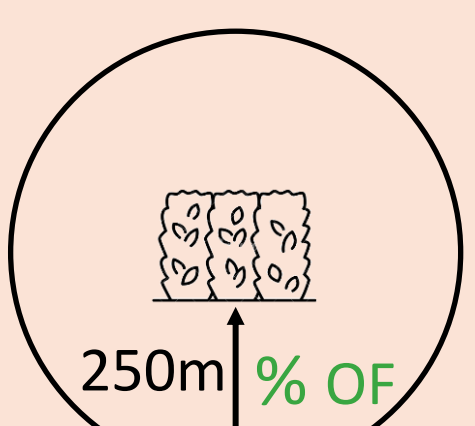
We aim to investigate:

1. Contamination levels in **wild farmland passerines**, in OF vs. conventional farming (CF).
2. Contamination levels in **wild passerines in gardens**, with the proximity of crops in CF.
3. **Comparison** of pesticide levels between **farming landscapes** and **domestic gardens**.

EXPERIMENTAL DESIGN

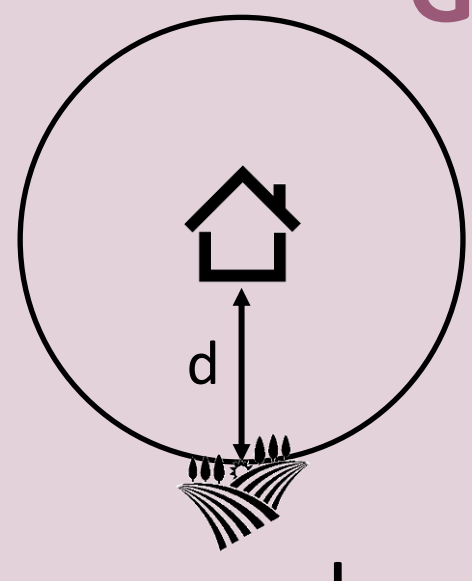
Hedgerow selection

12 along a
gradient of
% of OF



"Conventional" ≤ 25%
"Organic" > 75%

Garden selection



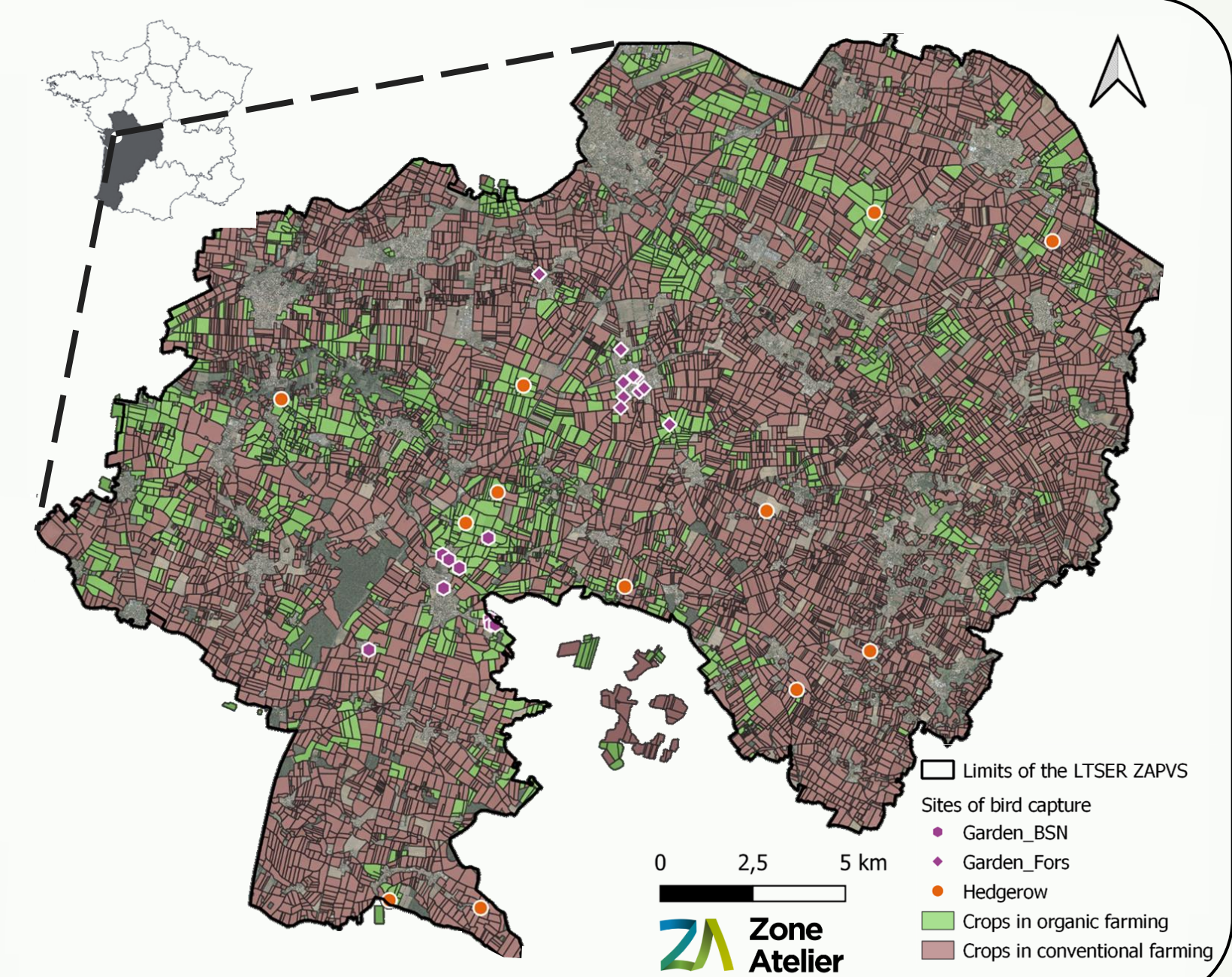
9 in Beauvoir-
sur-Niort 10 in
Fors

along a gradient of the distance
from the nearest CF crop

Median = 167m
"Near" ≤ median
"Far" > median

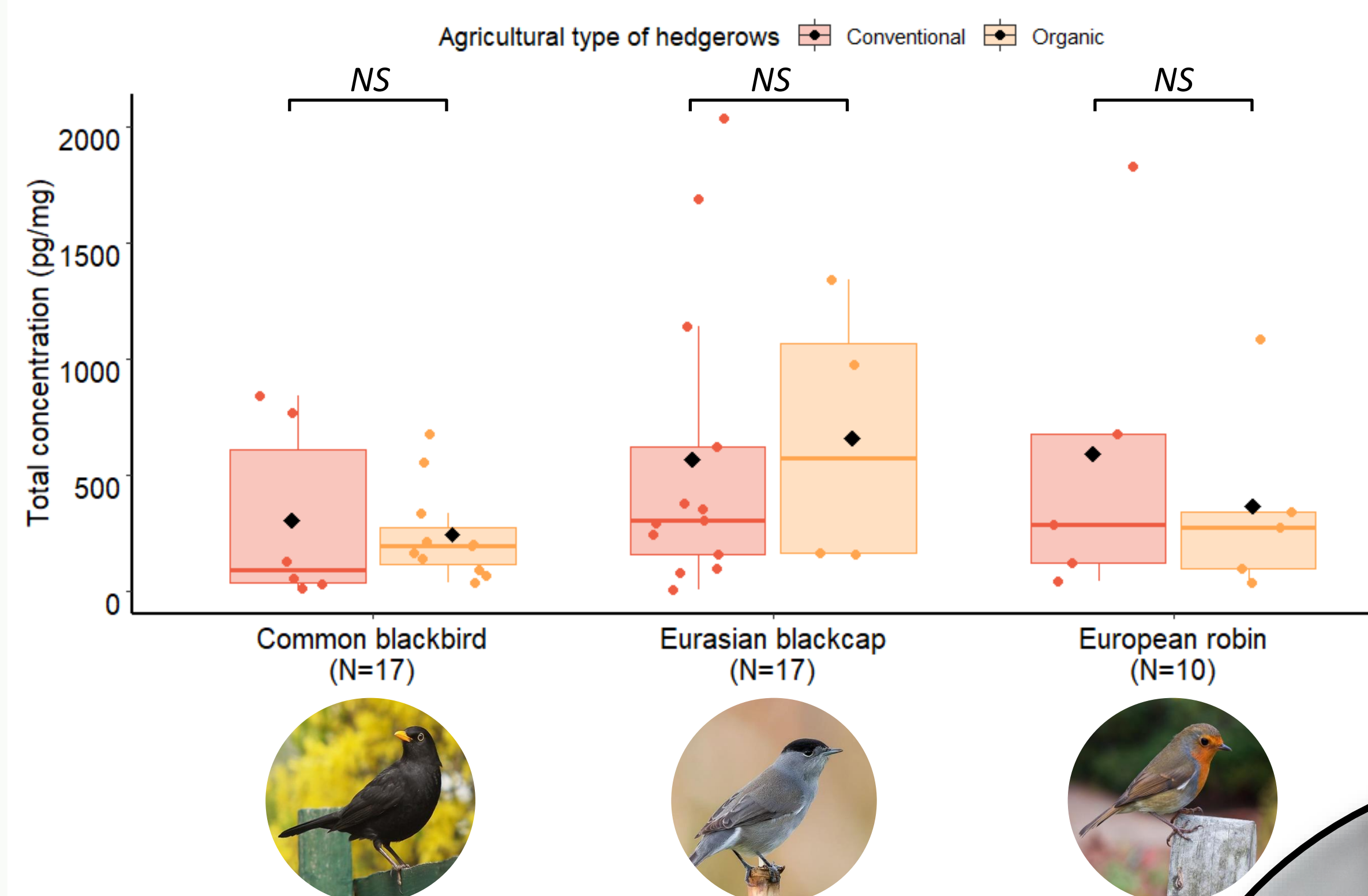
- Bird trapping during the breeding season (March-July 2023) in the Zone Atelier Plaine et Val de Sèvre in France (LTZER ZAPVS).²

- Dosage of 111 pesticides in the blood (recent and local exposure) for several passerine species.³



1. FARMLAND HEDGEROWS

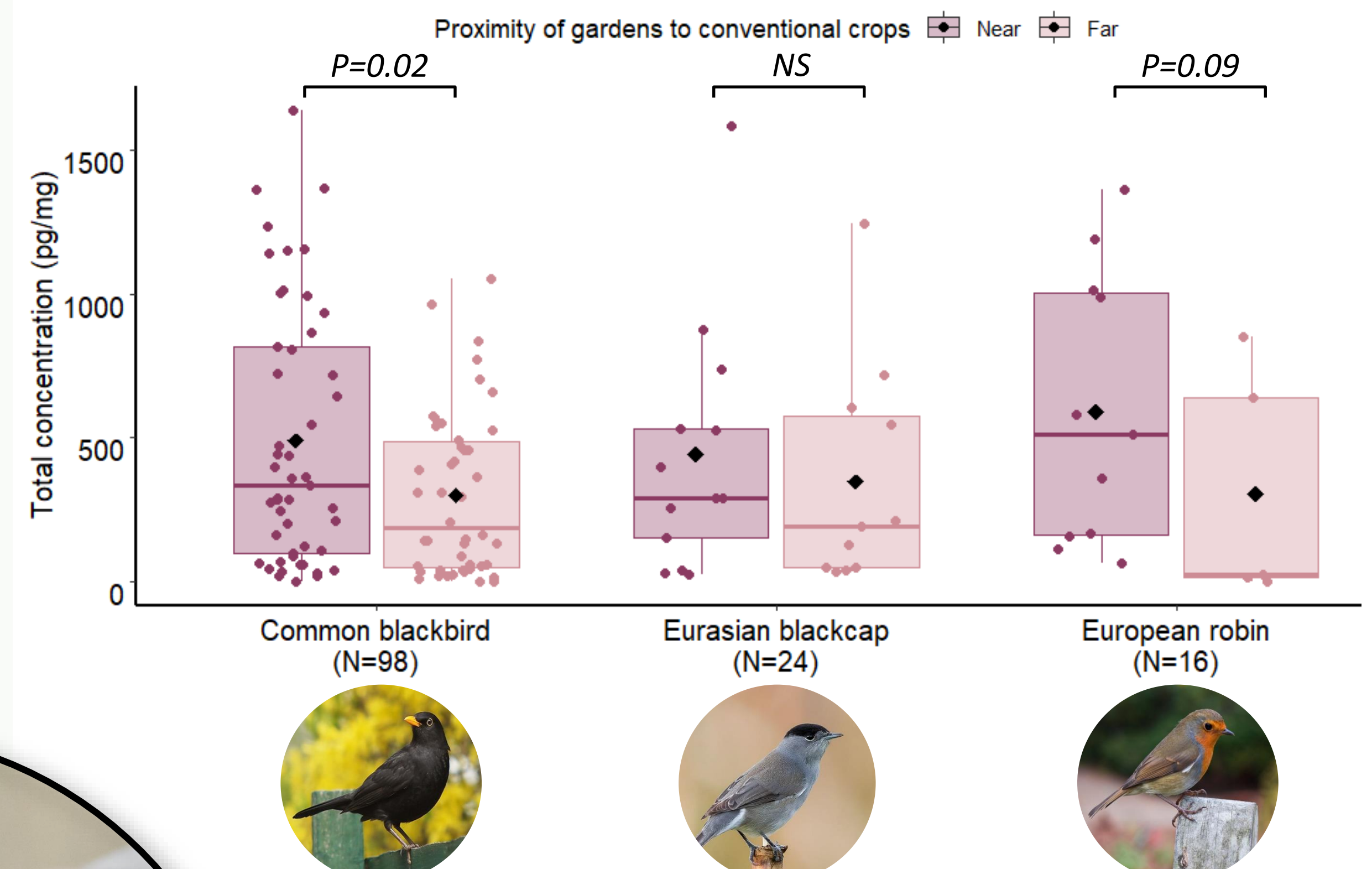
GLM, Agricultural type: $P=0.84$



No difference between OF and CF

2. DOMESTIC GARDENS

Linear Model, Garden type: $P<0.01$

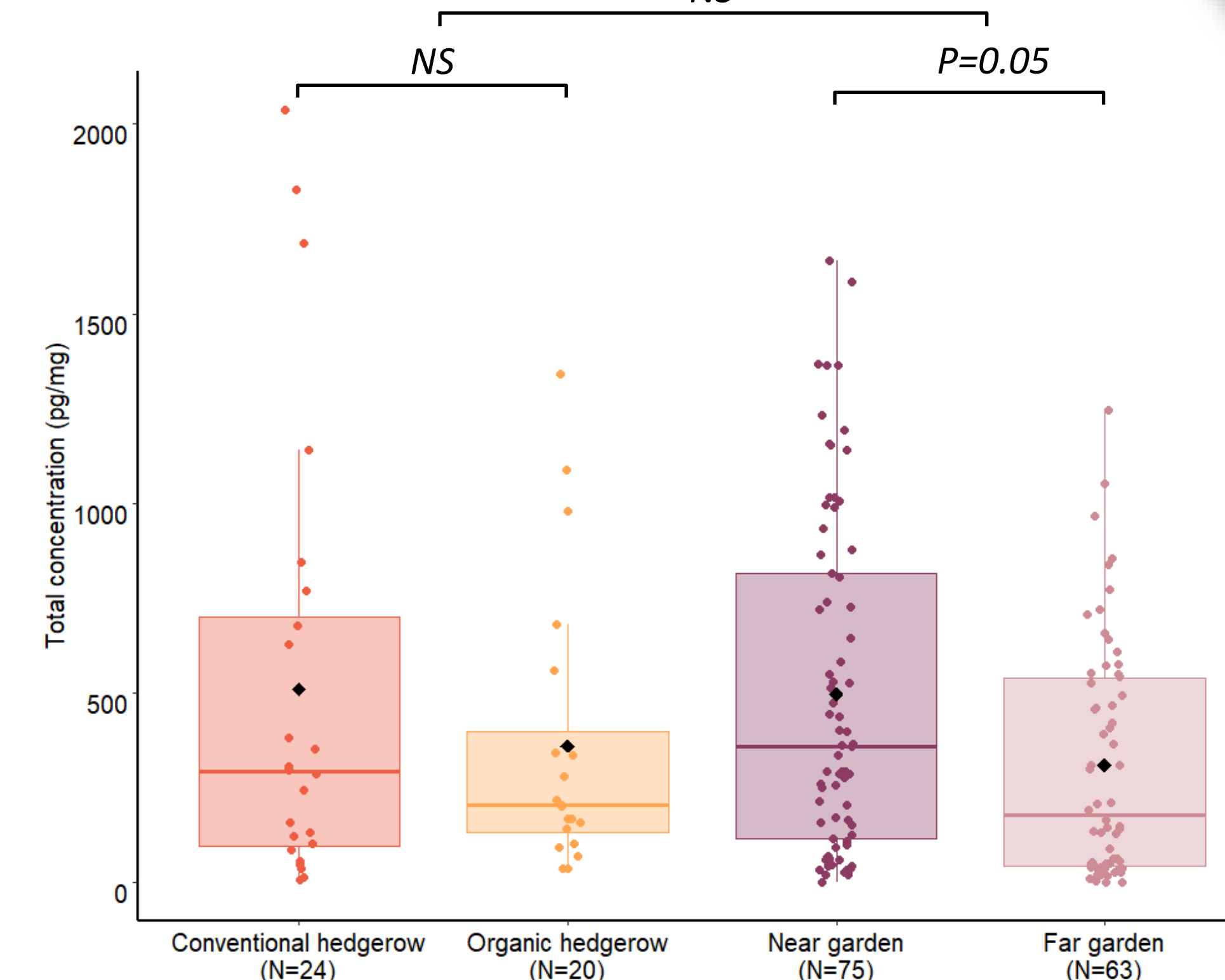


Near gardens > far gardens

3. COMPARISON

With Common blackbirds, Eurasian blackcaps & European robins

GLM, Site: $P=0.04$



No difference between farmland hedgerows and gardens

38 compounds detected:

14 fungicides
15 herbicides
9 insecticides

Including 18 banned
in France

CONCLUSIONS

- Pesticide contamination appears to be **ubiquitous** across different landscapes.
- Contamination of OF areas can occur from CF crops, though **rainwater run-off**⁴ or **spray drift**⁵.
- Contamination levels **decrease** with the distance of CF crops.
- **Inter-specific variability** may be due to differences in diet, spatial use, specific detoxification processes.⁶
- **Resident passerine species**: widely distributed, diverse ecologies, localised foraging areas



Bio-sentinels of environmental
contamination levels



Exposure of birds may indicate **risks**
to other species, including humans

One Health framework⁷

