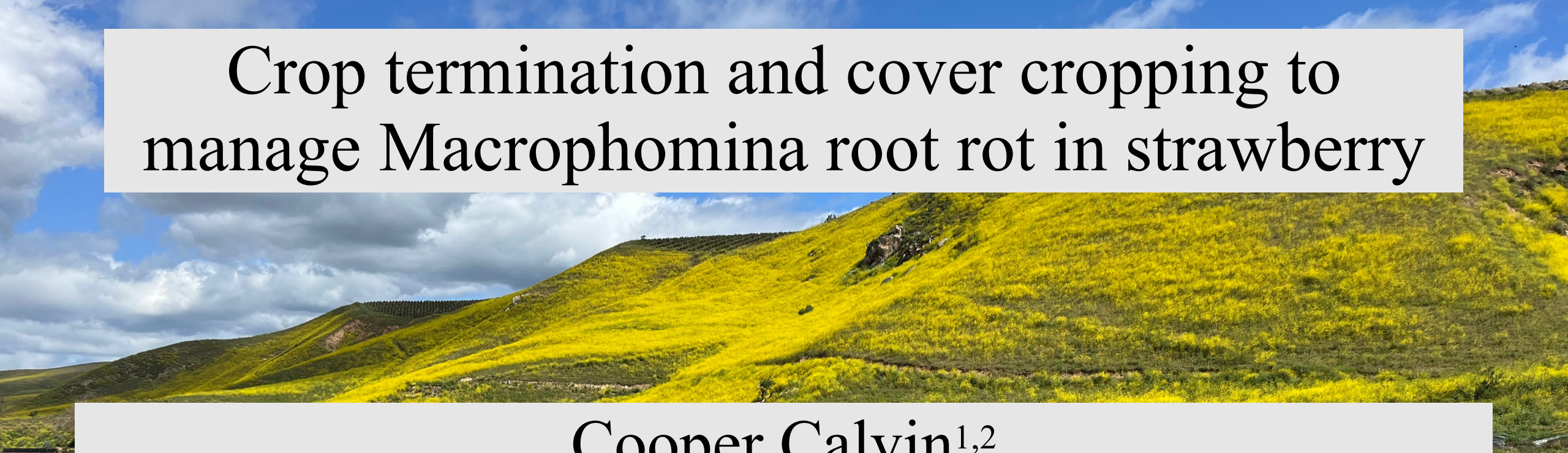
# Crop termination and cover cropping to manage Macrophomina root rot in strawberry




## Cooper Calvin[1,2]

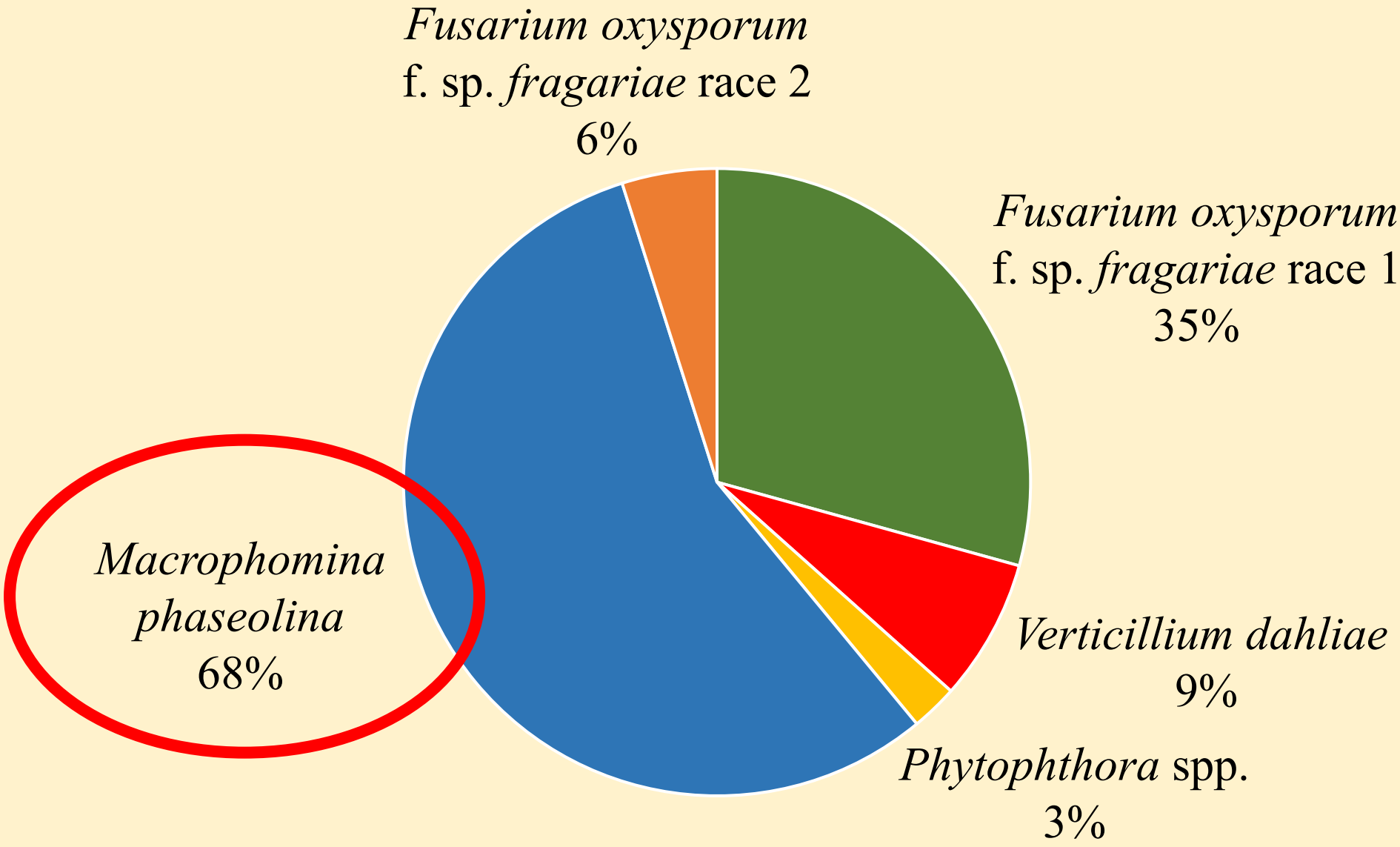
M.S. Student, Agriculture - Environmental Horticultural Sciences

Charlotte L.M. Decock[3], Gerald J. Holmes[1,2], Shashika S. Hewavitharana[1,2]

[1]Plant Sciences Department, California Polytechnic State University, San Luis Obispo, CA

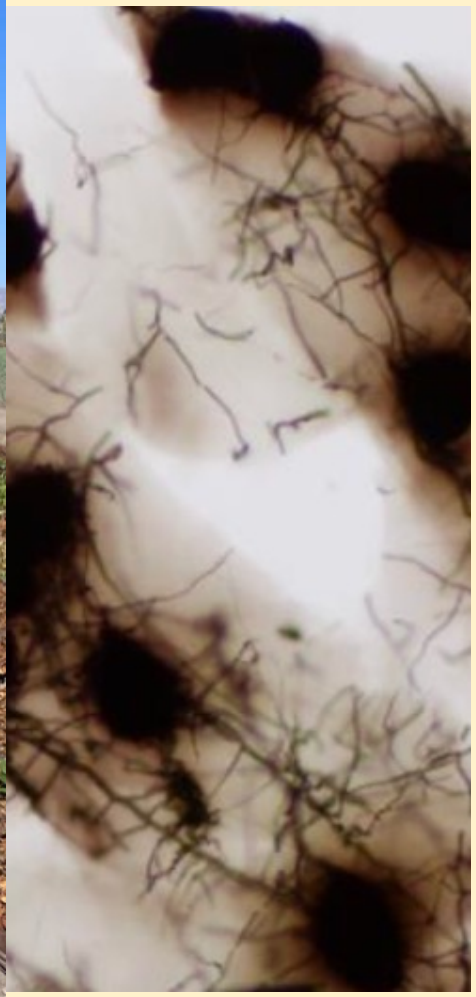
[2]Strawberry Center, California Polytechnic State University, San Luis Obispo, CA

[3]Natural Resources Management & Environmental Sciences Department, California Polytechnic State University, San Luis Obispo, CA




Pathogen incidence as a percent of 93 total plant samples of the Oxnard growing region.
(S. Simard, *unpublished*)

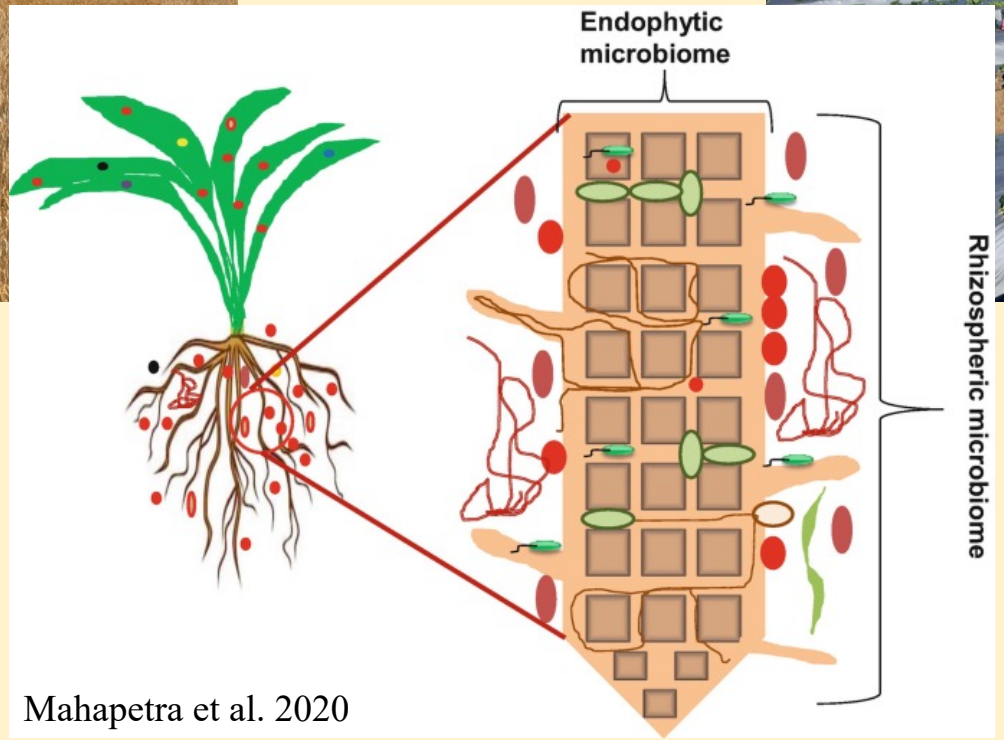
# *Macrophomina phaseolina*



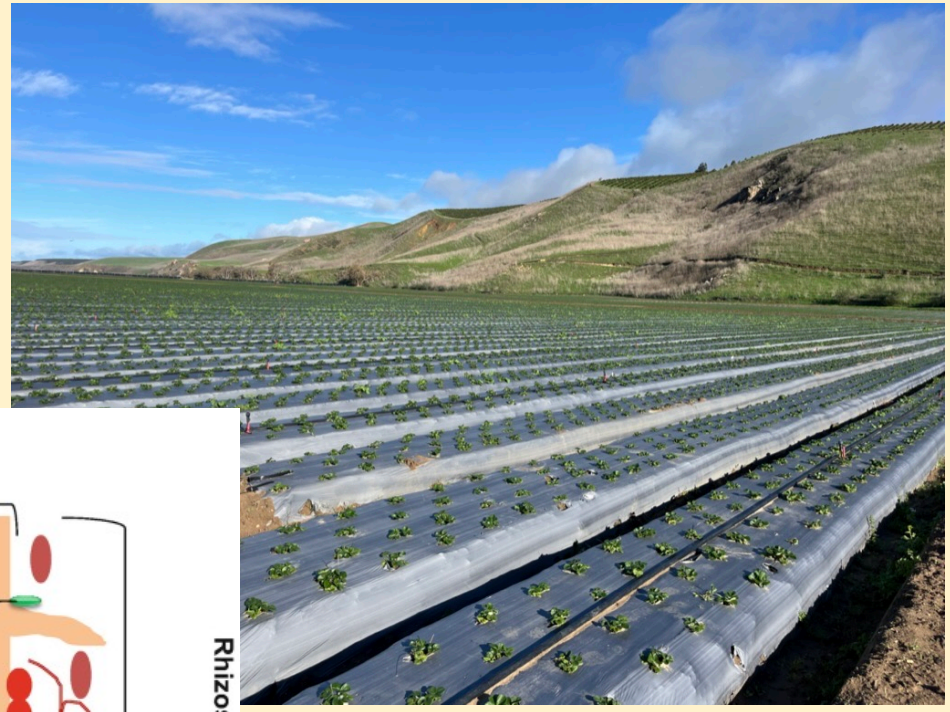
Mary Steele

# Pathogen suppressive microbiome

Wheat cover cropping




Mahapetra et al. 2020



Strawberry production

# Fumigation

## Crop termination

- Soil fumigant with herbicidal and fungicidal properties to kill pathogen, crop, and weeds
- Applied through drip irrigation

Gerald Holmes

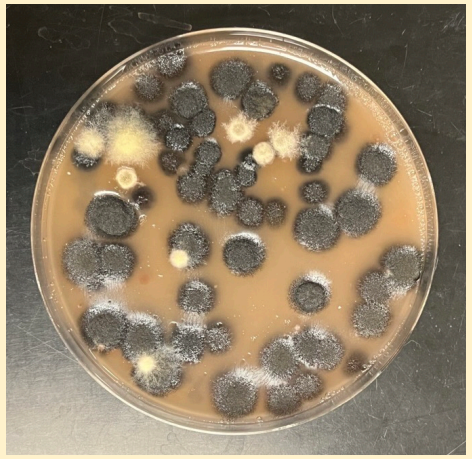
# Objectives

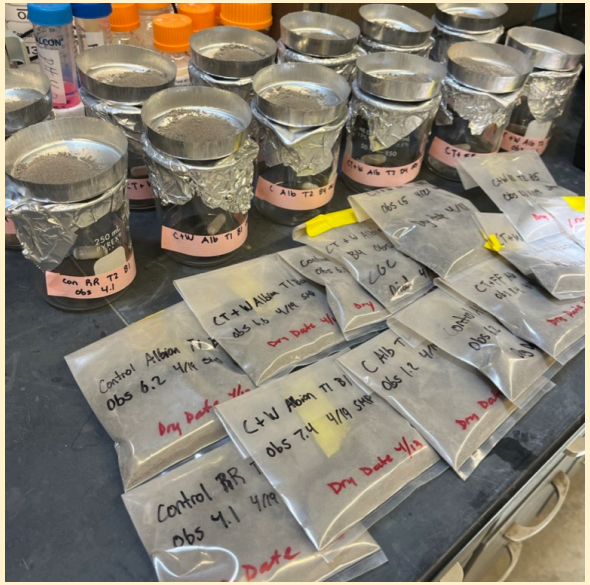
- Evaluate the pathogen suppressing potential of combining crop termination and cover cropping expressed as a reduction of Macrophomina root rot incidence.
- Unravel the mechanisms of cover crop mediated suppression of *M. phaseolina* as well as the improvement of soil and plant health from cover cropping.
- Lessen fumigant use in evaluated fields.
- Increase strawberry yields by improving soil health from cover cropping.

Conventional strawberry field post-cover crop

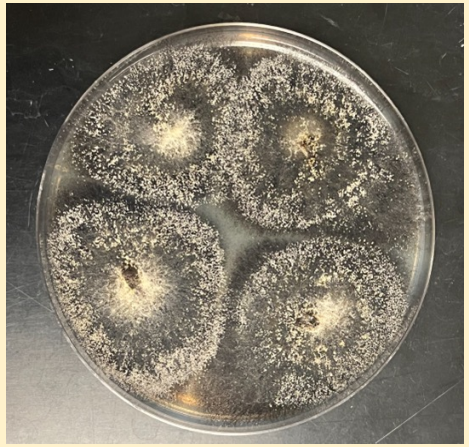
# Materials and methods

## Soil evaluations for *M. phaseolina*





## Plant evaluations for *M. phaseolina*



## Soil health and microbiome evaluations


## Fruit harvest

# Conventional soil trials

## Year 1 - pot trial

| **Four soil treatments** | | | |
|---|---|---|---|
| Untreated soil | Untreated soil + wheat 'Summit 515' | Crop terminated soil + wheat 'Summit 515' | Crop terminated + flat fumigated soil |
| **Two strawberry cultivars** | | | |
| Albion (very susceptible) | | Royal Royce (moderately susceptible) | |
| **Two concurrent trials in a RCBD** | | | |

2022

2023

# Conventional soil trials

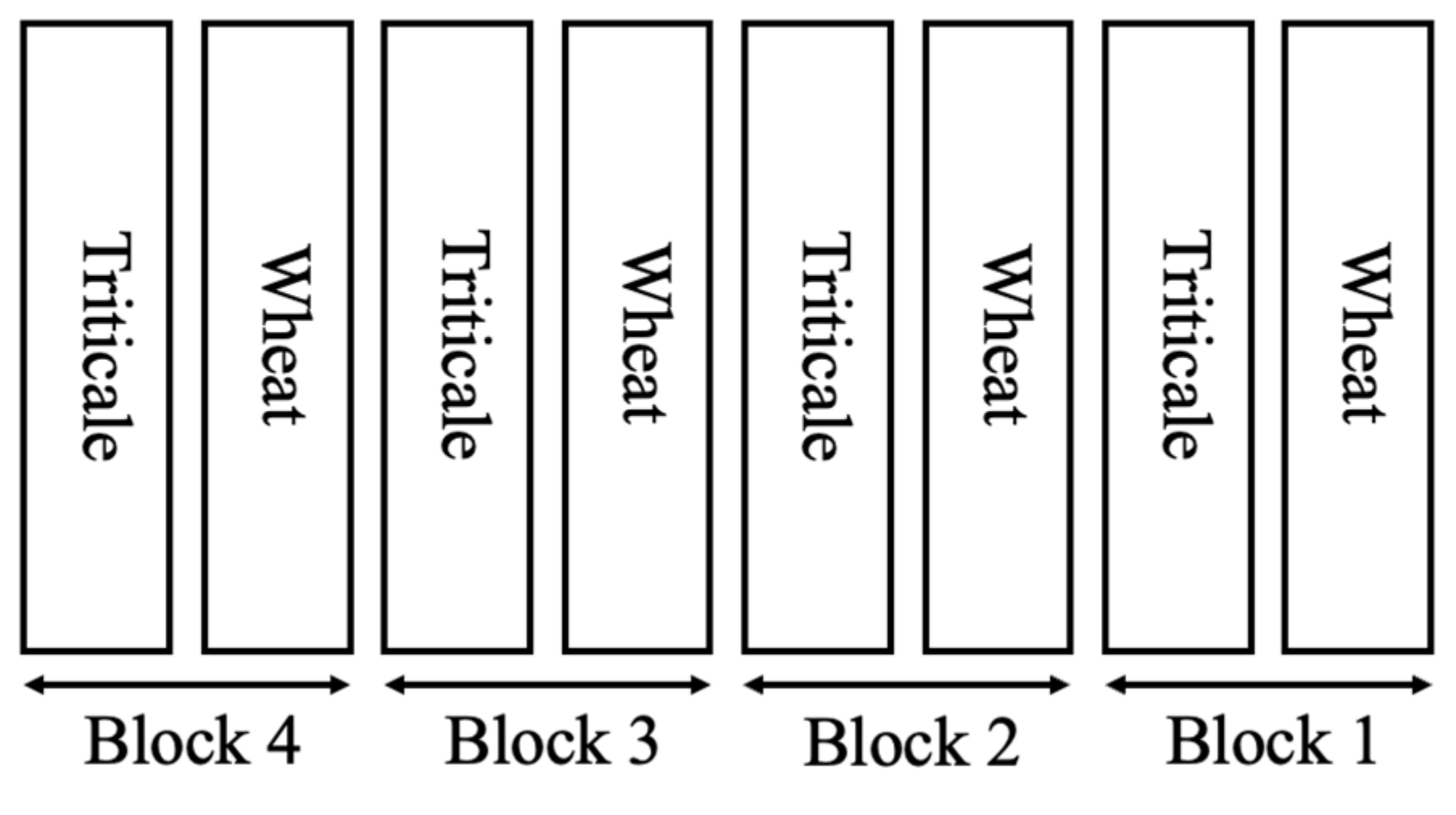
## Year 2 - field trial

| | |
|---|---|
| Soil received a crop termination treatment pre-cover crop, and was flat fumigated post-cover crop | |
| **Two cover crop cultivars** | |
| Wheat ‘Summit 515’ | Triticale ‘Pacheco’ |
| **Two strawberry cultivars** | |
| Portola (very susceptible) | Salma (very susceptible) |

2023

2024

# Experimental design of the conventional field trial

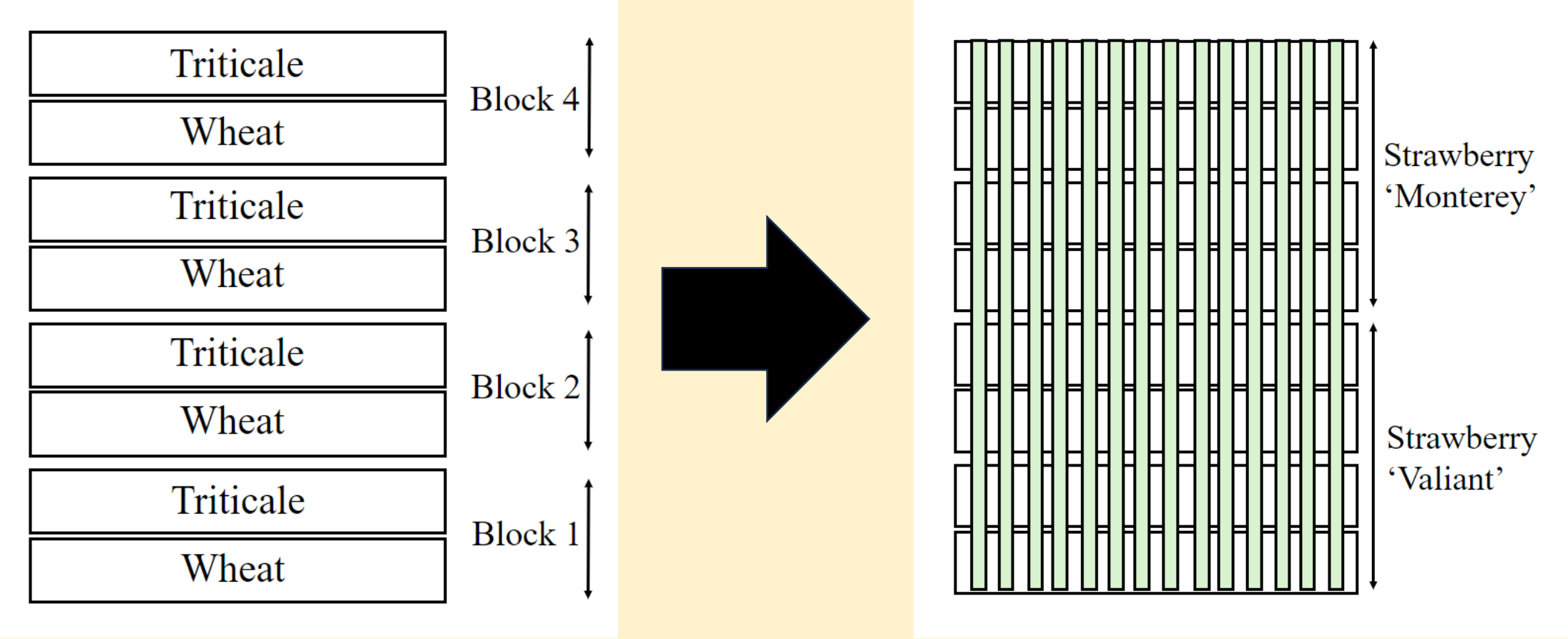


# Organic field trial

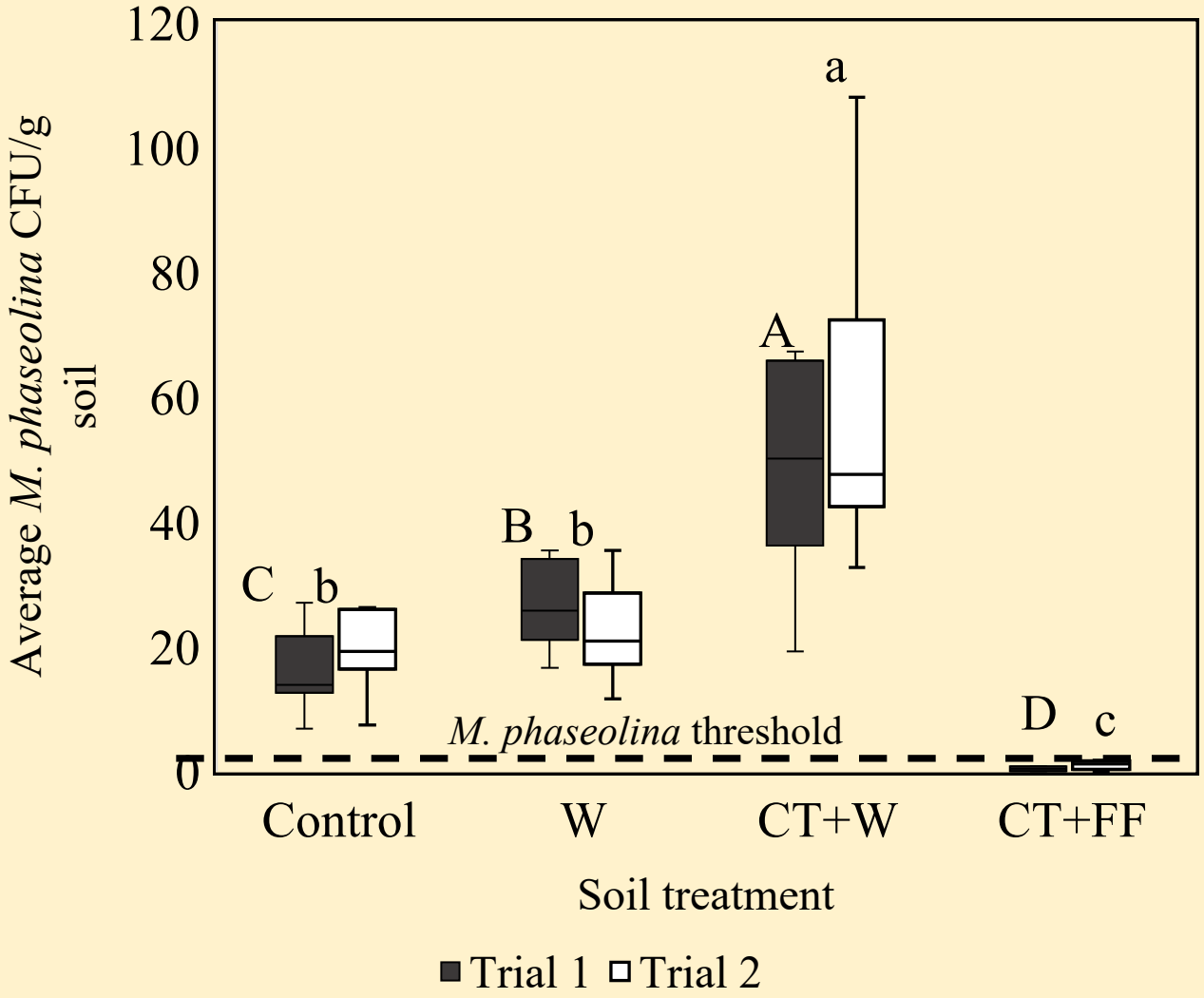
| **Two cover crop cultivars** | |
|---|---|
| Wheat ‘Summit 515’ | Triticale ‘Pacheco’ |
| **Two strawberry cultivars** | |
| Monterey (very susceptible) | Valiant (moderately susceptible) |

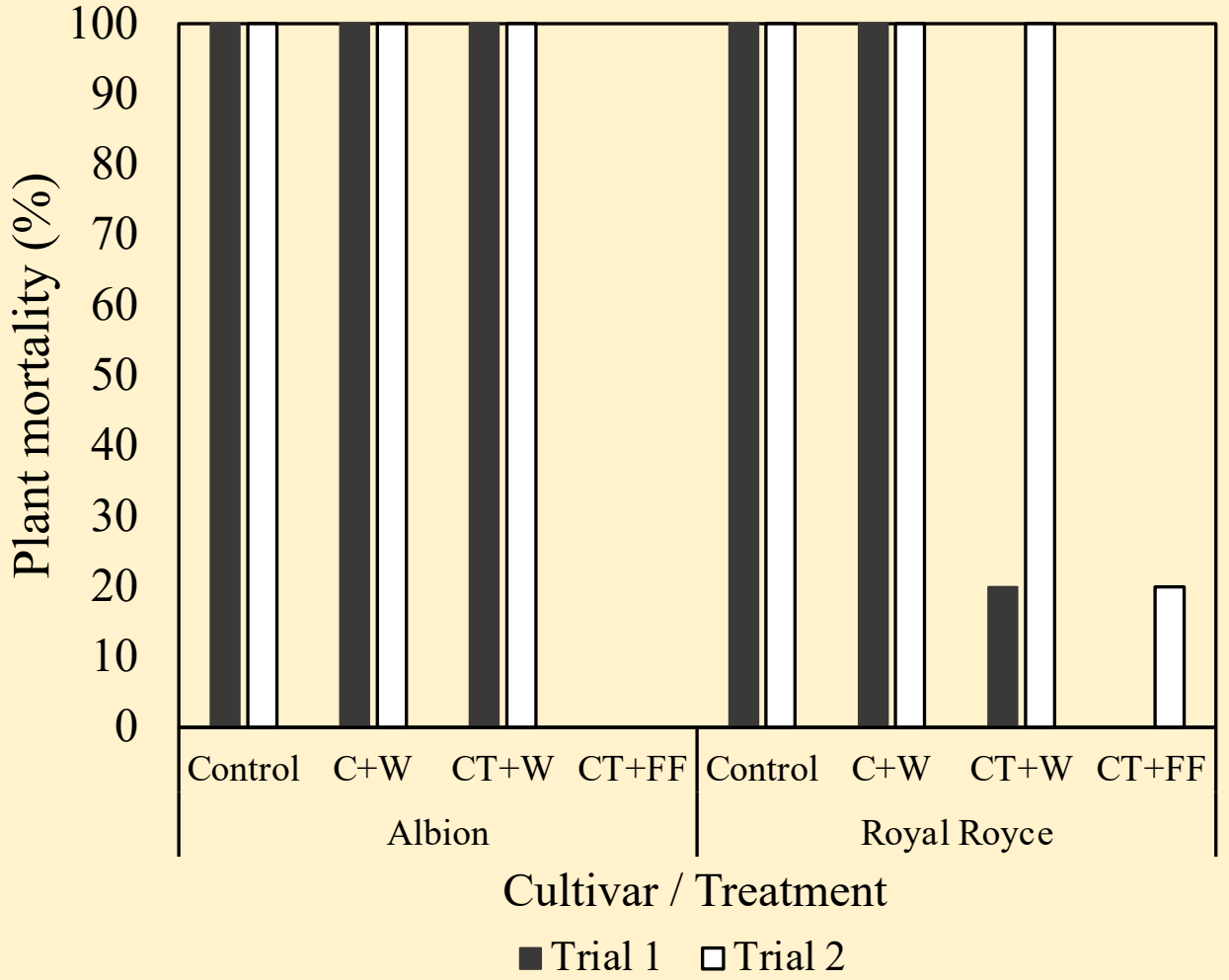
3 Feb 2023 to 28 Aug 2023

# Organic field trial experimental design



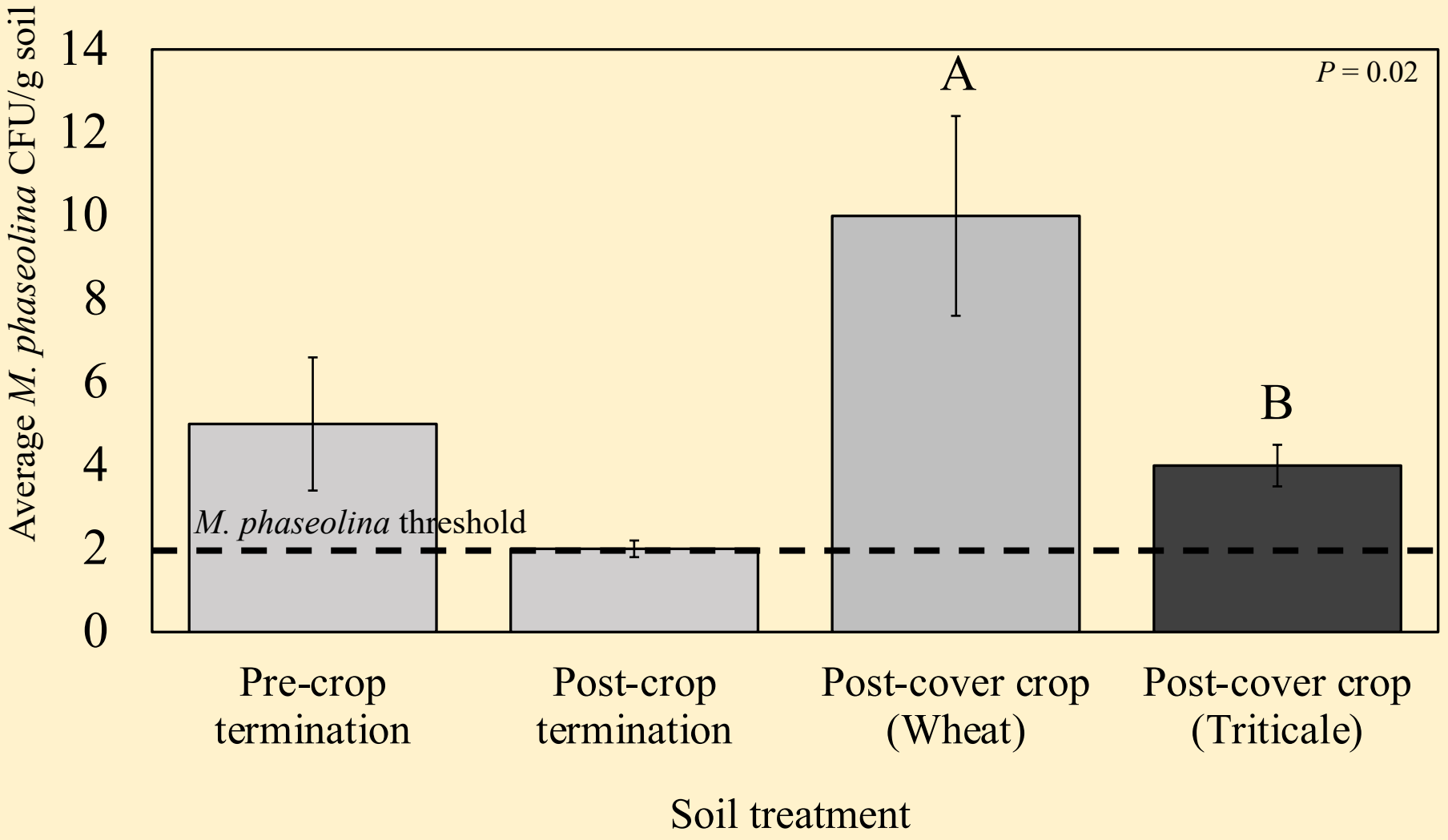
# Results – pot trial



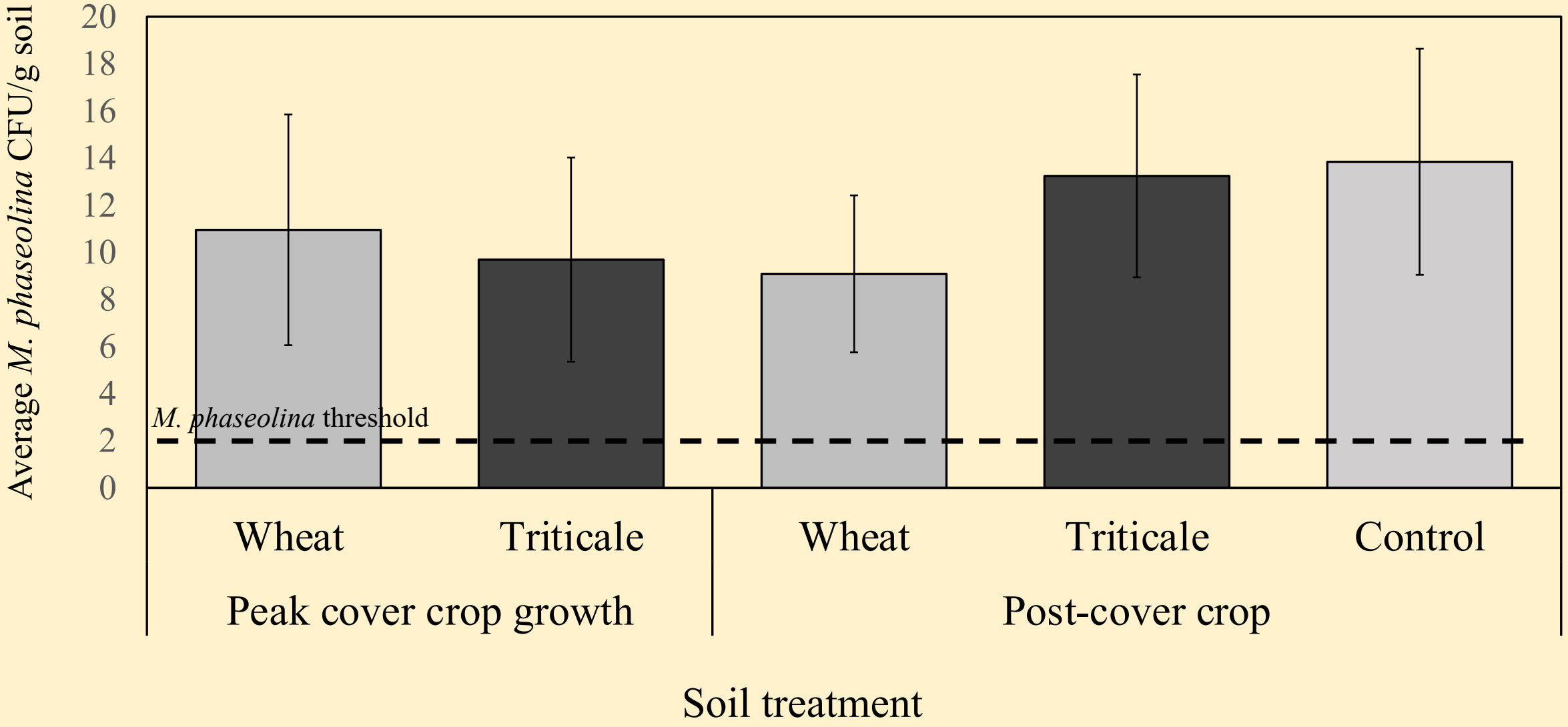




| Control | W | CT+W | CT+FF |
|---|---|---|---|
| Untreated soil | Untreated soil planted with wheat ‘Summit 515’ | Crop terminated soil planted with wheat ‘Summit 515’ | Crop terminated and flat fumigated soil |

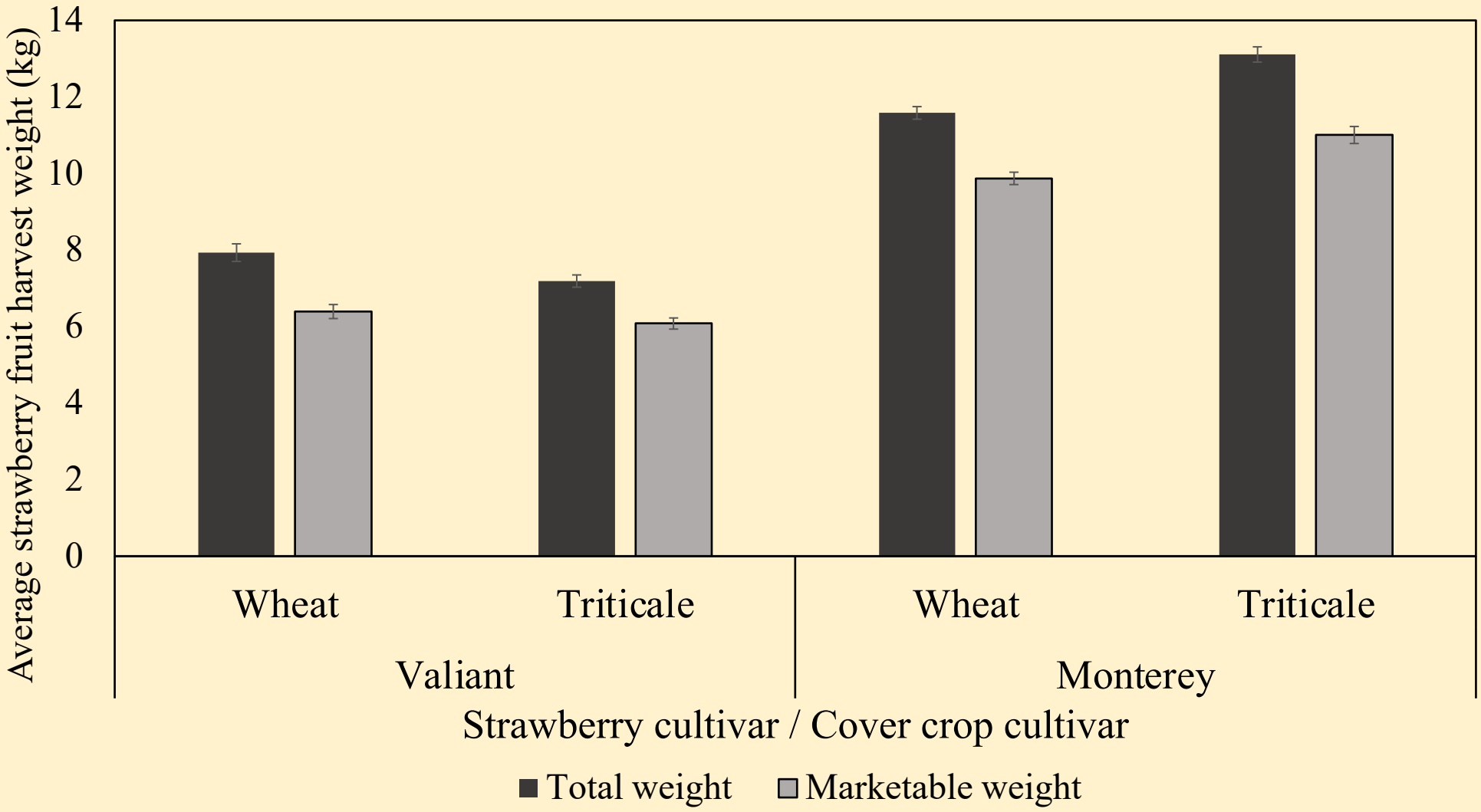
# Results - conventional field trial



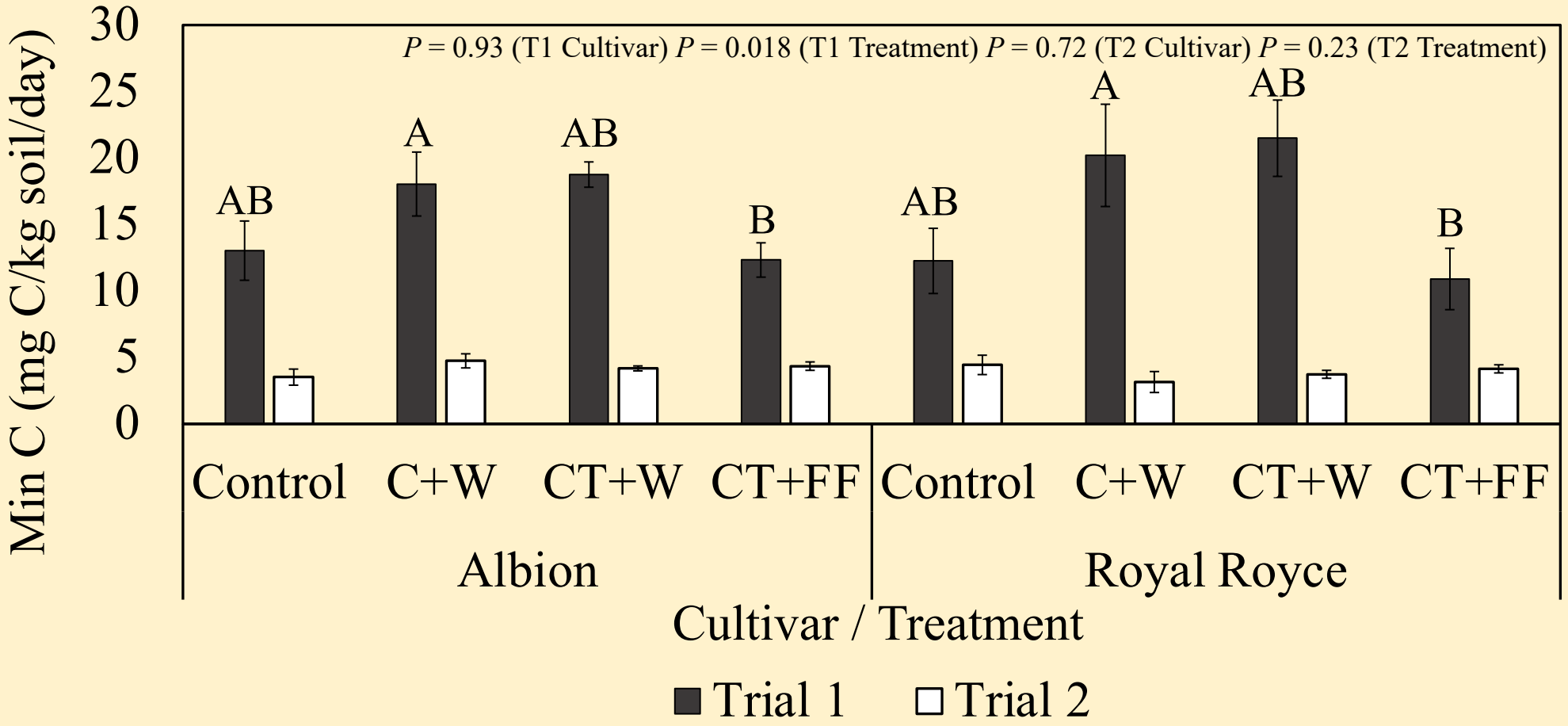
# Results - organic field trial



# Organic field trial harvest



# Soil health tests



# Takeaways

- Cover cropping as a standalone treatment may not be enough to manage high *M. phaseolina* populations

- Could be part of an integrated approach with less intensive fumigants such as crop termination in less infested fields

- The cover crops only had one season to accumulate a beneficial microbiome

# Future Research

- Plant and soil evaluations for *M. phaseolina* over the rest of the growing season for both the conventional and organic fields
- Soil health and microbiome analyses
- Cover crop and soil nutritional analyses

# Acknowledgements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AGRICULTURAL RESEARCH INSTITUTE

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Questions?