Assessing the Frequency of Pythium Wilt and INSV Co-Occurrence in Monterey County's Lettuce Production

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Background

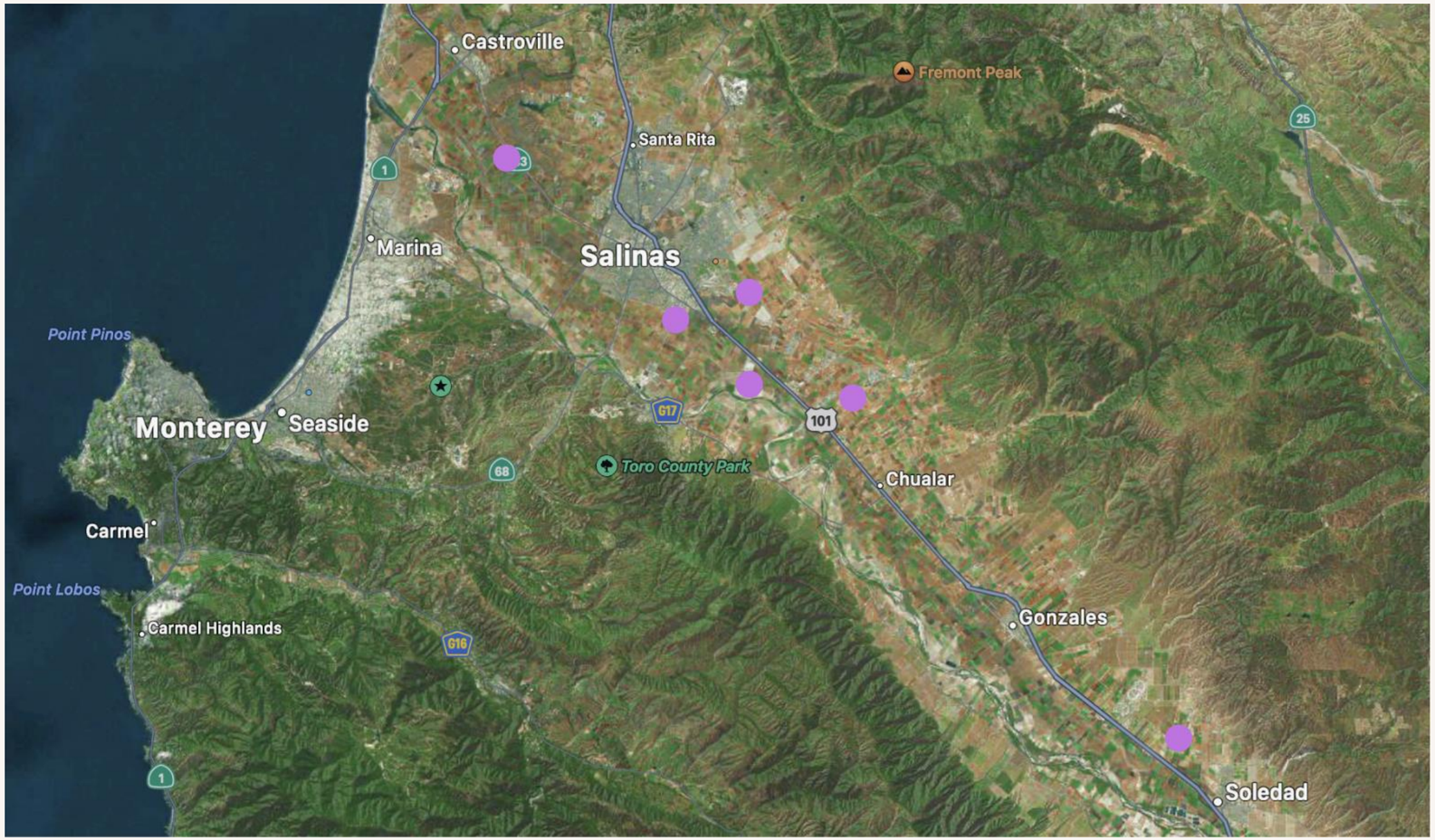
- Pythium wilt and INSV are currently the most pressing issues affecting lettuce industry in Monterey County
- First observations of diseases in Monterey County:
  - Impatiens necrotic spot virus (INSV) – 2006
  - Pythium wilt of lettuce – 2011
- Co-occurrence of these diseases has not been studied extensively

Objectives

- Evaluate the frequency of Pythium wilt and INSV co-infection in commercial lettuce fields
- Characterize disease and symptom development in co-infected plants

Methods

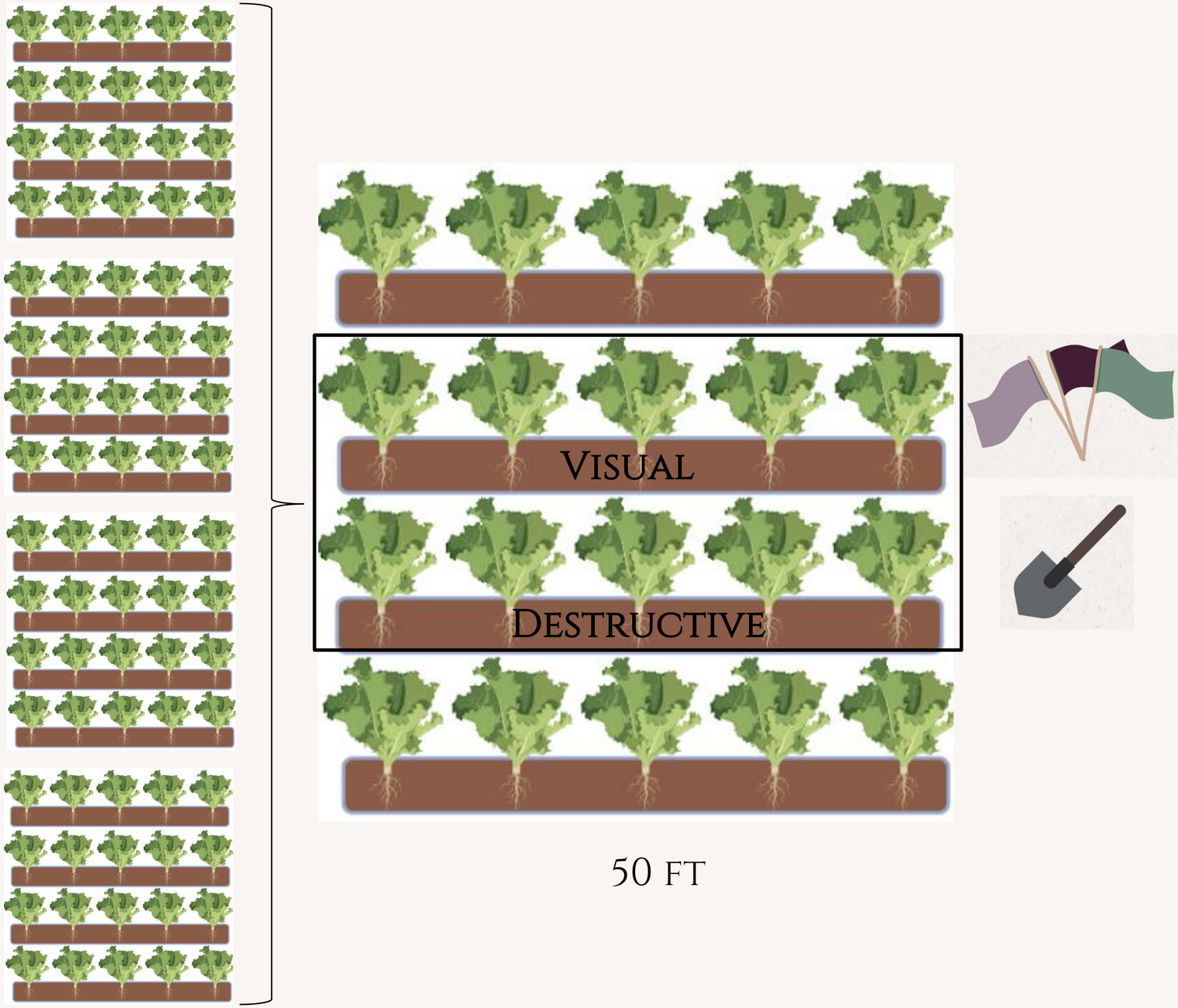
- Fields with a history of INSV and Pythium wilt



Methods

- Fields with a history of INSV and Pythium wilt

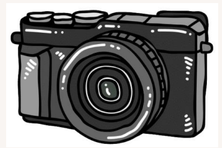
- 4 paired seedlines (8 total seedlines) were used to assess disease incidence



Methods

Visual

Destructive



INSV (USDA)
TAS - ELISA

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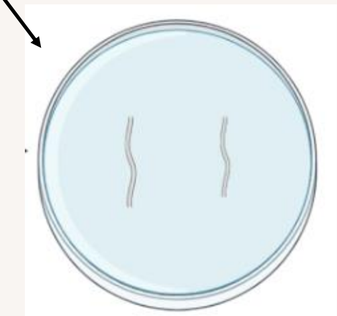
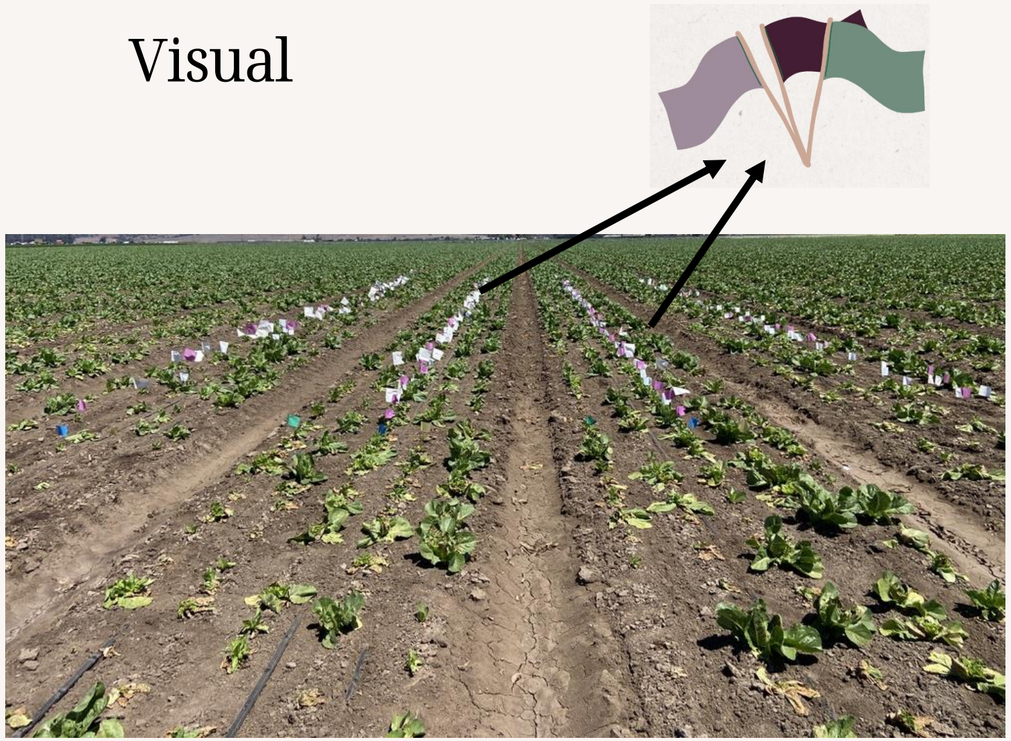


Pythium wilt (CSUMB)
Semi-selective media
Isolate purification
Morphological characterization
Molecular ID confirmation

Methods

Visual

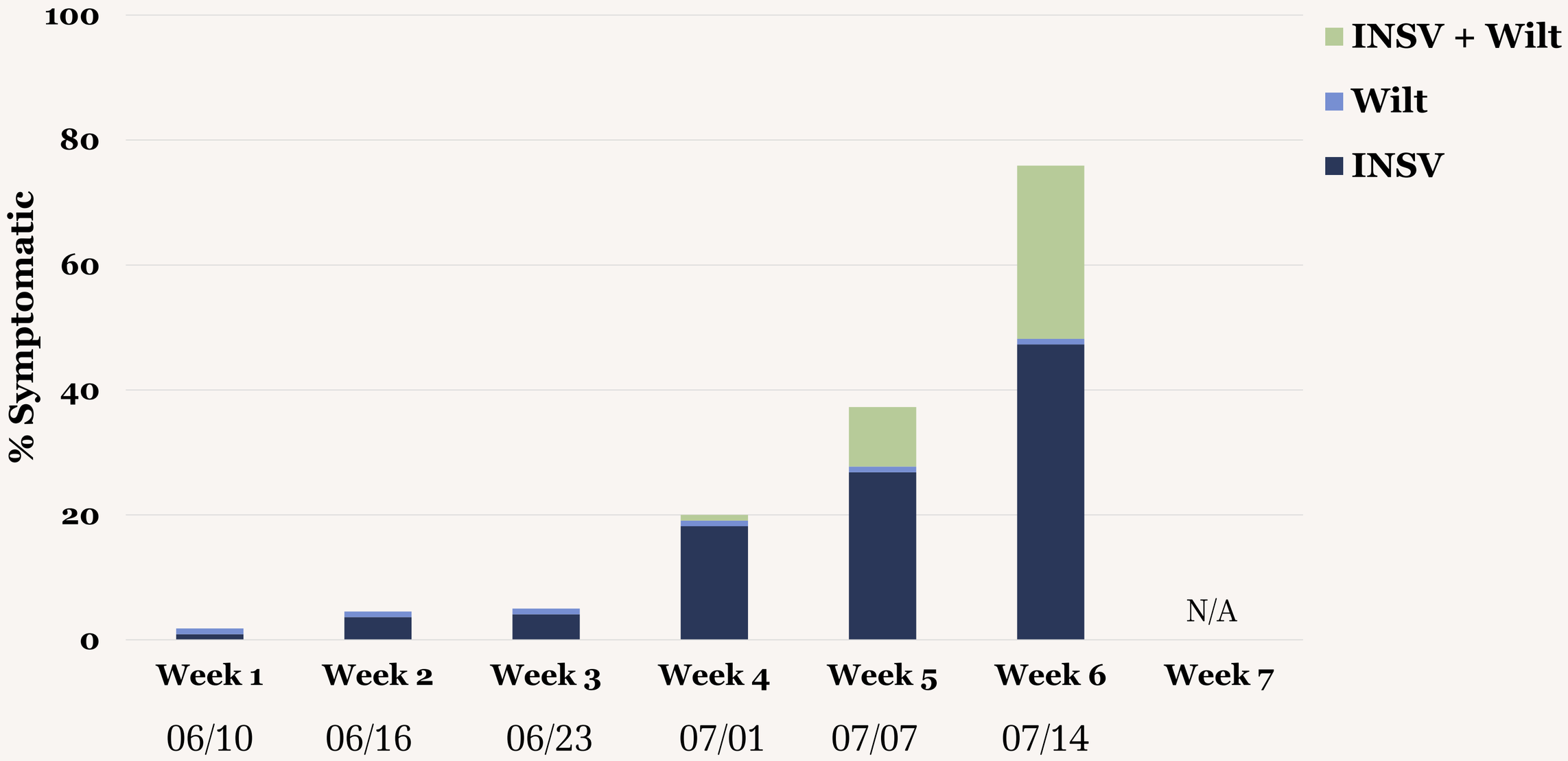


- Plants within visual evaluation rows were assessed for aboveground symptoms and flagged for each category:
  - INSV
  - Wilt
  - INSV + Wilt

- Metadata was collected for each field
  - Lettuce type and variety
  - Wet date
  - Harvest date
  - Crop history reports
  - Soil characteristics (physical and chemical)

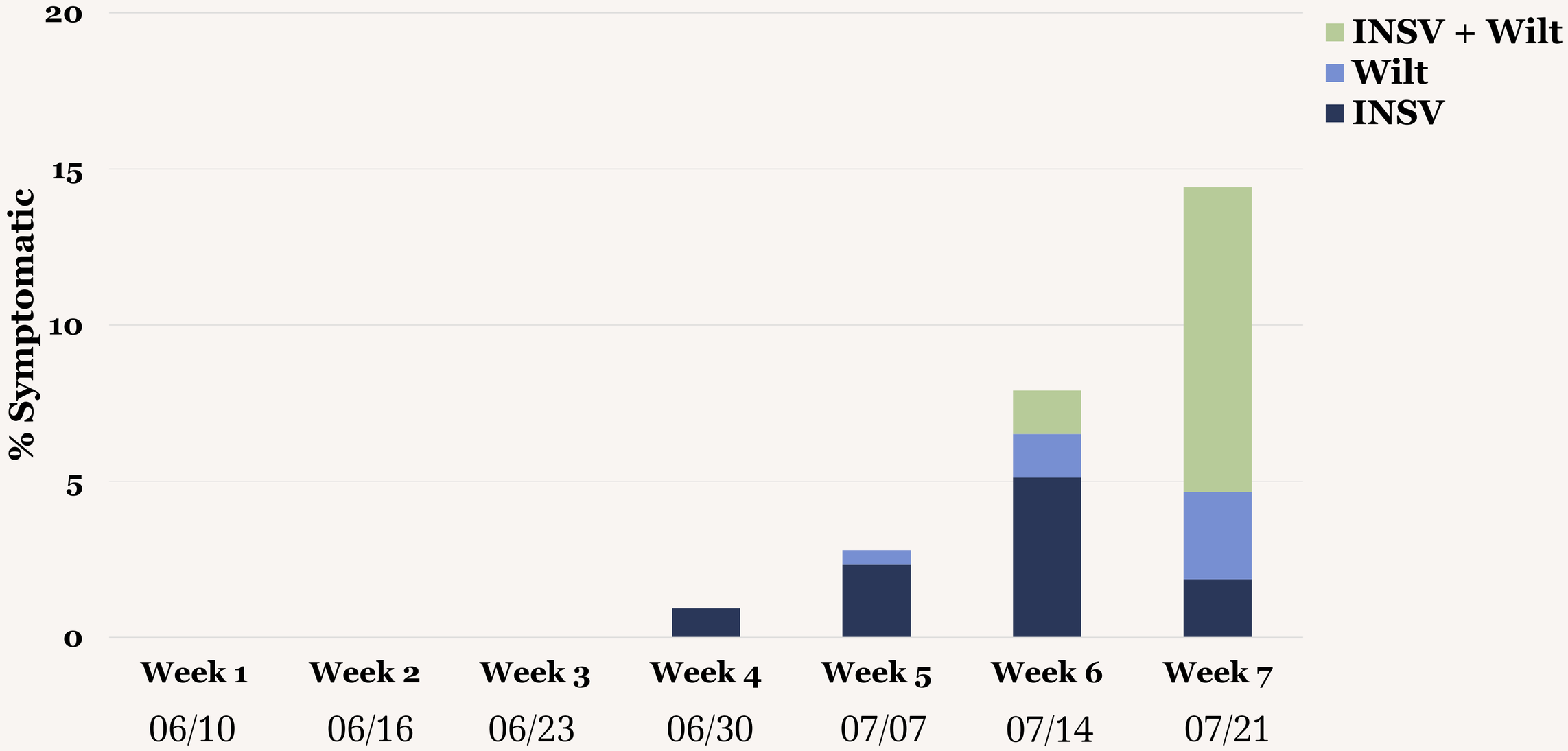
Visual Evaluation Results: Field 1

Conventional, direct-seeded
Lettuce: Romaine var. Abilene
Wet date: 05/17/2022
Harvest date: (not harvested)



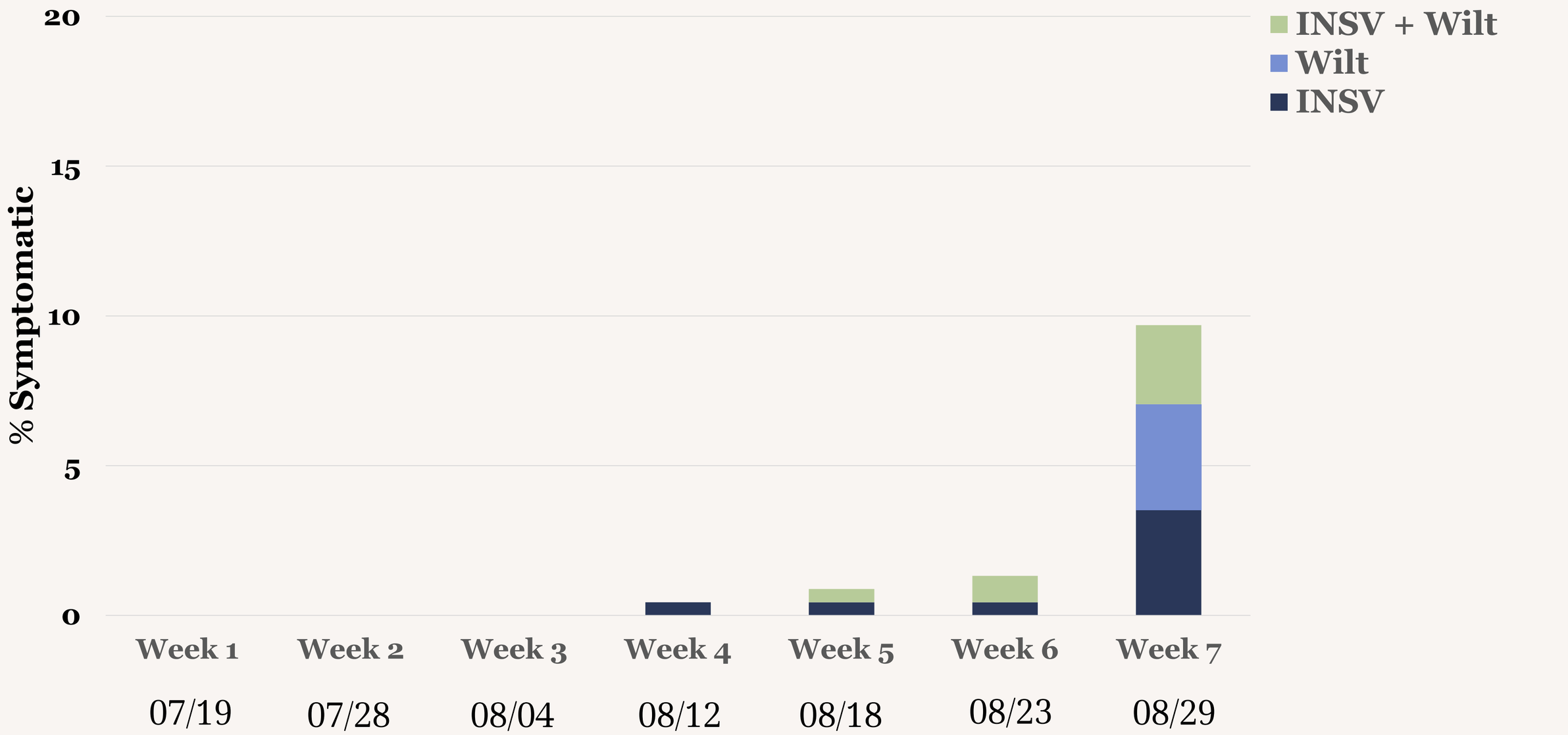
Visual Evaluation Results: Field 2

Conventional, direct-seeded
Lettuce: Iceberg var. Lucky
Wet date: 05/25/2022
Harvest date: 07/29/2022



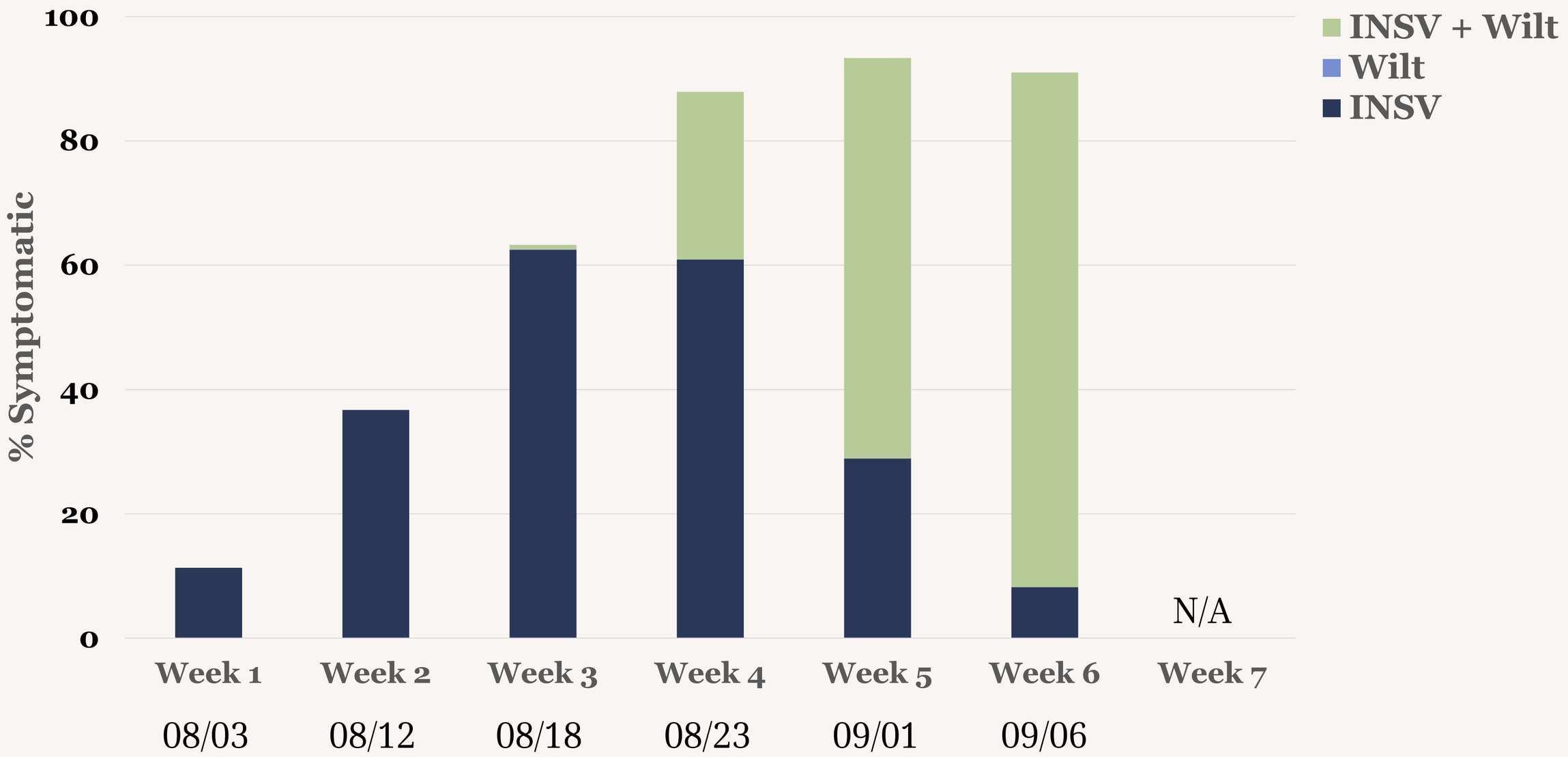
Visual Evaluation Results: Field 3

Conventional, direct-seeded
Lettuce: Iceberg var. Somerset
Wet date: 07/30/2022
Harvest date: 08/29/2022



Visual Evaluation Results: Field 4

Conventional, direct-seeded
Lettuce: Romaine var. Duquesne
Wet date: 07/12/2022
Harvest date: (not harvested)



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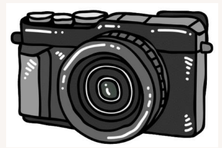

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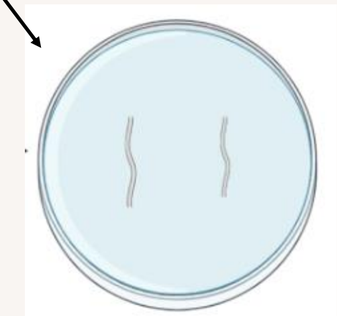

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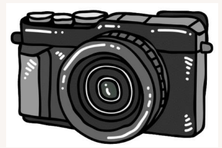
Methods

- 20 plants representative of disease incidence were collected each week
- All plants were washed and photographed
- Tissues were taken for confirmation of INSV and Pythium using enzyme-linked immunosorbent assay (ELISA) tests and plating

Destructive



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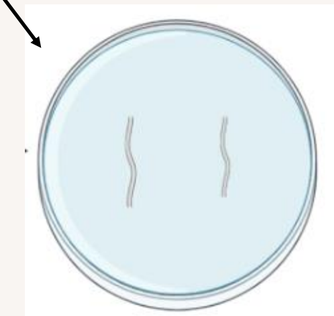

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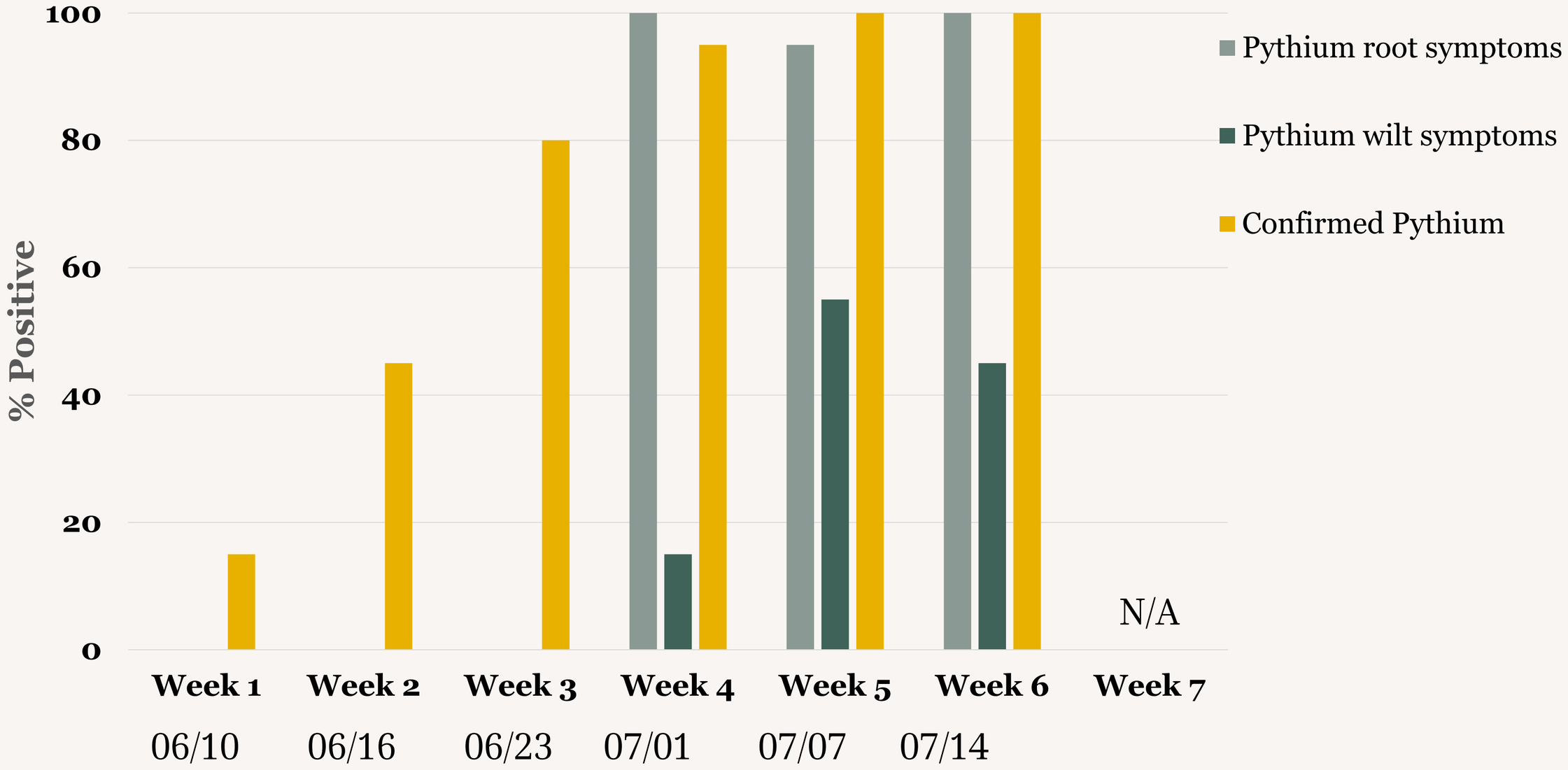
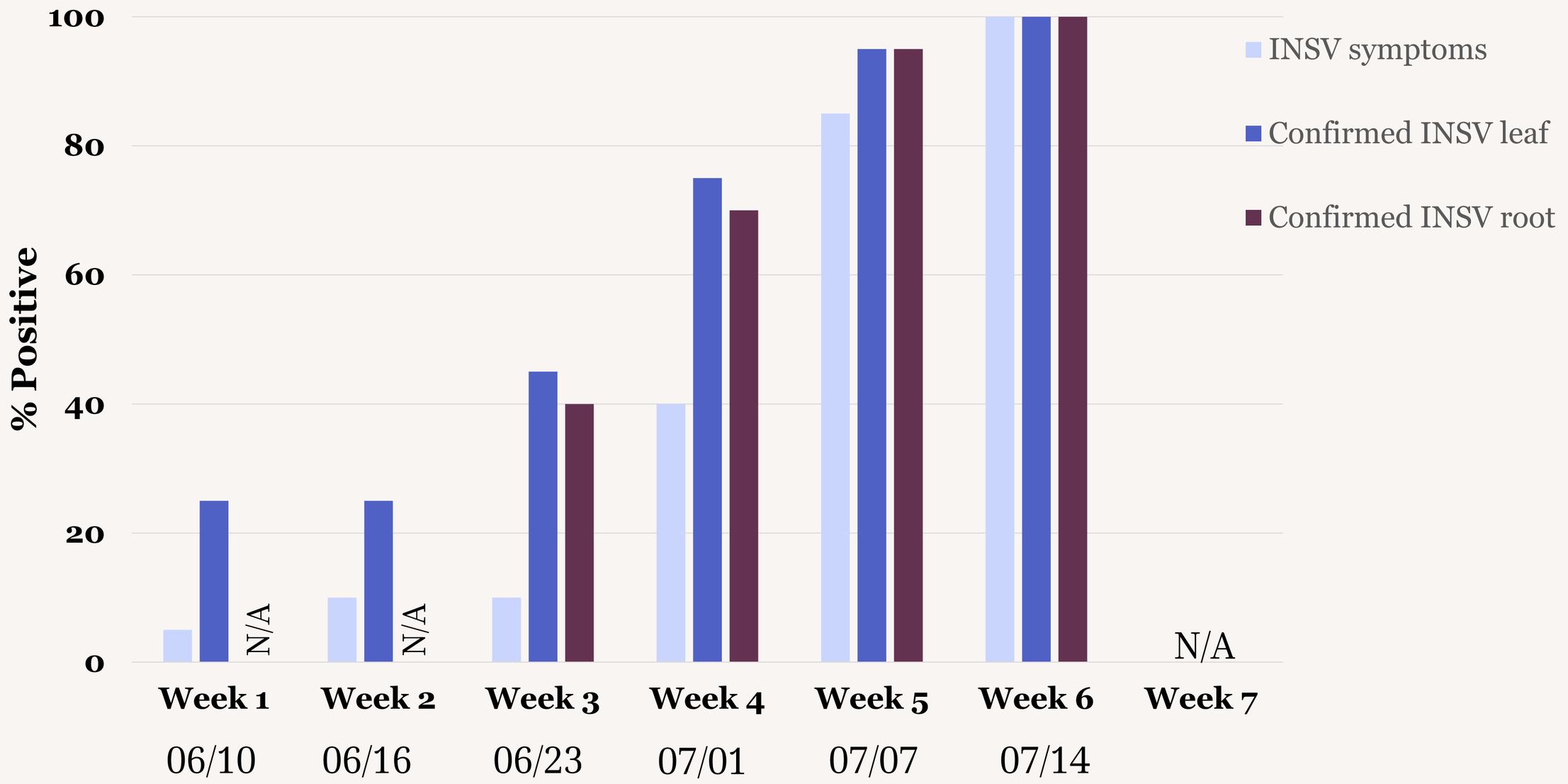
Field 1: Pythium

Conventional, direct-seeded
Lettuce: Romaine var. Abilene
Wet date: 05/17/2022
Harvest date: (not harvested)



Field 1: INSV

Conventional, direct-seeded
Lettuce: Romaine var. Abilene
Wet date: 05/17/2022
Harvest date: (not harvested)



Field 1: Pythium + INSV

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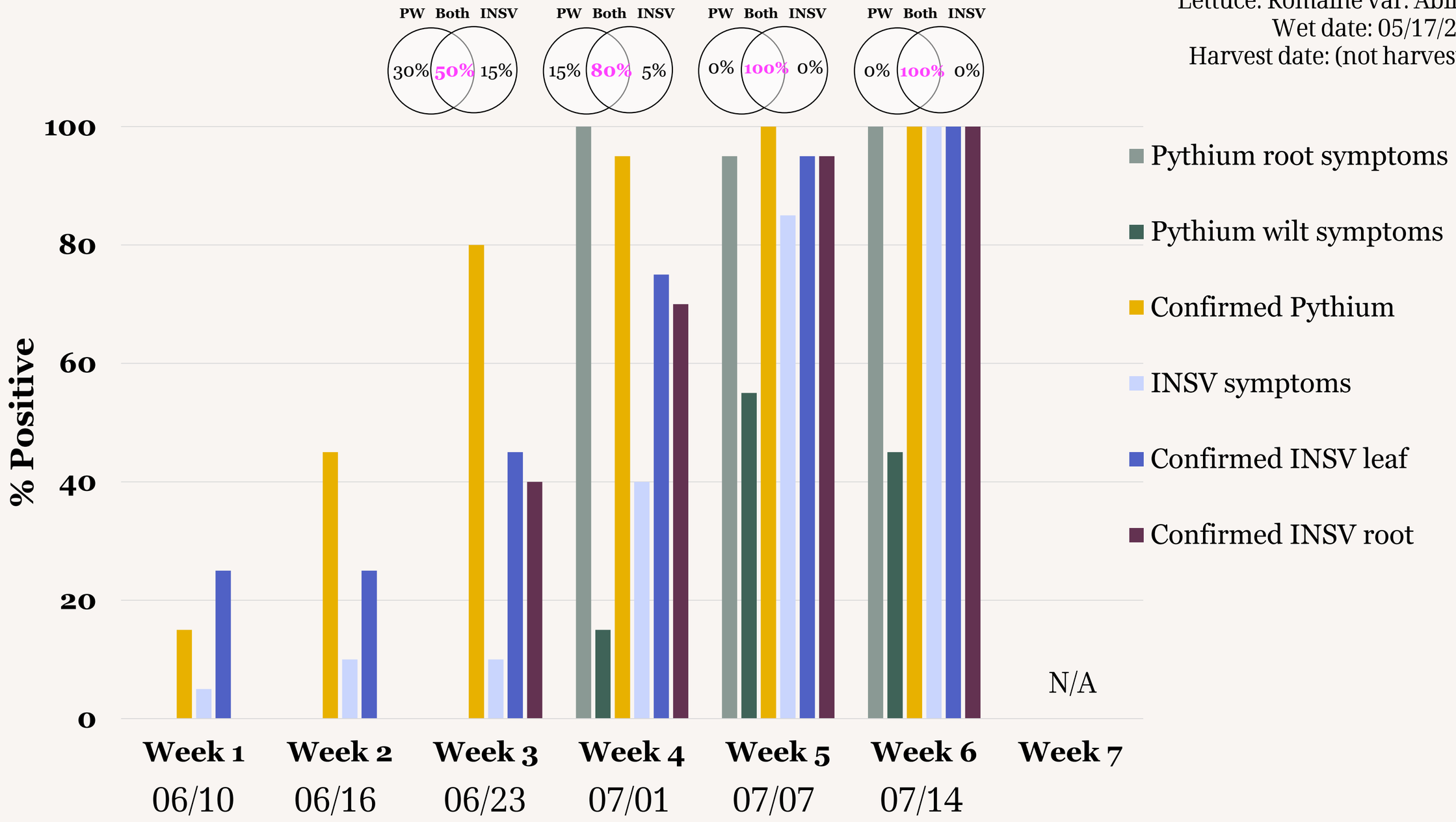
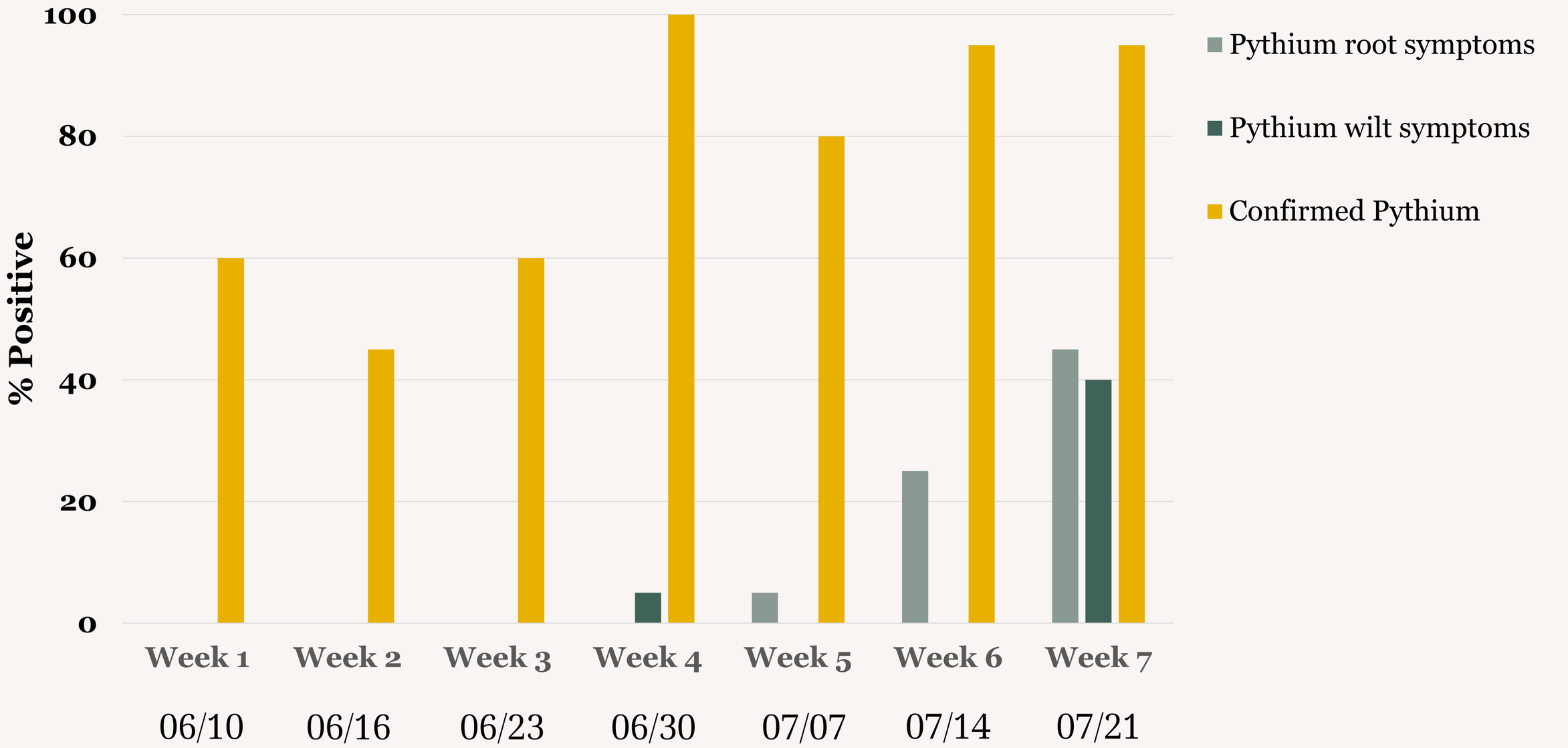
Lettuce: Romaine var. Abilene
Wet date: 05/17/2022
Harvest date: (not harvested)



Field 2: Pythium

Conventional, direct-seeded
Lettuce: Romaine var. Abilene
Wet date: 05/17/2022
Harvest date: 07/29/2022



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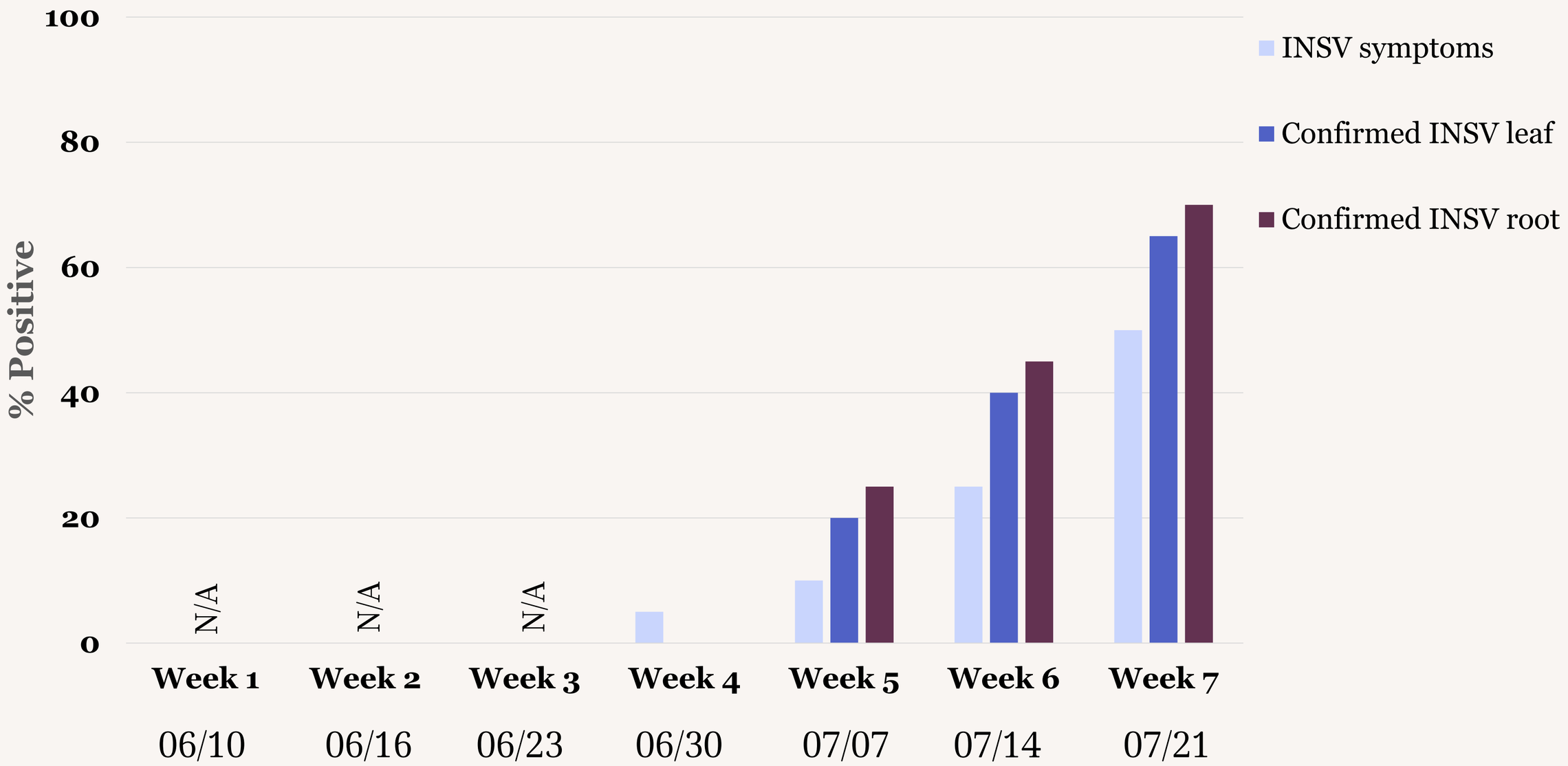

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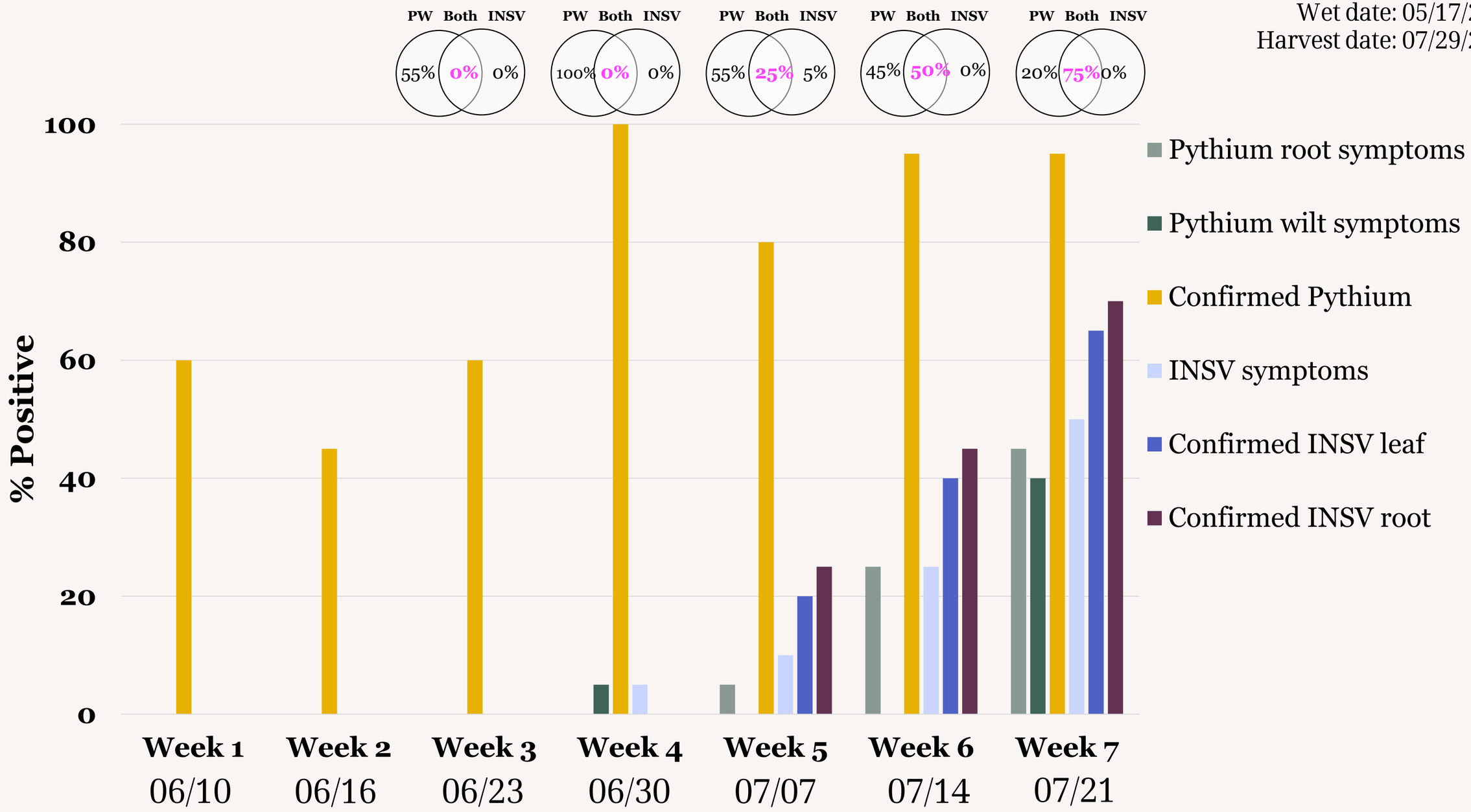
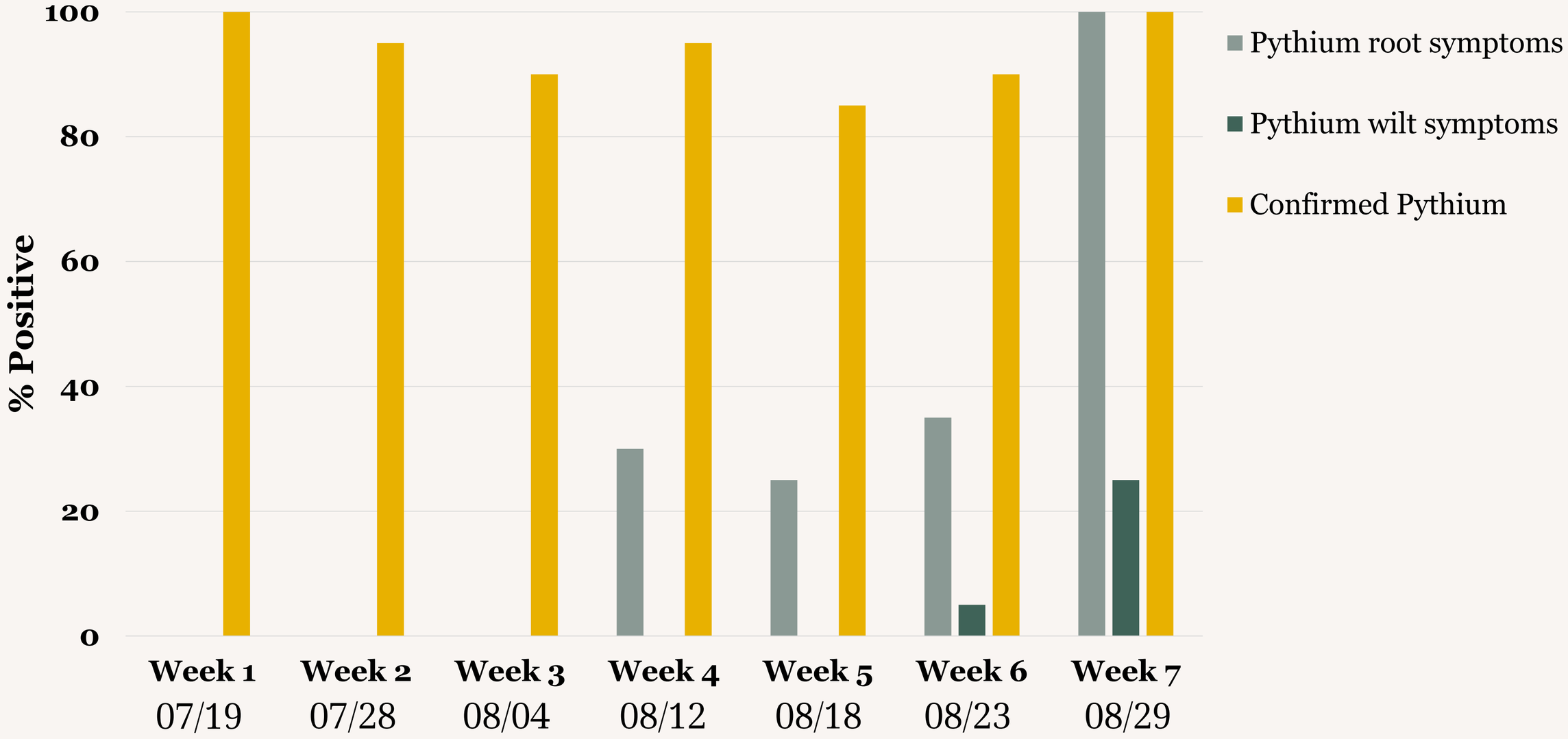


Field 3: Pythium

Conventional, direct-seeded
Lettuce: Iceberg var. Somerset
Wet date: 07/30/2022
Harvest date: 08/29/2022



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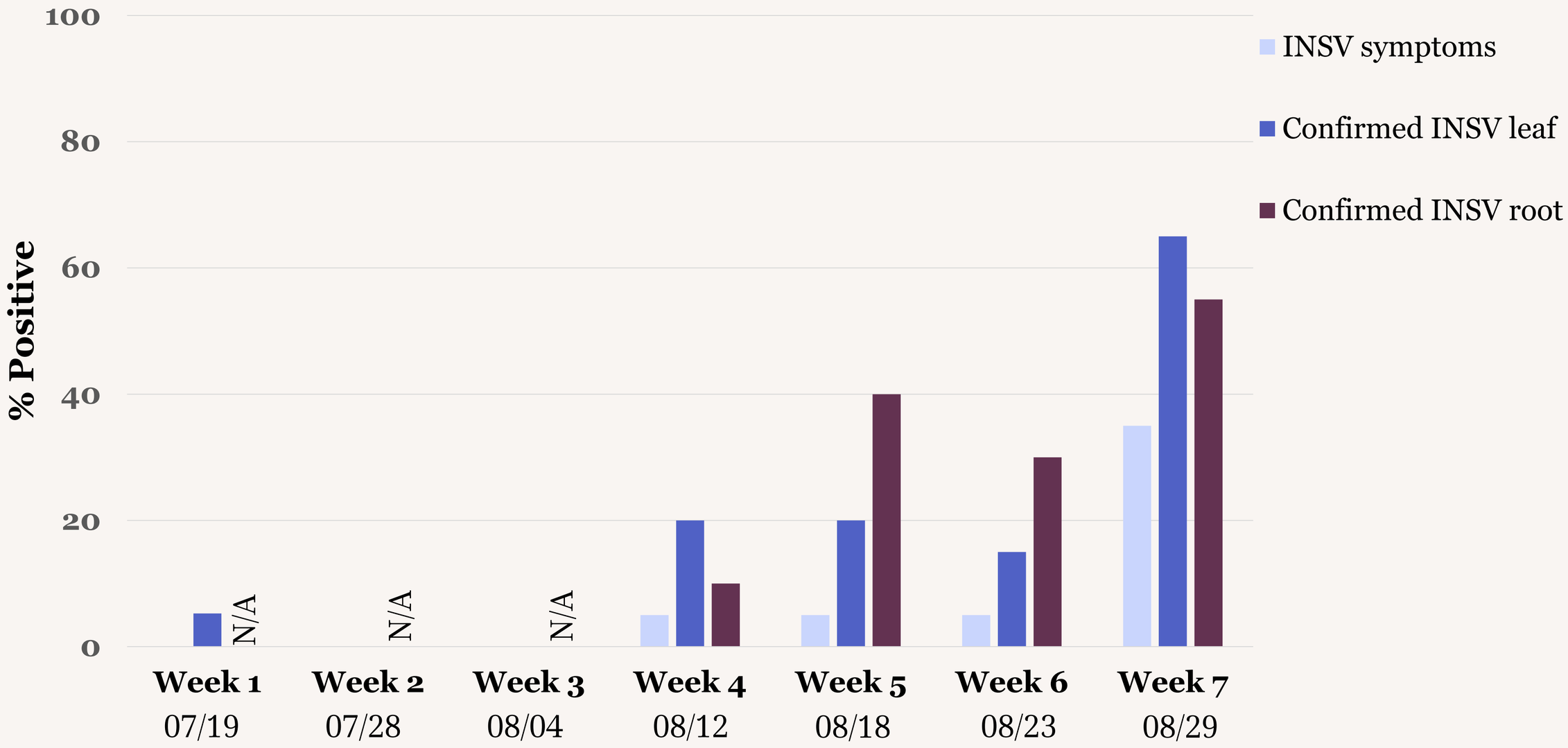

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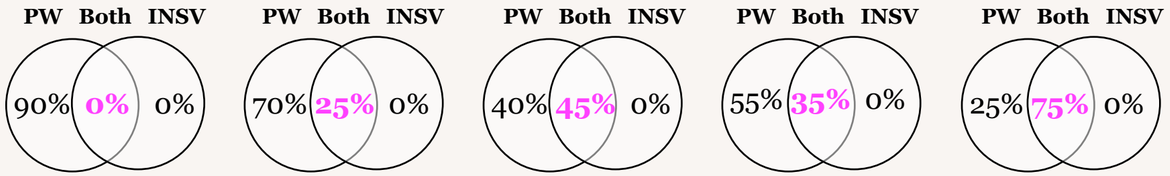

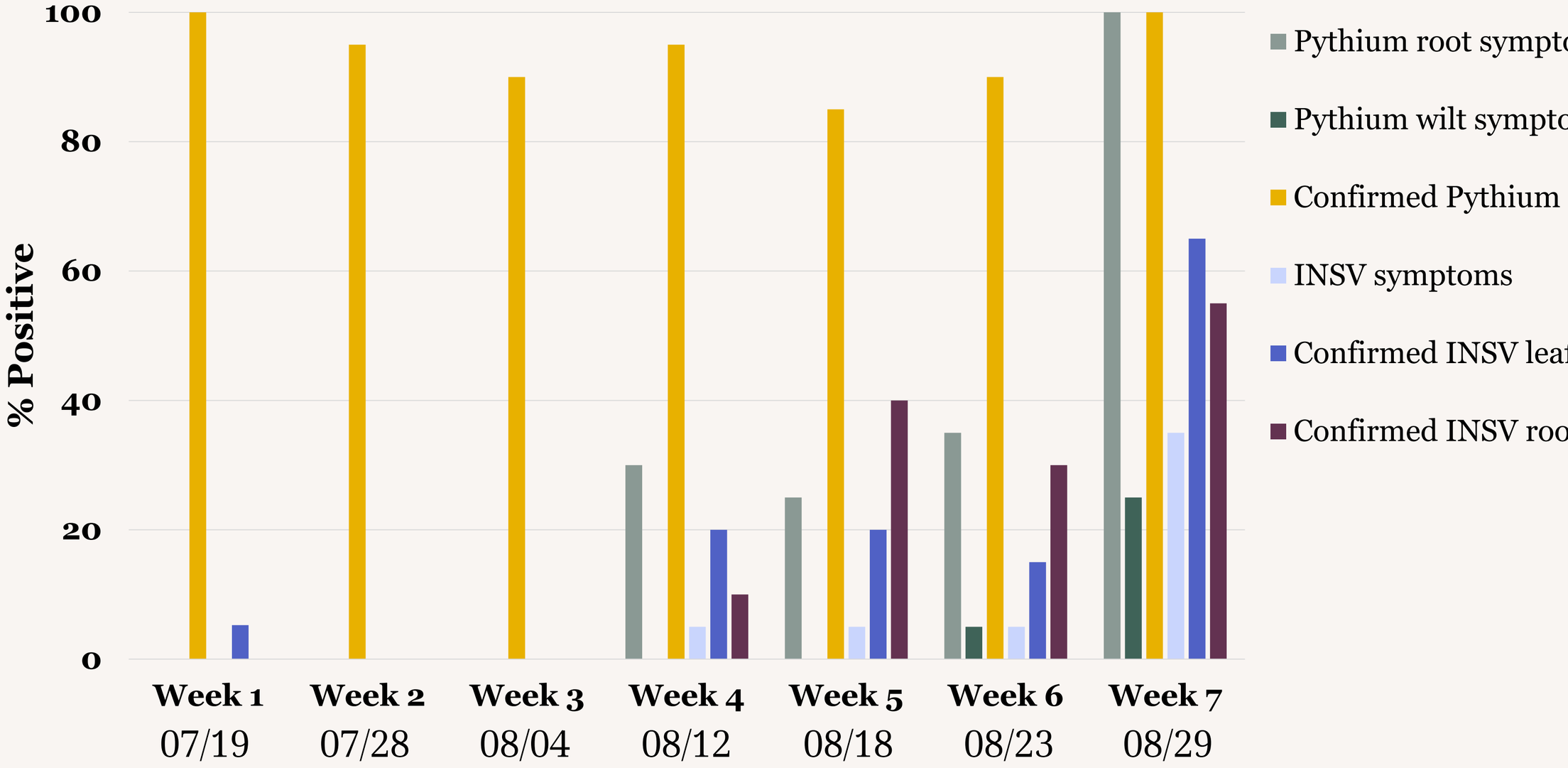

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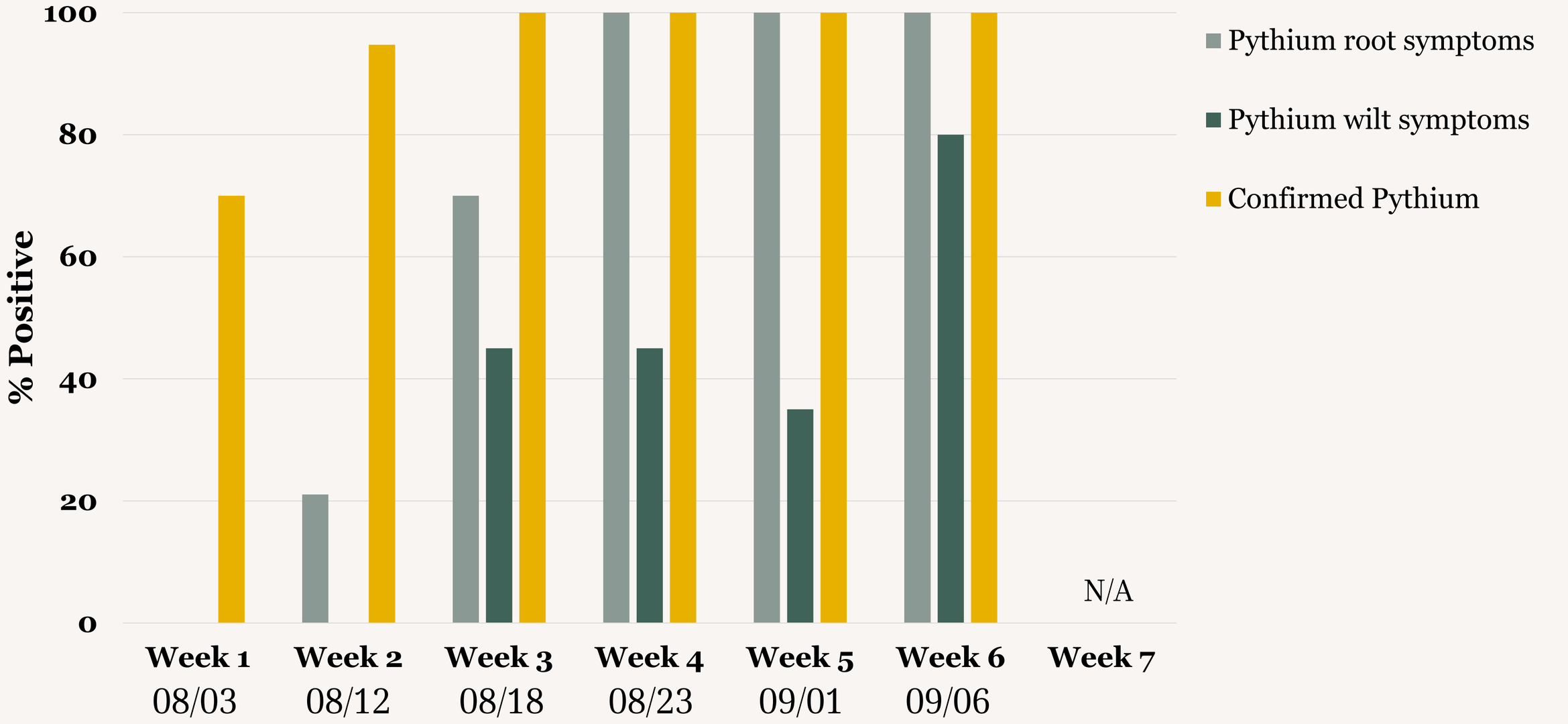

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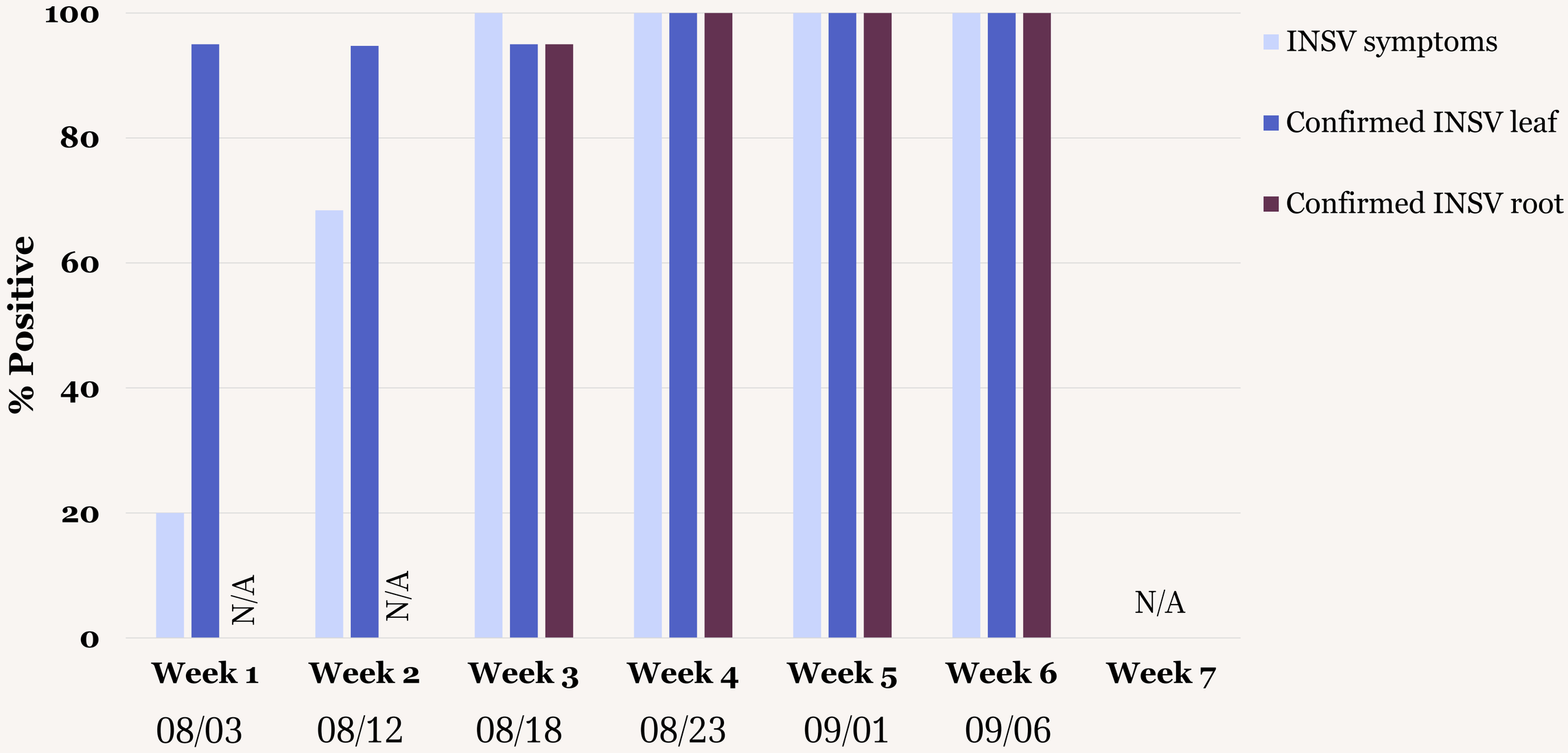

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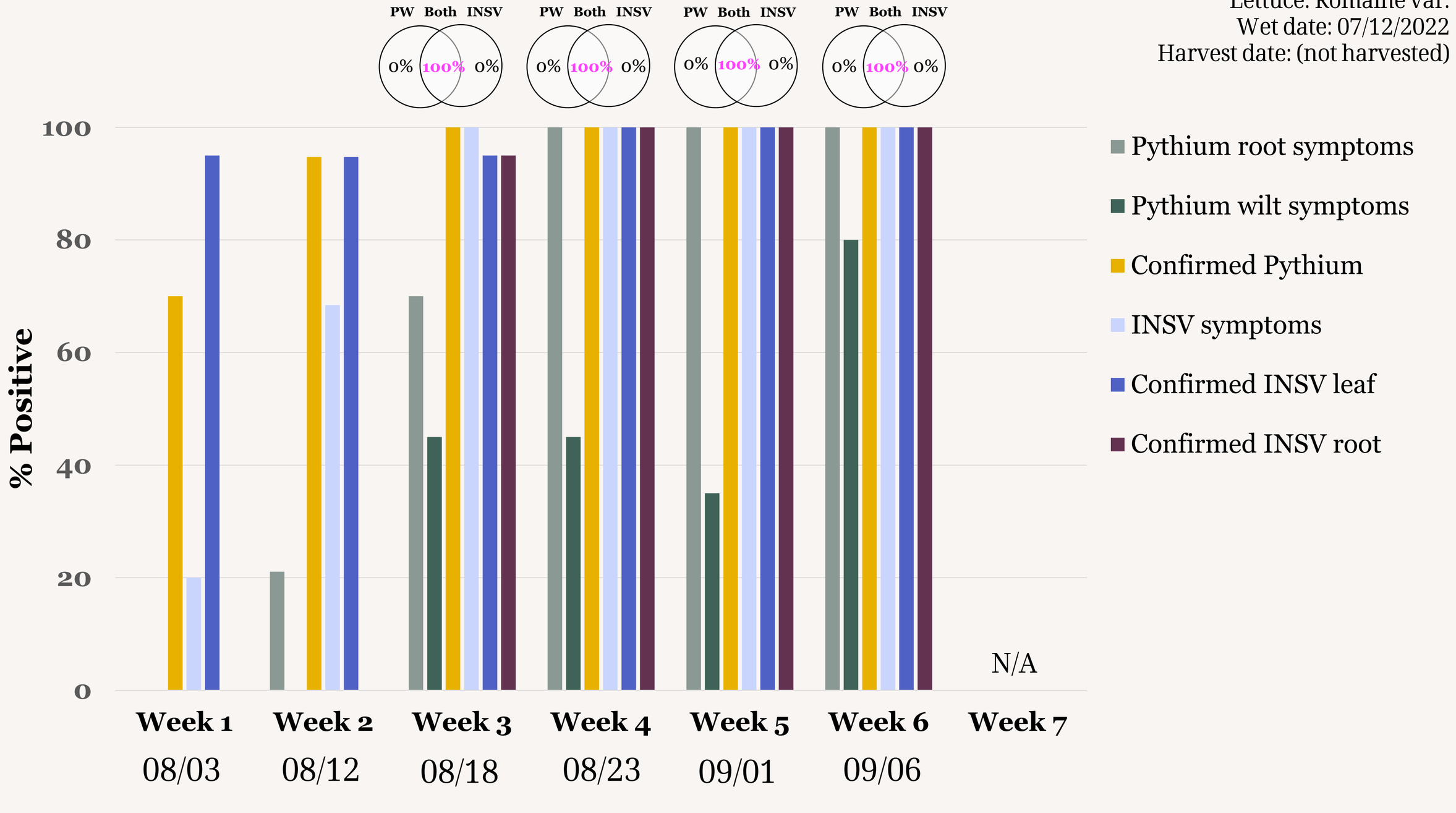

Key Findings

- INSV was found in the roots, not just in the leaf tissues
- Pythium symptoms were present in the roots before aboveground wilting was detected
- Only assessing aboveground symptoms can miss infection, as plants are infected weeks before aboveground symptoms arise

Conclusions

- In general, both INSV and Pythium wilt were generally found in lettuce plants across locations and throughout the season

- Field rated symptomatic plants only represented a small portion of plants infected with either/both INSV and Pythium wilt

- Onset of INSV symptoms usually appeared before plants showed extensive wilting, which may have been due to Pythium wilt
  - As season progressed, the frequency of symptomatic co-infected plants increased

Acknowledgements

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California State University MONTEREY BAY

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CALIFORNIA LEAFY GREENS RESEARCH BOARD

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Thank you!
Questions?

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