UC DAVIS
UNIVERSITY OF CALIFORNIA

Department of
LAND, AIR AND WATER RESOURCES
University of California, Davis
Climate Change • Sustainable Agriculture
Environmental Quality • Landscape Processes

Availability of nitrogen in processing tomato residue

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South Sacramento Valley Processing Tomato Production Meeting, Woodland

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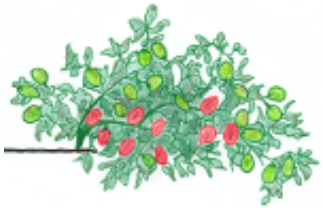
N uptake by processing tomatoes

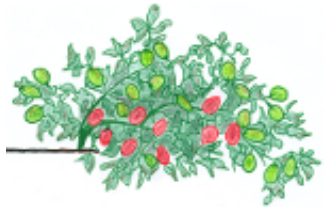
- Results from field trial at UC Davis
- Average yield: 60 t/ac, no treatment effects
- Average values from 2 years (2017 and 2018)

Treatment	N application	Fruits	Total N uptake	N in fruits	N in vines
	lbs/acre	lbs N/ton	lbs/acre	lbs/acre	lbs/acre
Low N	150	2.5	227	146	81
Intermediate N	200	2.8	255	164	91
High N	250	3.0	314	192	122



Factors affecting decomposition and N mineralization

- Soil temperature
- Soil moisture
- Residue nitrogen content; C to N ratio
- Residue moisture
- Residue management



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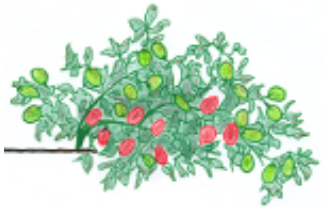
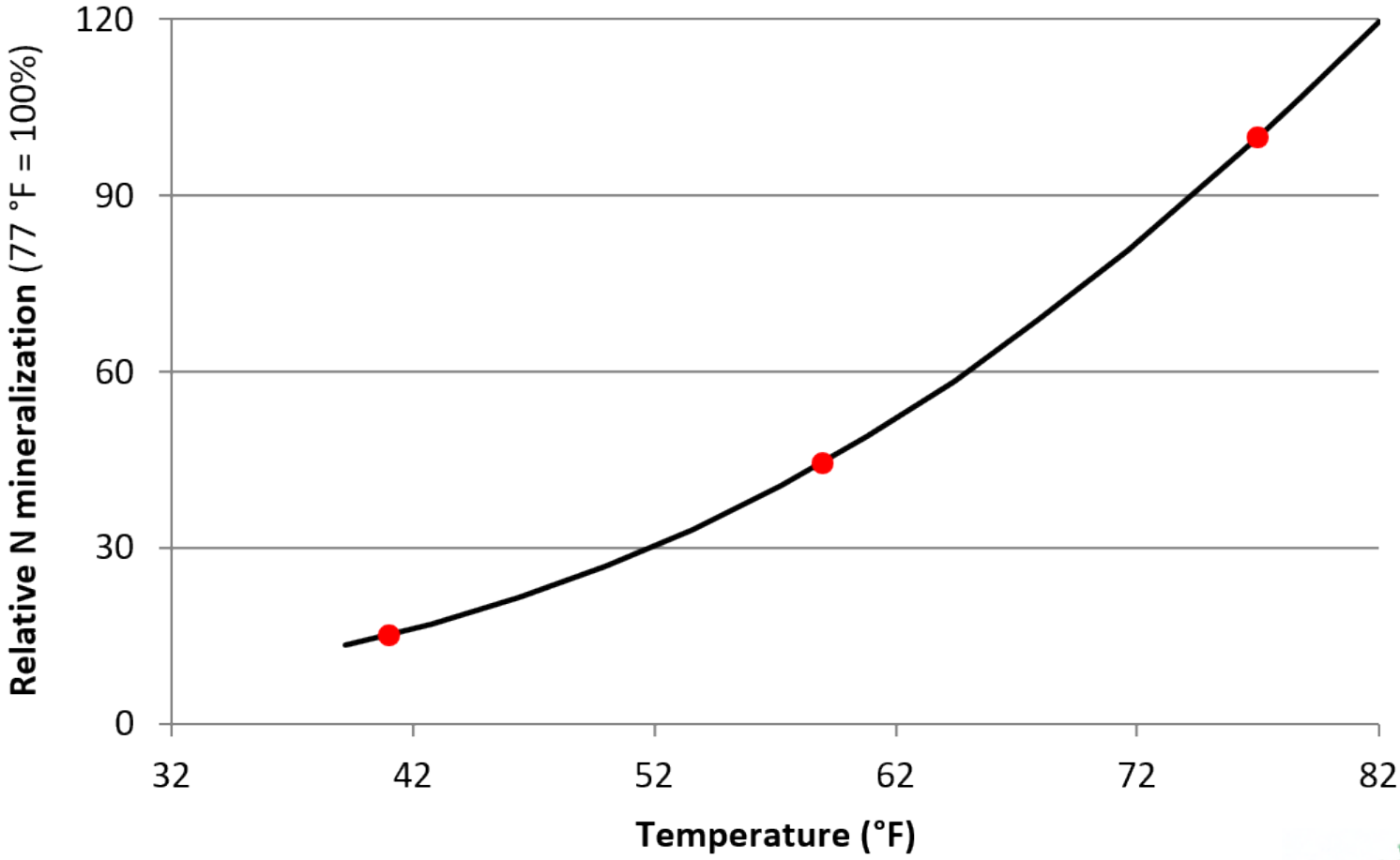
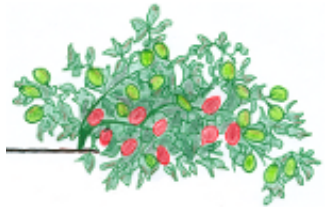


Factors affecting N mineralization: Temperature





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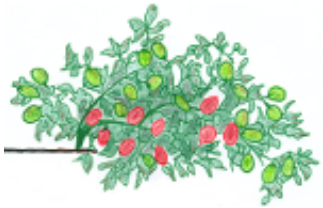
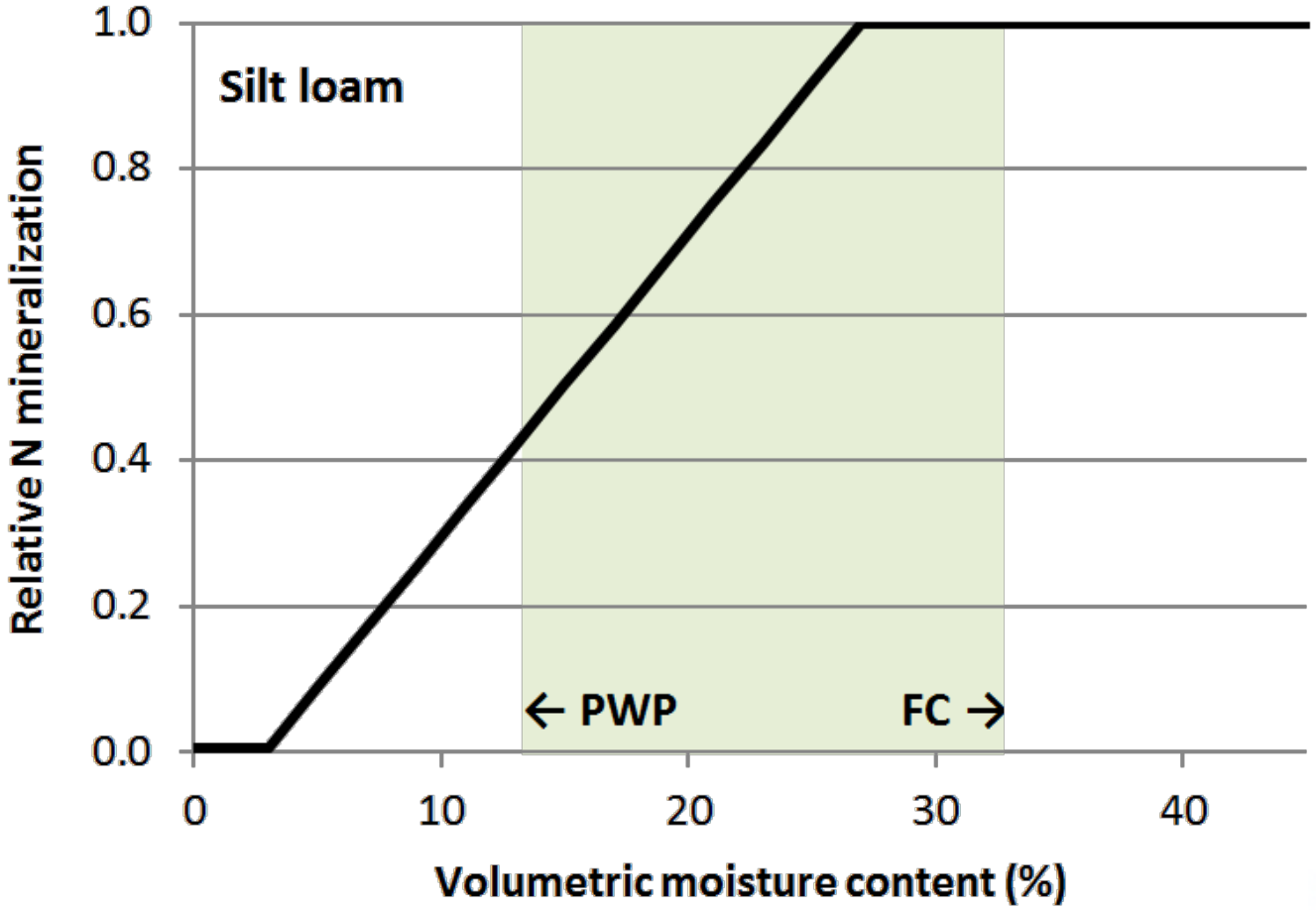


Factors affecting N mineralization: Soil moisture



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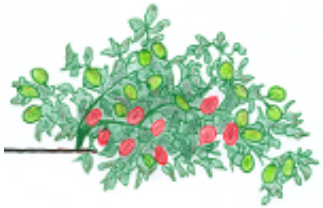
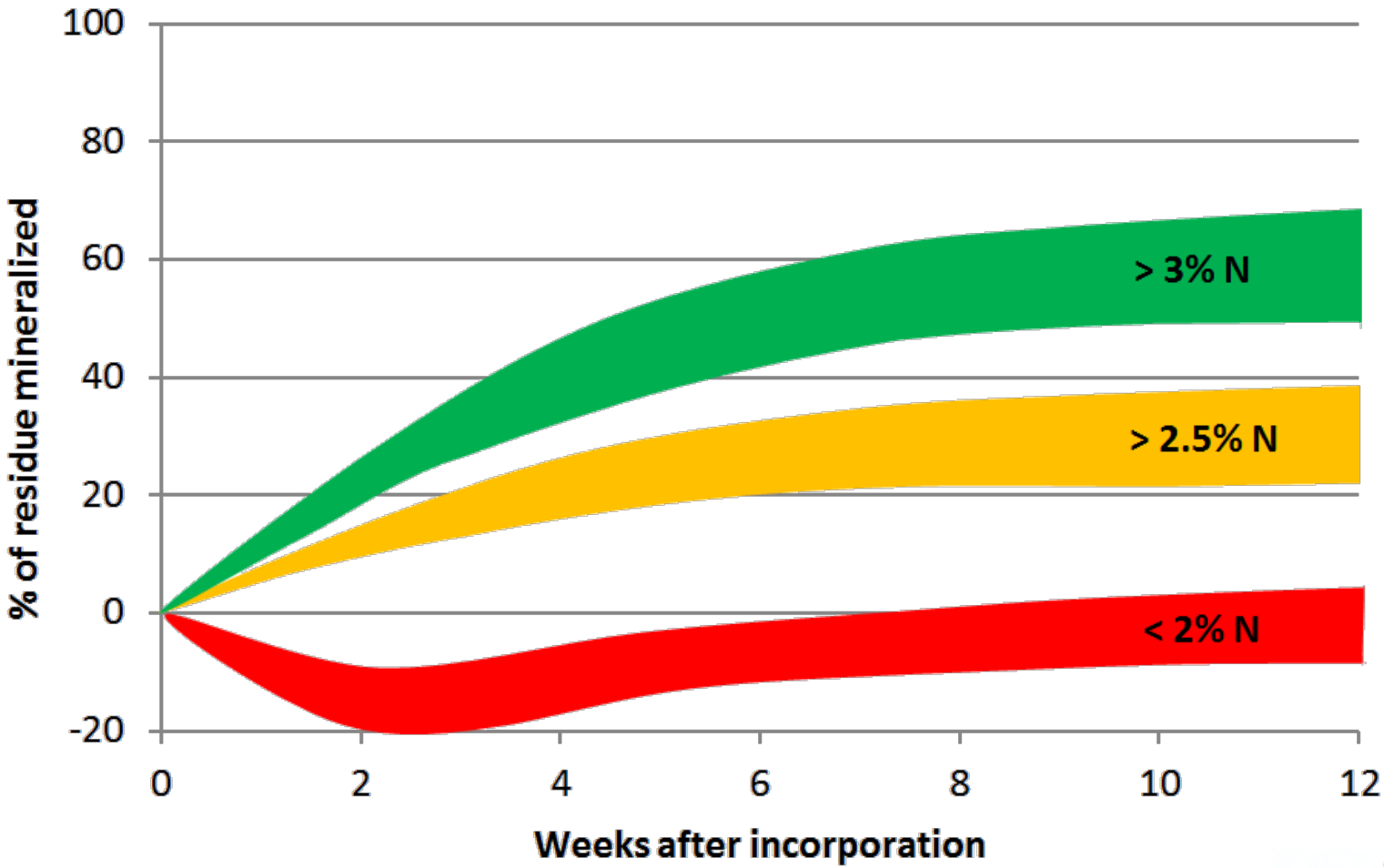


Factors affecting N mineralization: Residue N content



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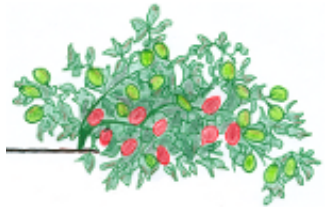


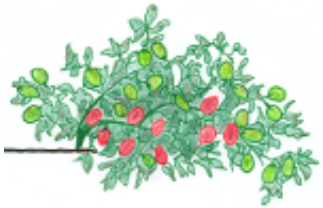
Studies: Treatments

Laboratory incubation:

- Treatments included:
  - Different soil moisture contents (FC, PWP)
  - Different residue moisture (fresh, air dry)
- Constant temperature (77 °F) for 12 weeks

Field trial:

- Treatments included:
  - Plots with residue incorporation
  - Plots without aboveground residue
- Soil sampling throughout the winter



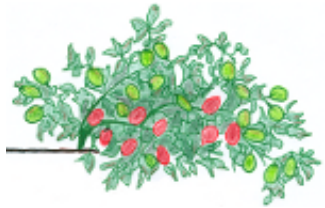
Studies: Soils and Residues

Residue properties:

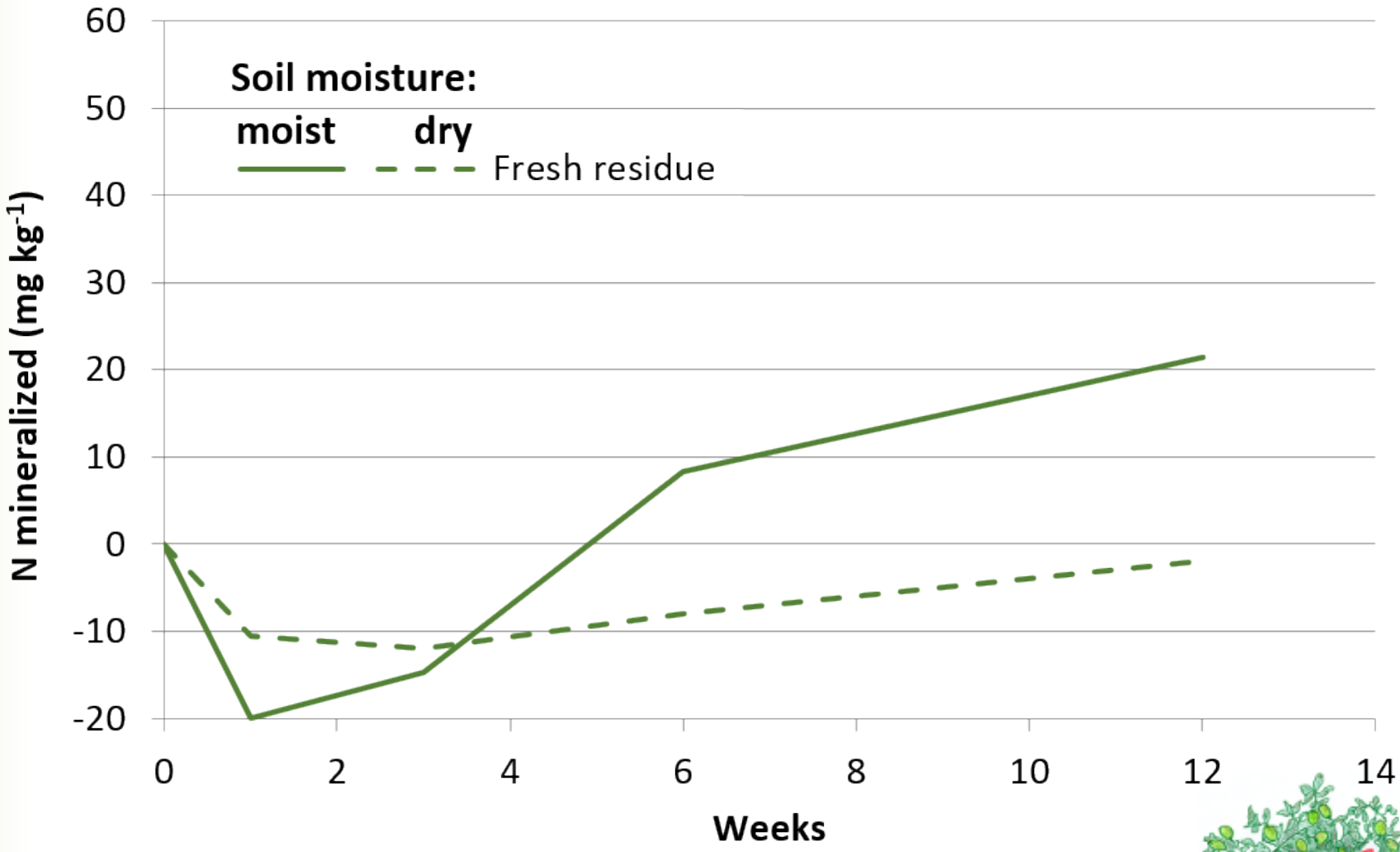
- 1.8% N
- C to N ratio of 22:1

Soil properties:

- Location: west of UC Davis campus
- Yolo silt loam
- pH 7.6
- 1.4% soil organic matter



Nitrogen mineralization



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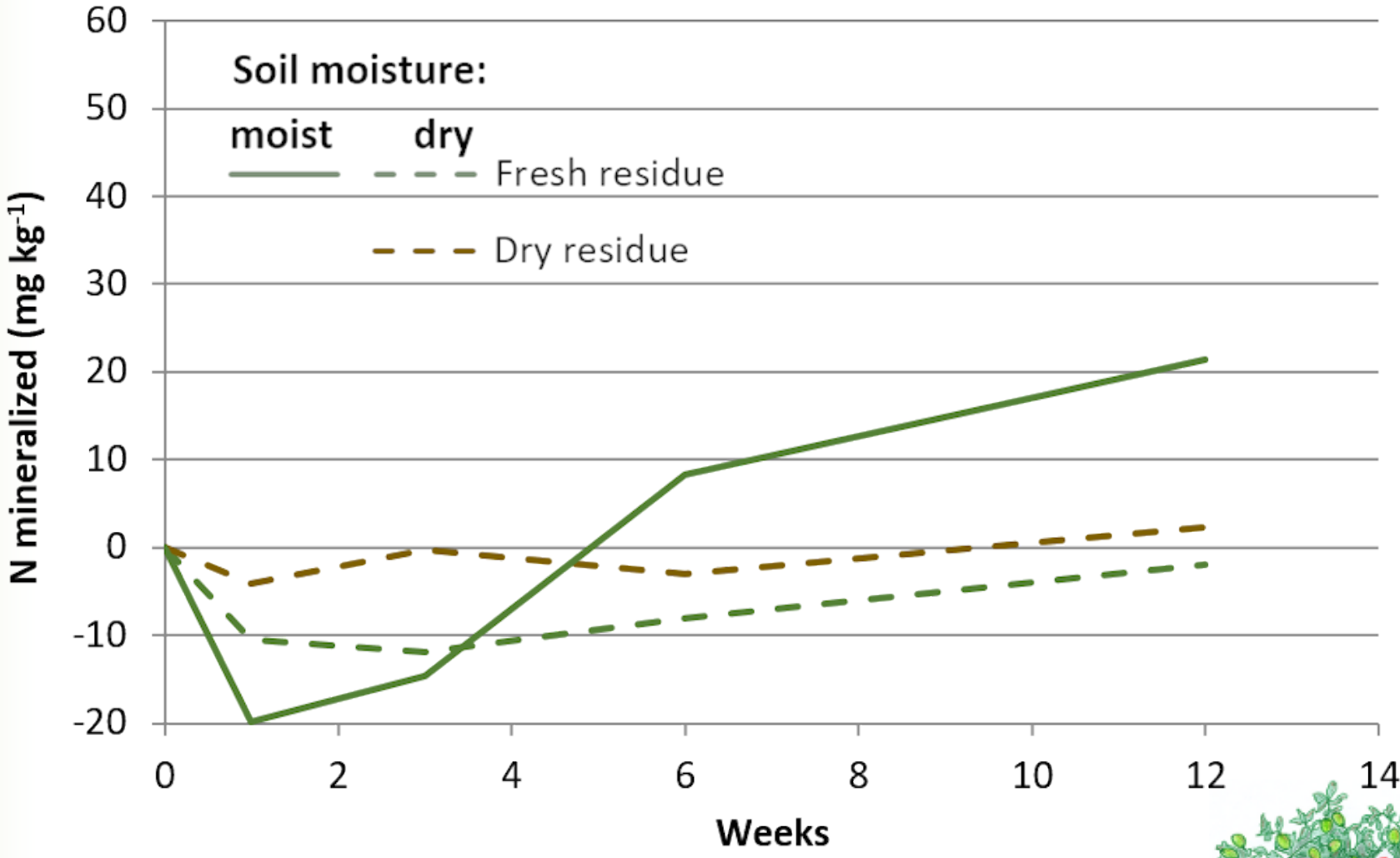

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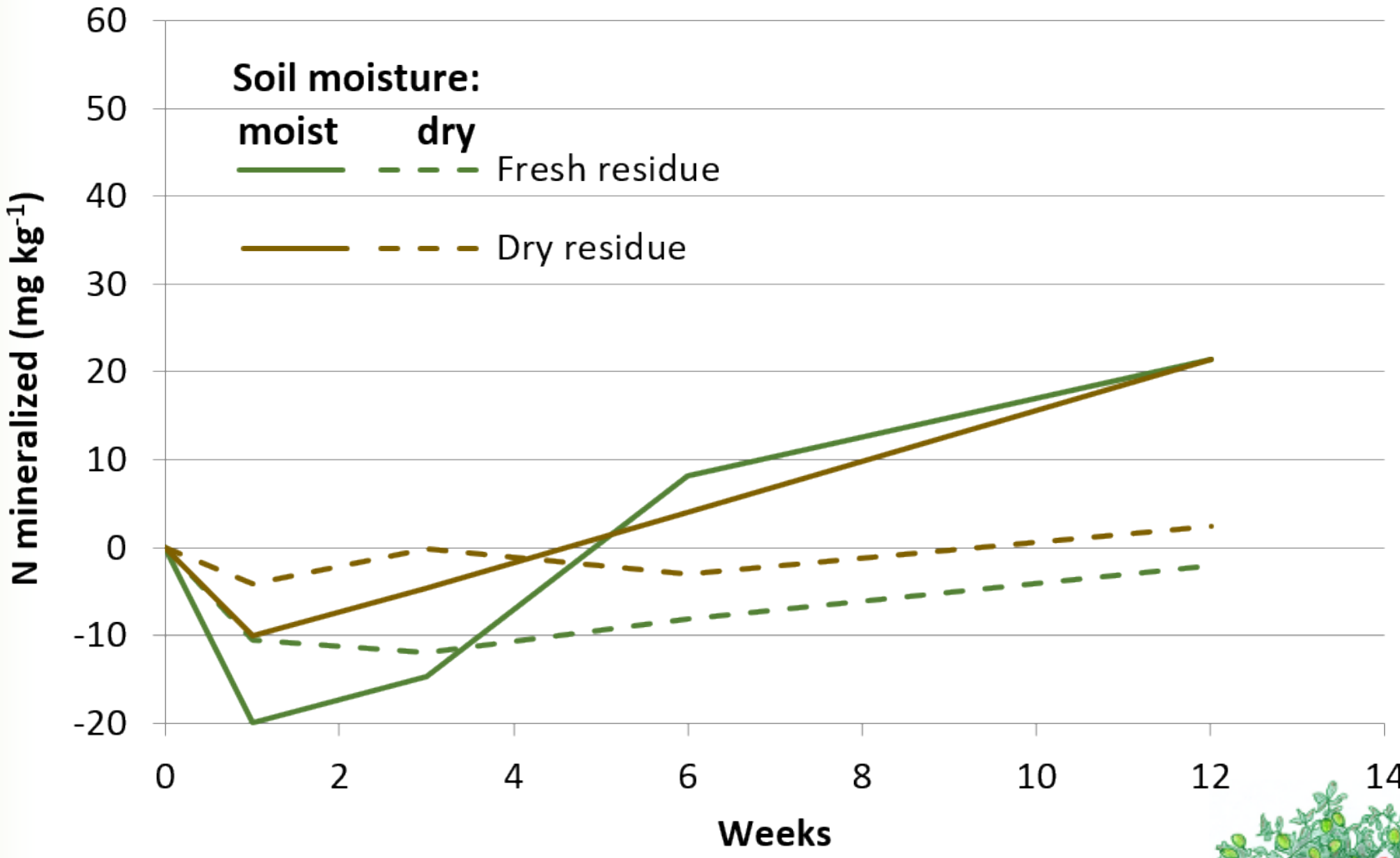
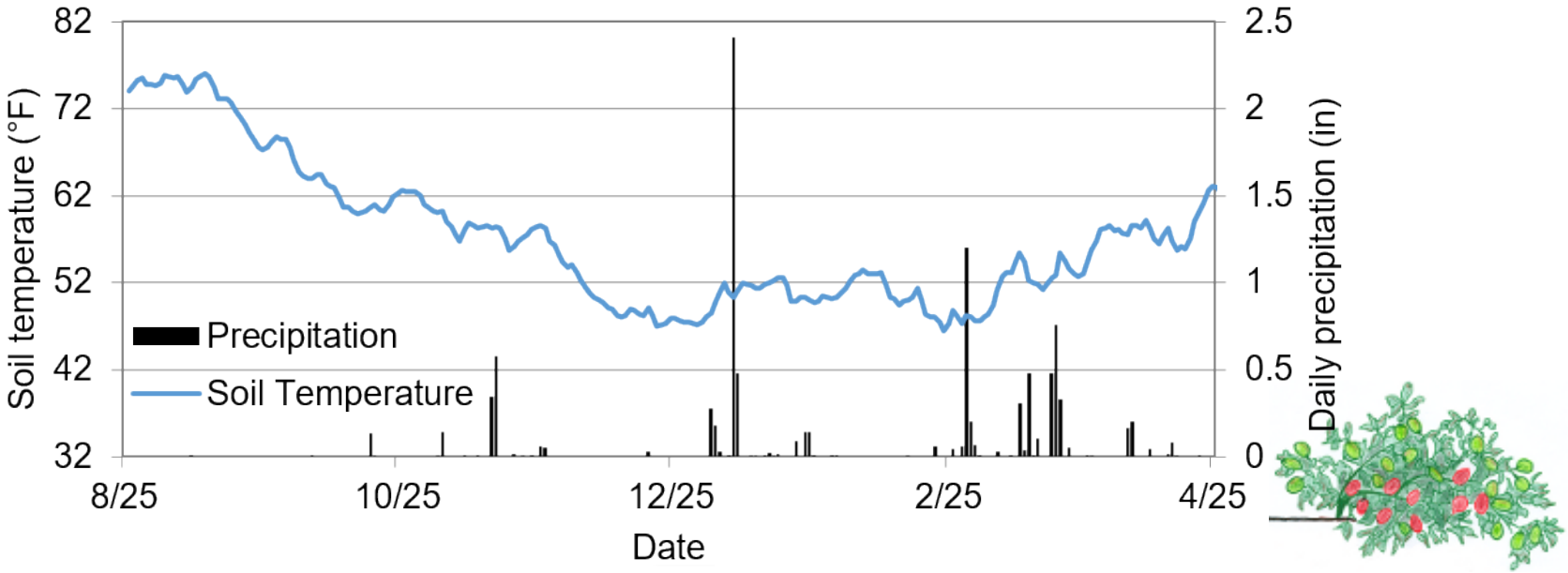


Nitrogen mineralization in the field during the winter



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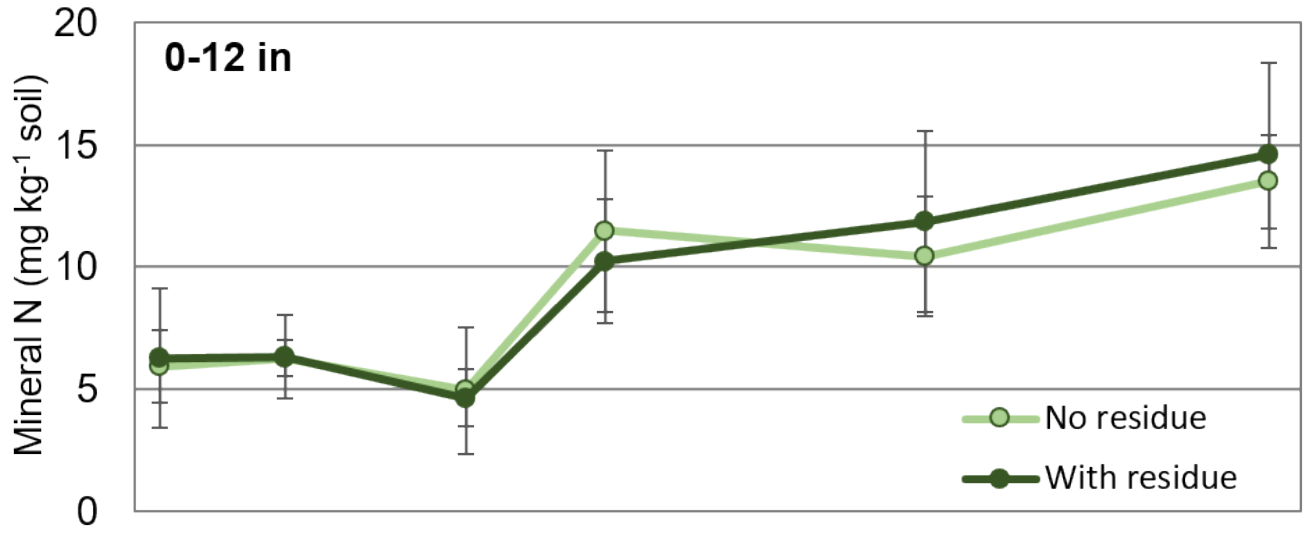

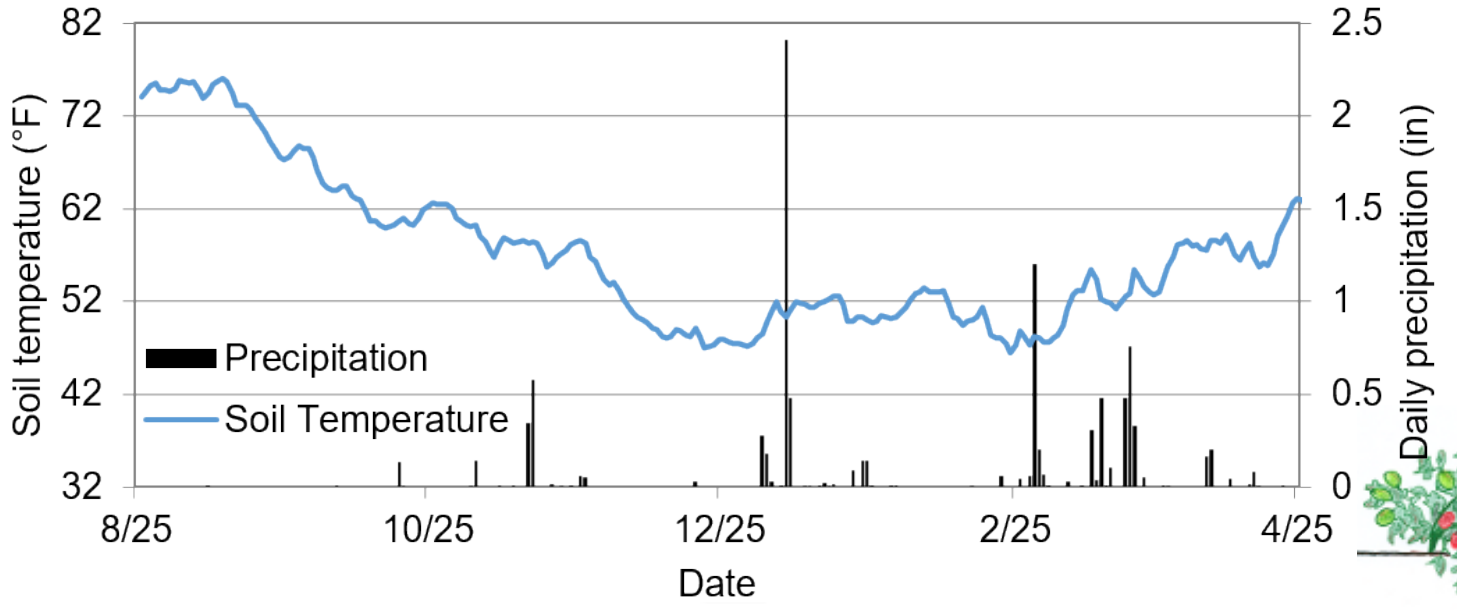

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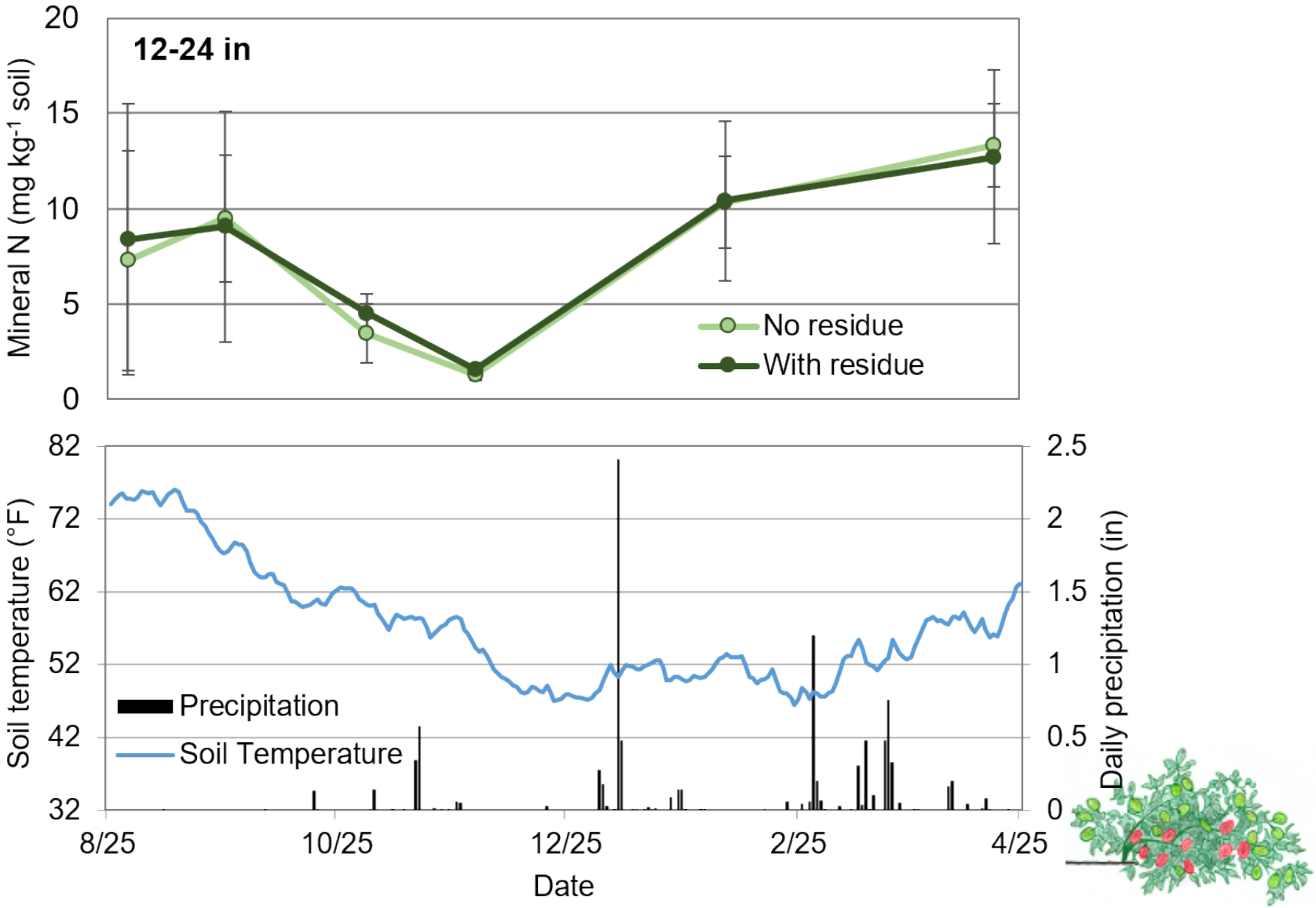
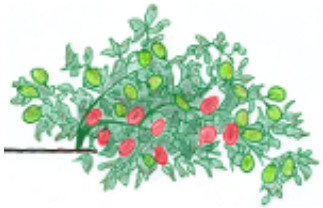


Conclusions

- Plants adjust N uptake to N availability
  - ⇨ Not all of the “excess” N is at risk of being leached
- One third of N in aboveground biomass left in the field as residues
- N mineralization from tomato residue during the winter is slow
  - ⇨ C:N ratio of around 20:1
  - ⇨ Fall: dry soil
  - ⇨ Winter: cool soil



Acknowledgement

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