



## Effect of row covers on high tunnel soil temperature

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# High Tunnels

- High Tunnel = passive solar hoop house
- Uses Plastic to trap IR heat
- Low Energy Input
- Out-of-season growing
- Daily temperature swings: High in day, low at night



## Row Covers

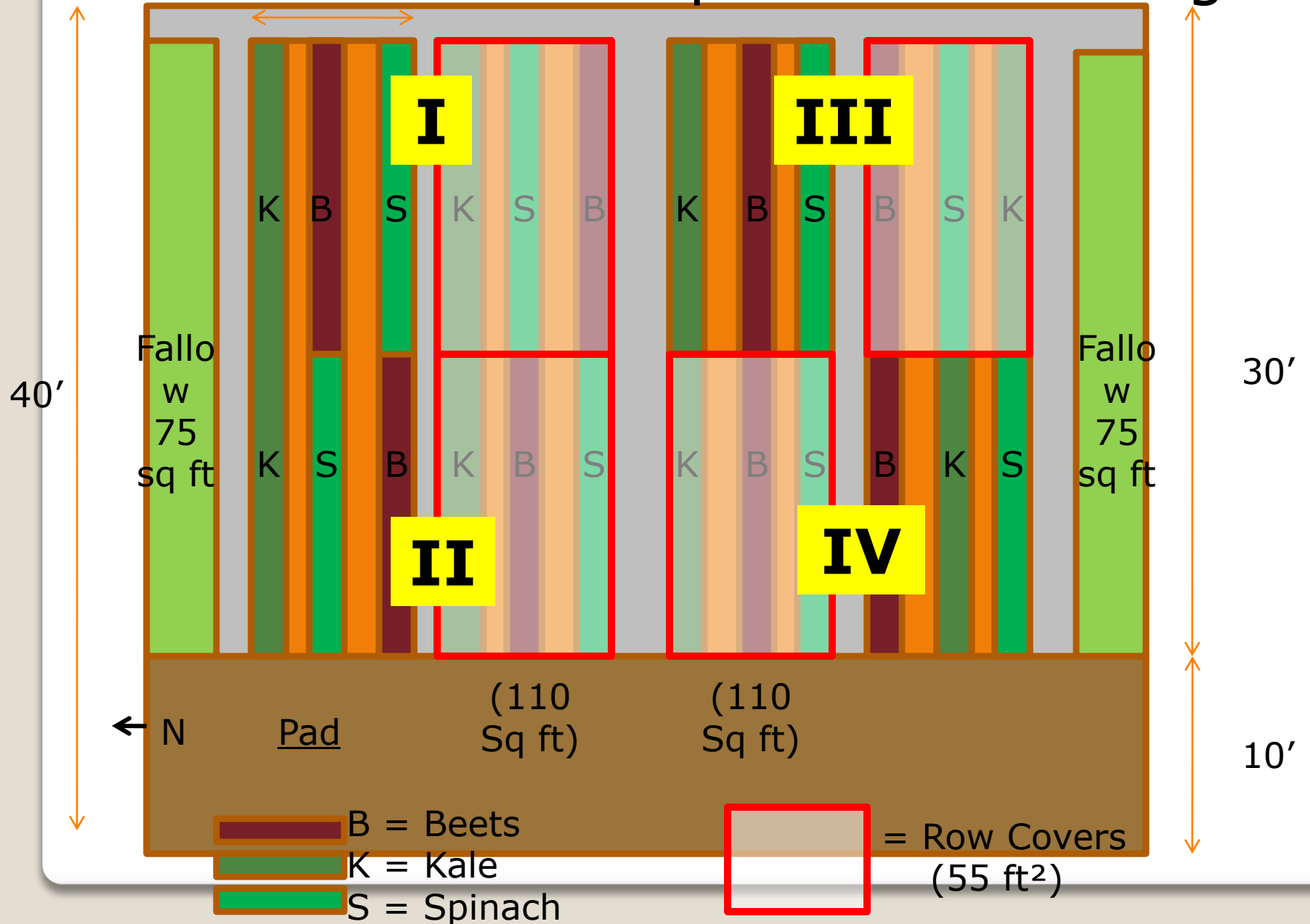
- Translucent polyester blanket ('Reemay')
- Retains heat
- Potential to enhance season extension in high tunnels

# Methods



- Randomized Complete Block Design
- Two treatments
  - Covered
  - Uncovered (Control)
- Three crops, direct seeded and transplanted
  - Kale (*Brassica napus pabularia*)
  - Beet (*Beta vulgaris*)
  - Spinach (*Spinacia oleracea*)
- Four replicates

# Randomized Complete Block Design



A person is working in a greenhouse, holding a yellow basket over a row of plants. The background shows the structure of the greenhouse and some outdoor greenery.

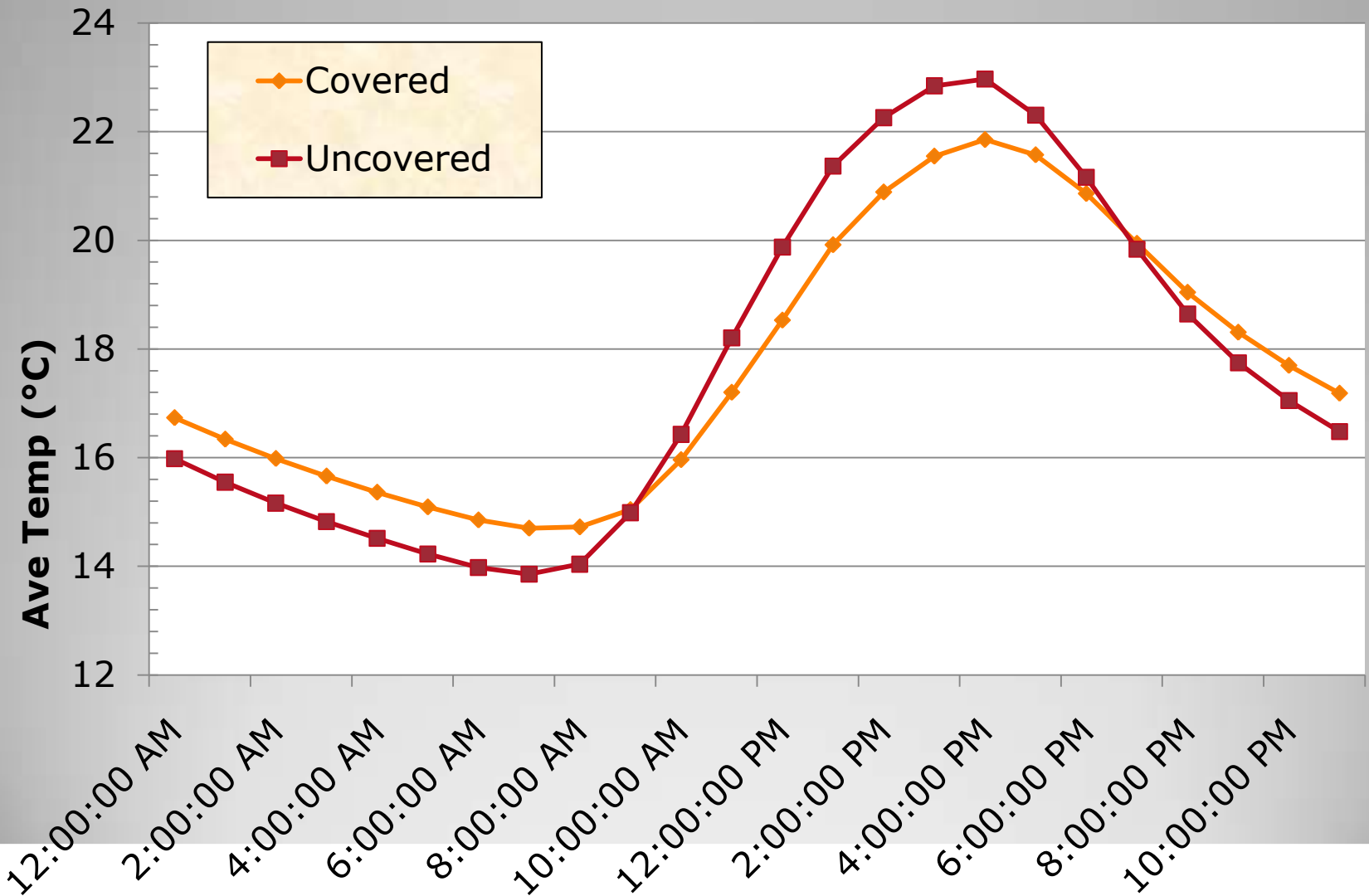
# Temperature

- Soil temperatures (top 15 cm) logged hourly
  - Average, Maximum and Minimum
- Two sampling periods:
  - March 2-May 18, 2010 (77 Days);
  - Jan 24-March 4, 2011 (71 Days)

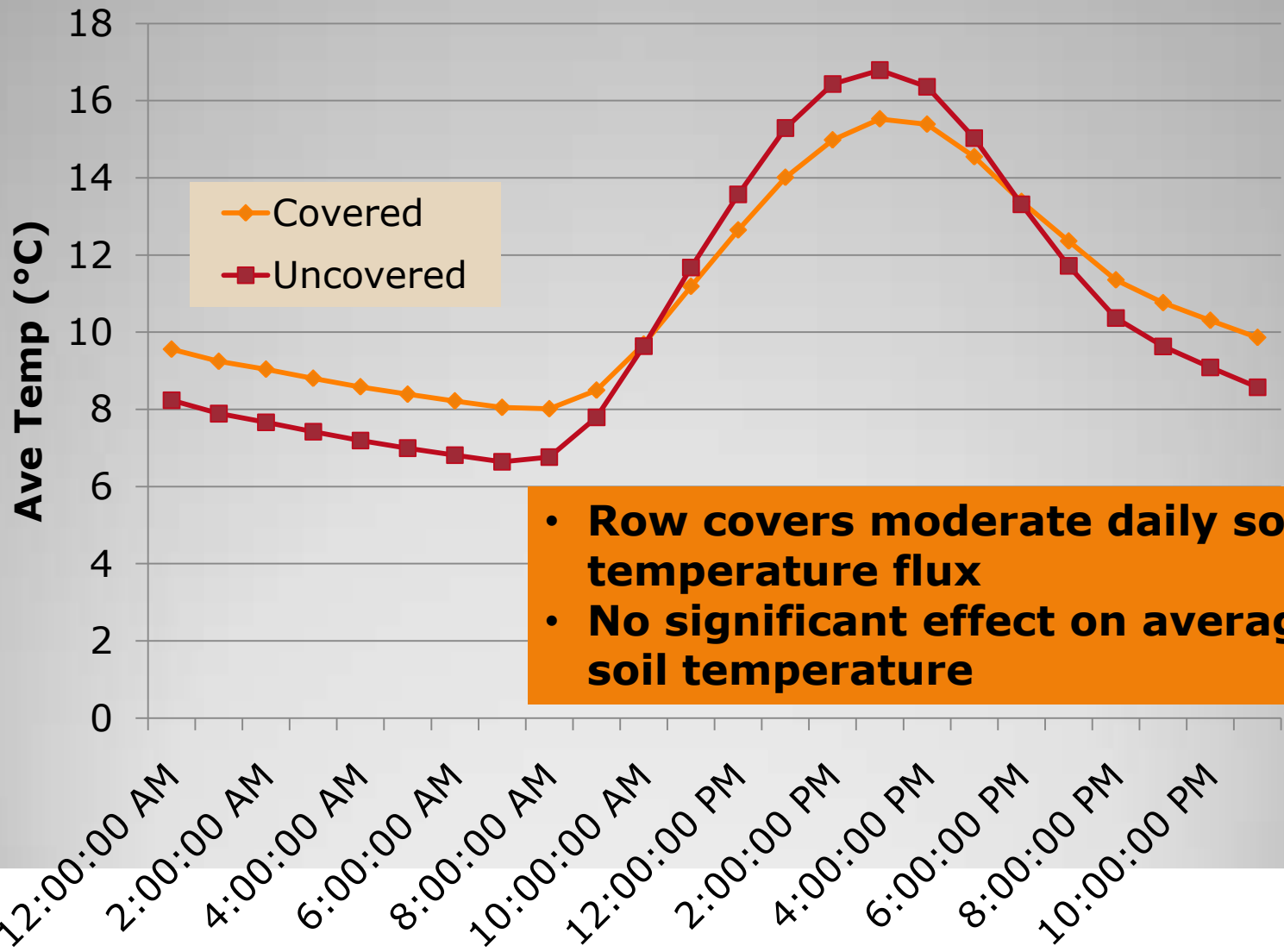
# Yield

- Aboveground fresh weight of 2 m<sup>2</sup> subsample recorded for each plot
- All crops and plantings pooled

# Daily Soil Temperature Fluctuation: 2010

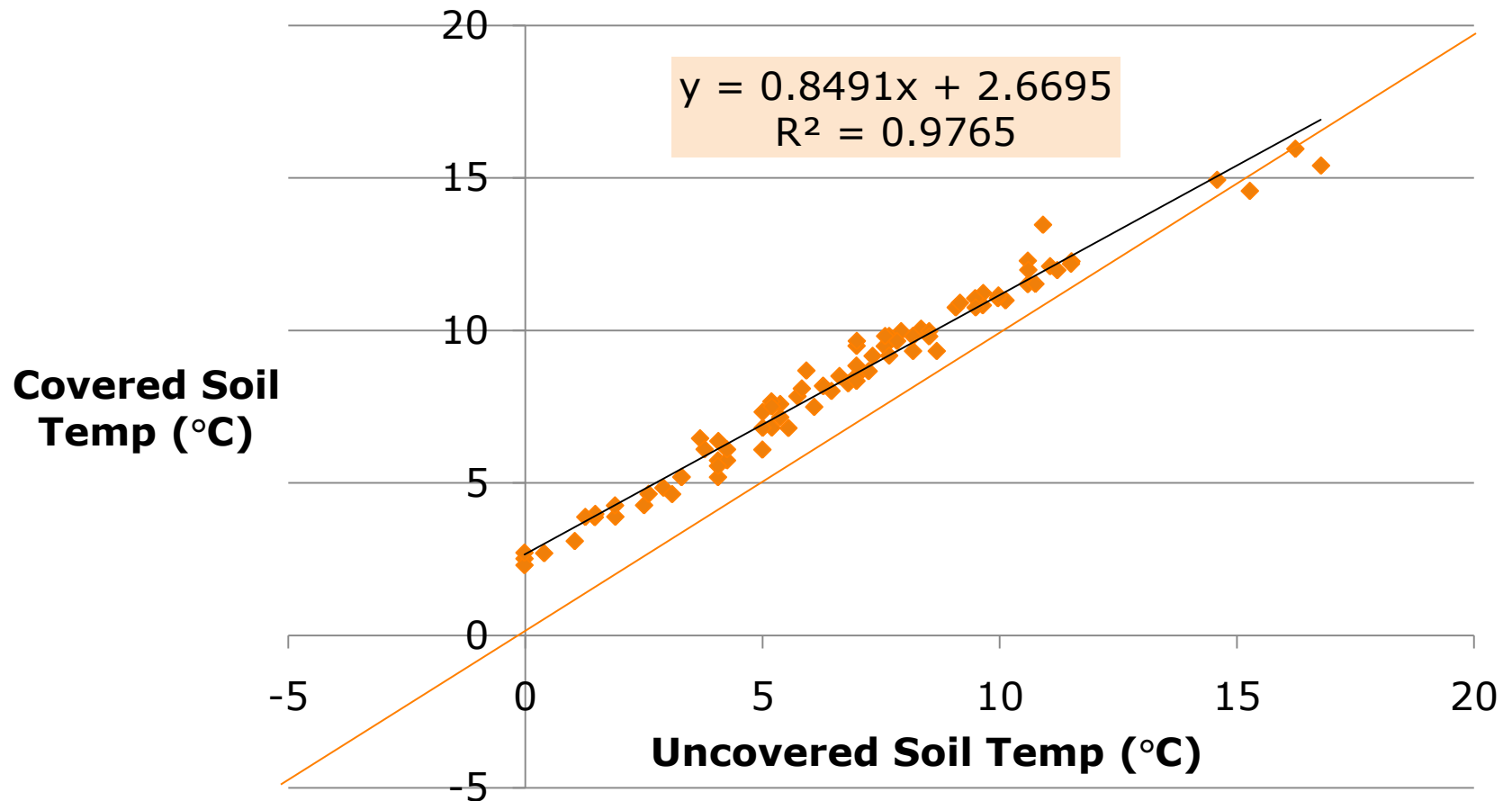


# Daily Soil Temperature Fluctuation: 2011



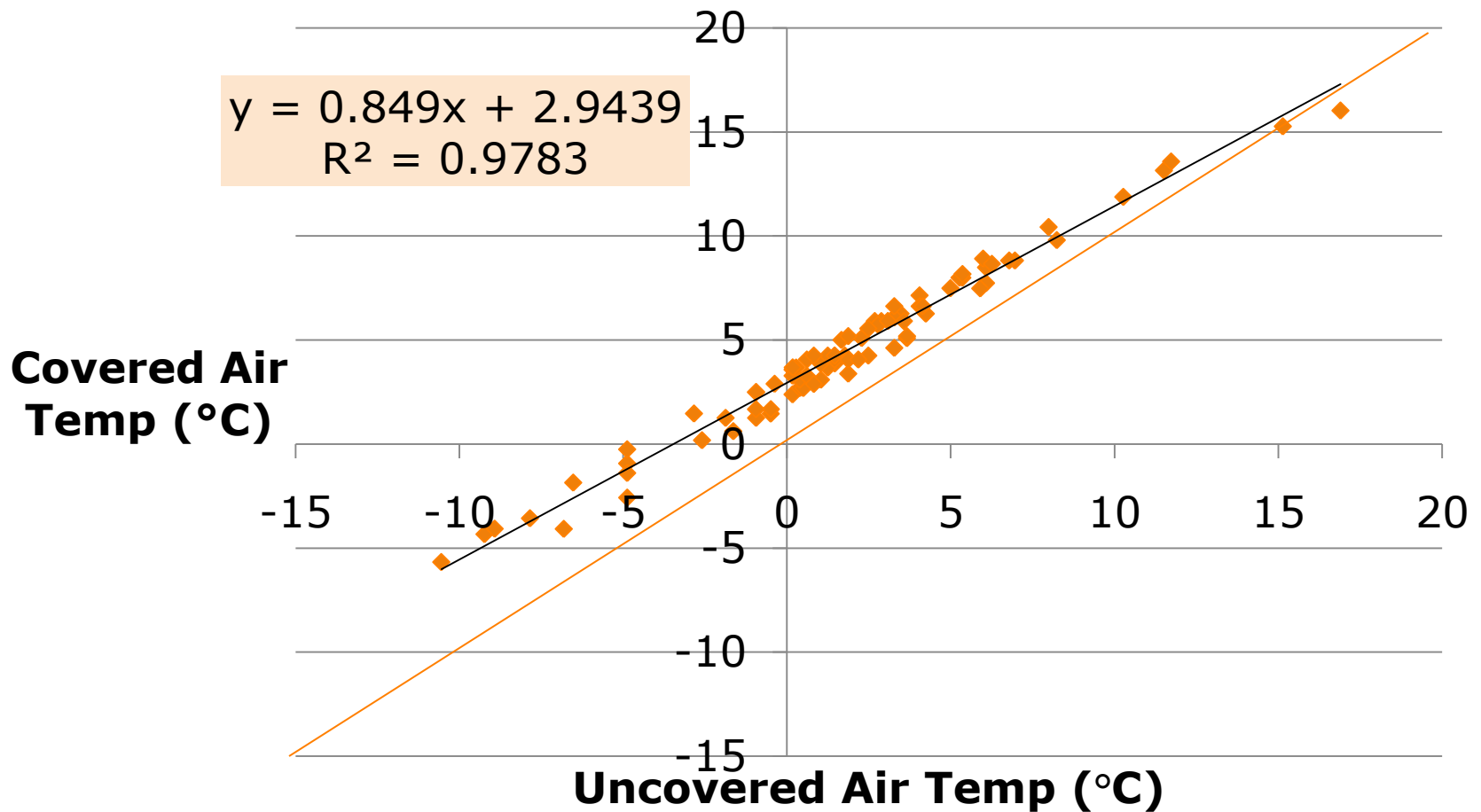
- Row covers moderate daily soil temperature flux
- No significant effect on average soil temperature

# Relationship between daily minimum soil temps with and without row covers



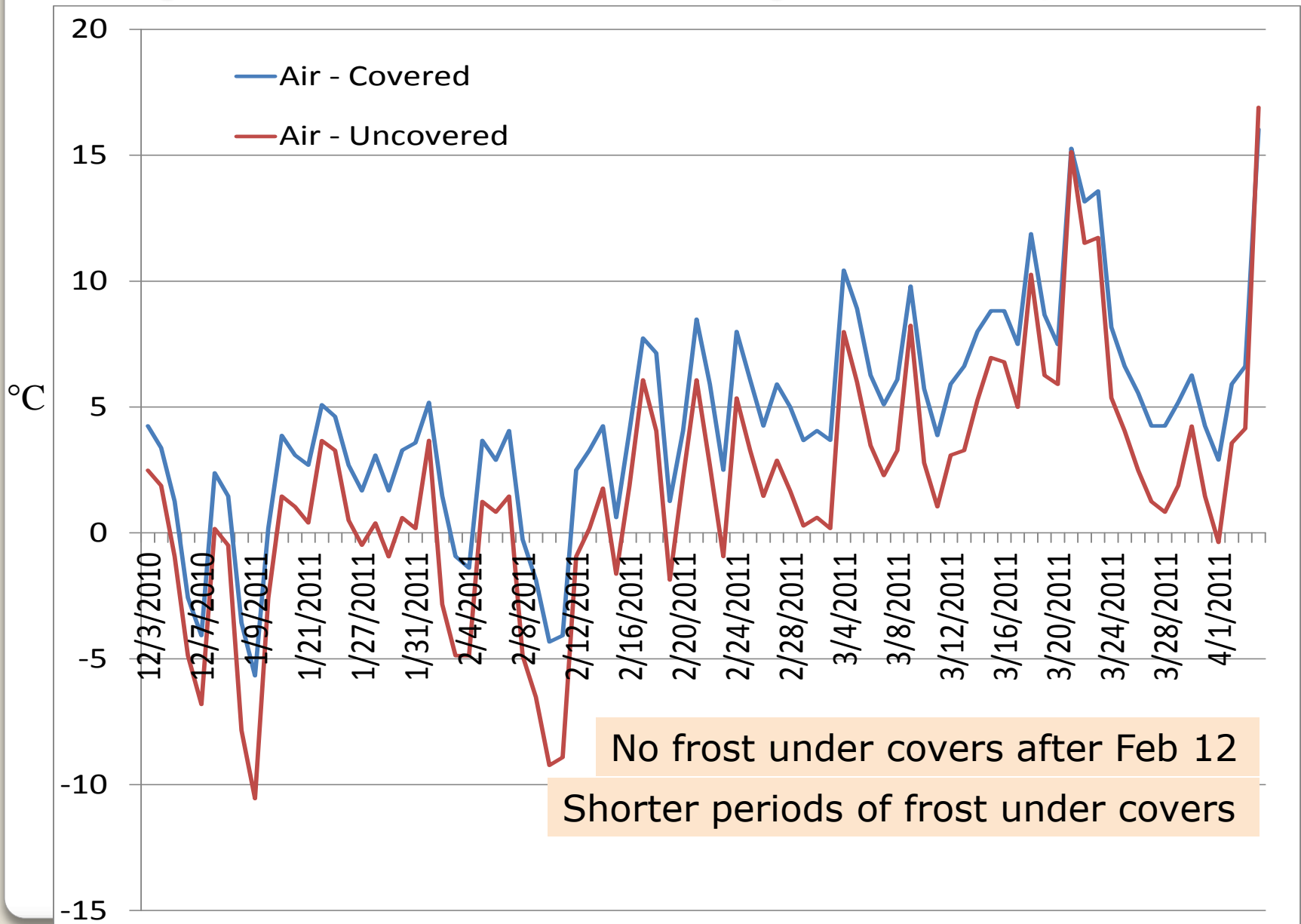
**Covers warm soil more at cool temperatures  
Covered soil does not freeze**

# Relationship between daily minimum air temps with and without row covers

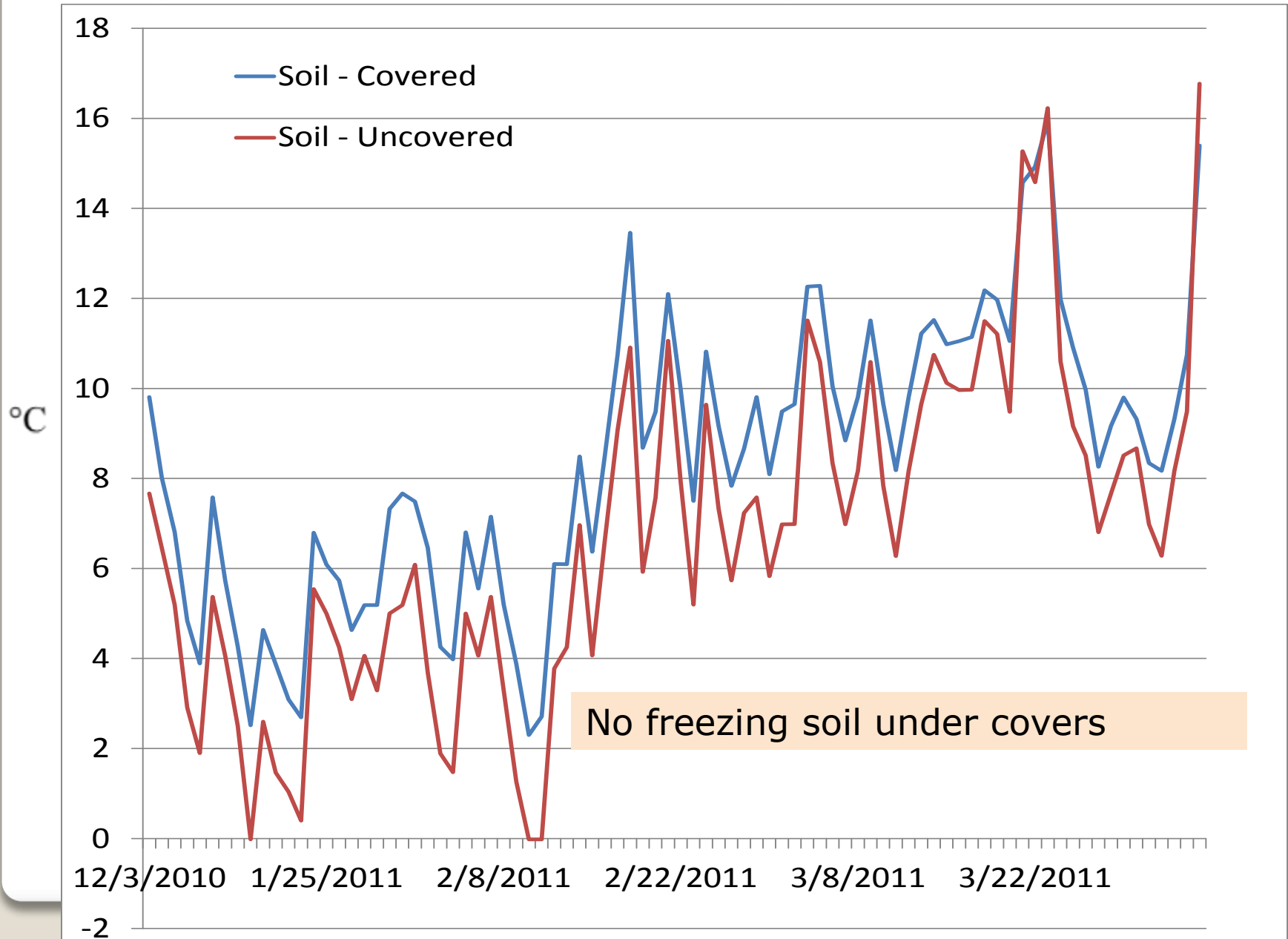


**Covers warm air more at cool temperatures**

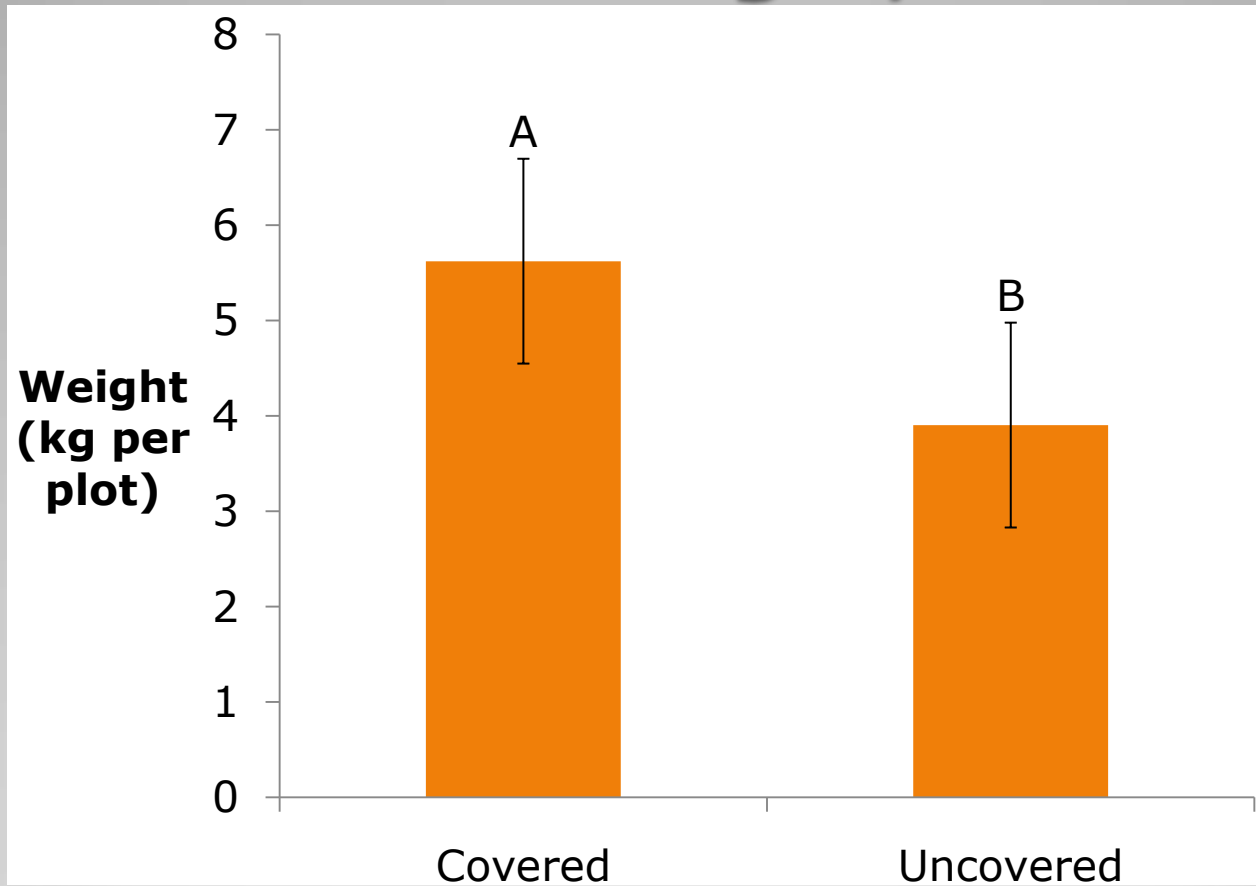
# Daily Minimum Air Temperature, 2011



# Daily Minimum Soil Temperature, 2011



# Yield: Fresh weight, 2010-11



- Row covers increase yield
- Year and replicate have no significant effect

A photograph of a person wearing a hat and work clothes, pushing a wheelbarrow or similar equipment through a high tunnel. The tunnel is covered with white plastic and supported by a metal frame. The ground is covered with brown straw mulch. The person is in the background, and the tunnel extends into the distance.

## Analysis

- Row covers moderate temperature but do not affect average soil temperature
  - Warmed soil at cool temps
  - Cooled soil at warm temps
- Rows covers extended frost free period inside high tunnel
- Row covers increased yield of spring-grown cool season vegetable crops

# Discussion

- Row covers offer both protection from frost and a harvest advantage in high tunnels
- Recommended for high tunnel growers

