



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



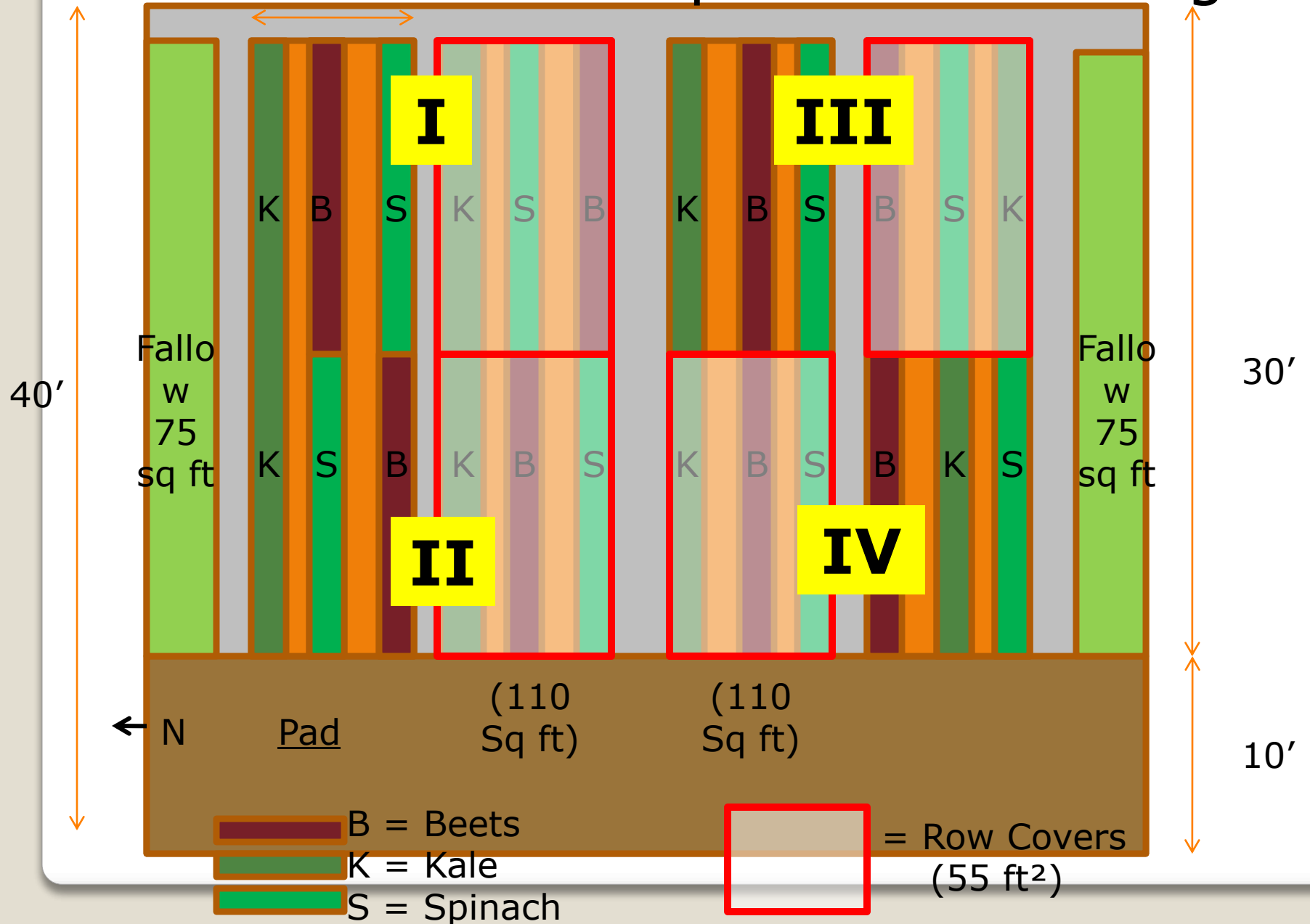
Row Covers

- 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.

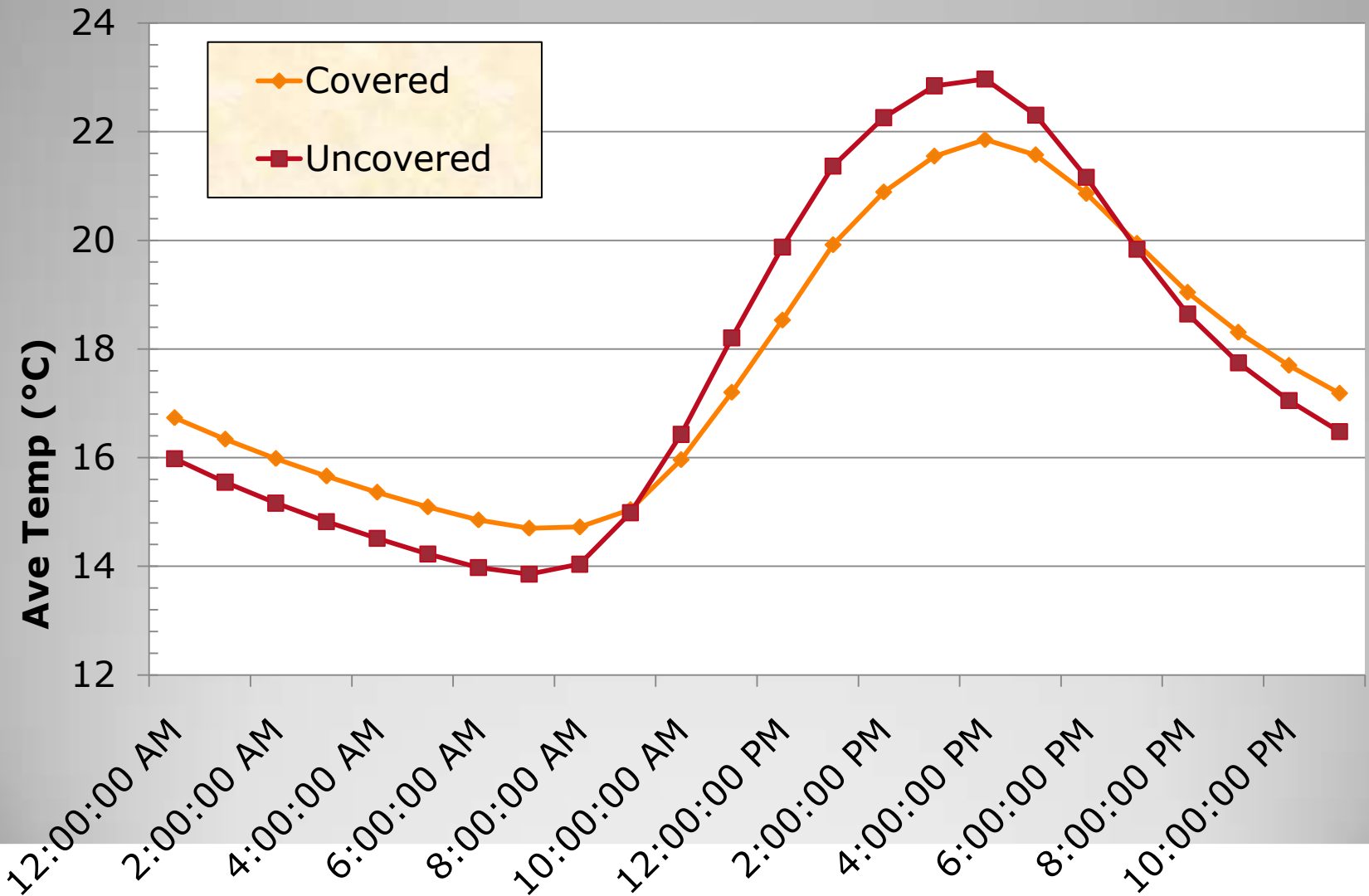
Temperature

- 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)

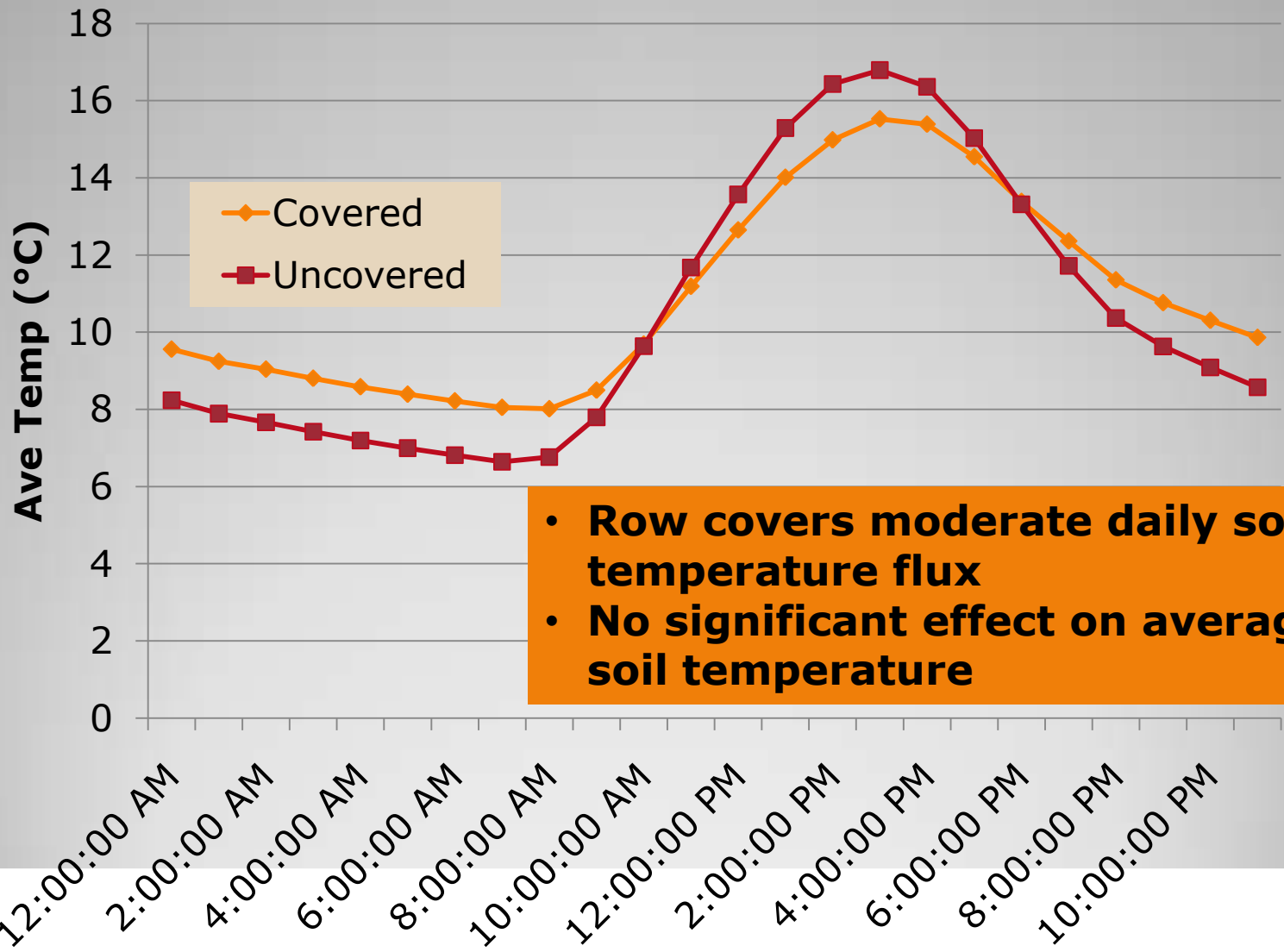
Yield

- Aboveground fresh weight of 2 m² subsample recorded for each plot
- All crops and plantings pooled

Daily Soil Temperature Fluctuation: 2010

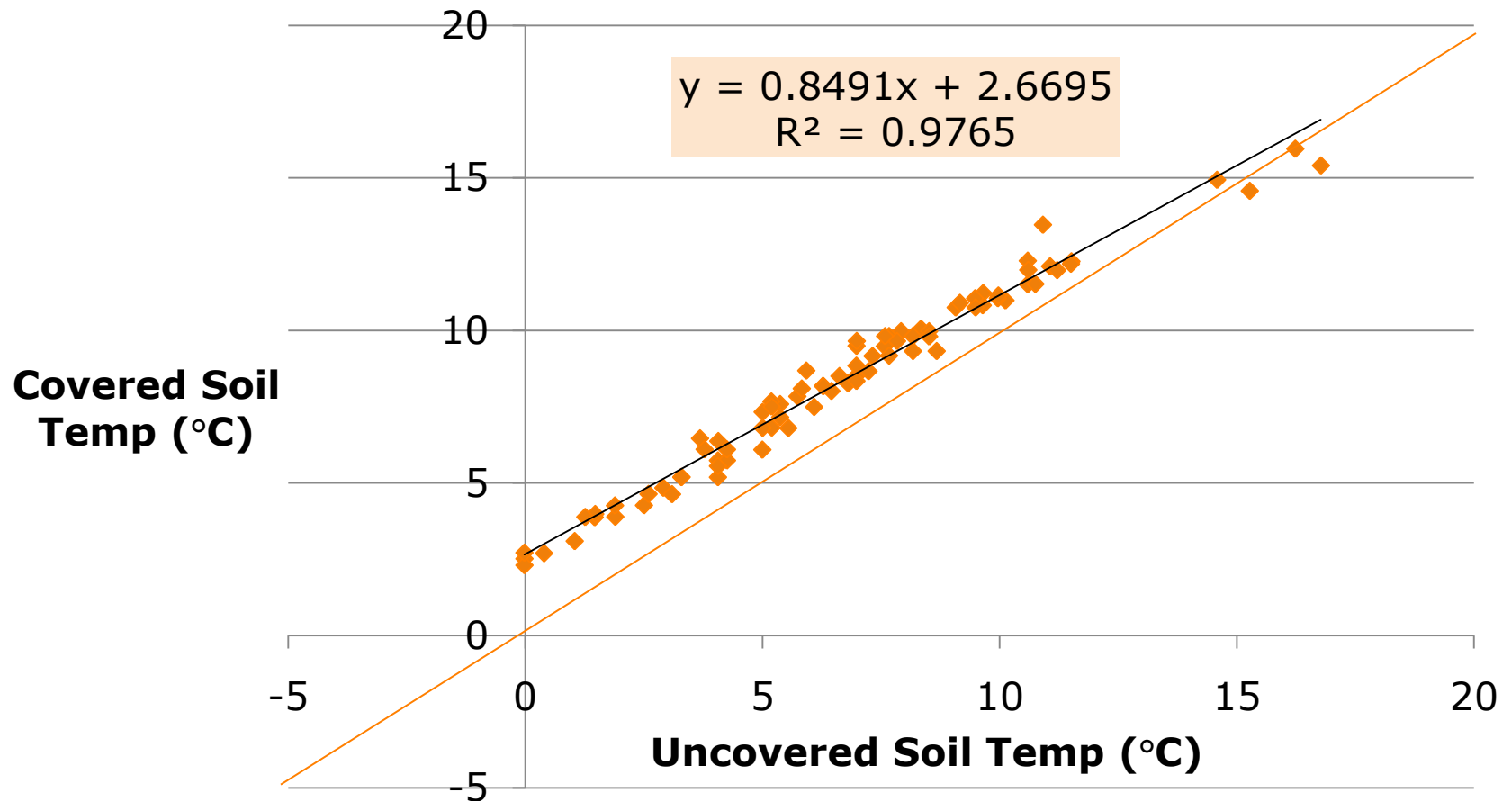


Daily Soil Temperature Fluctuation: 2011



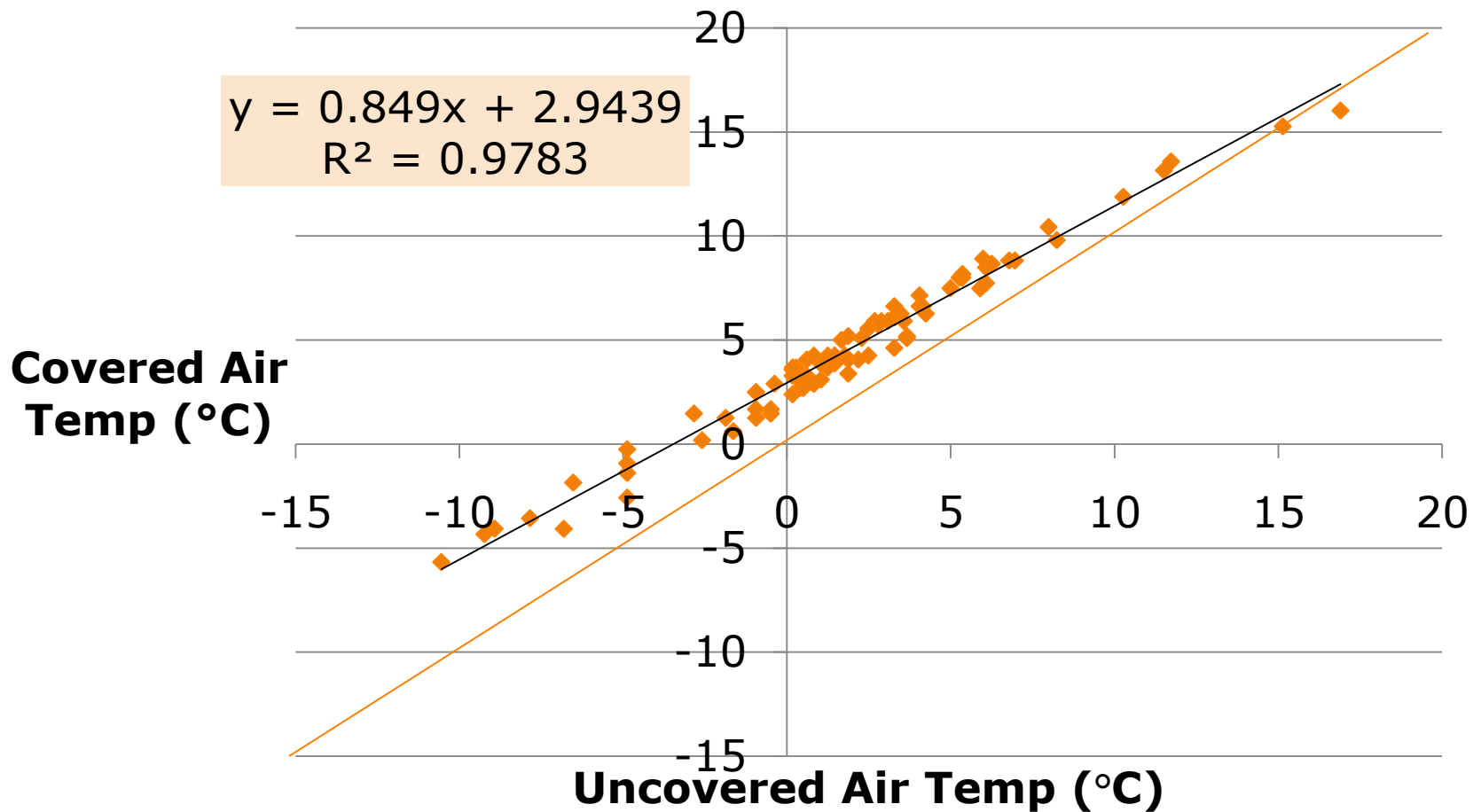
- Row covers moderate daily soil temperature flux
- No significant effect on average soil temperature

Relationship between daily minimum soil temps with and without row covers



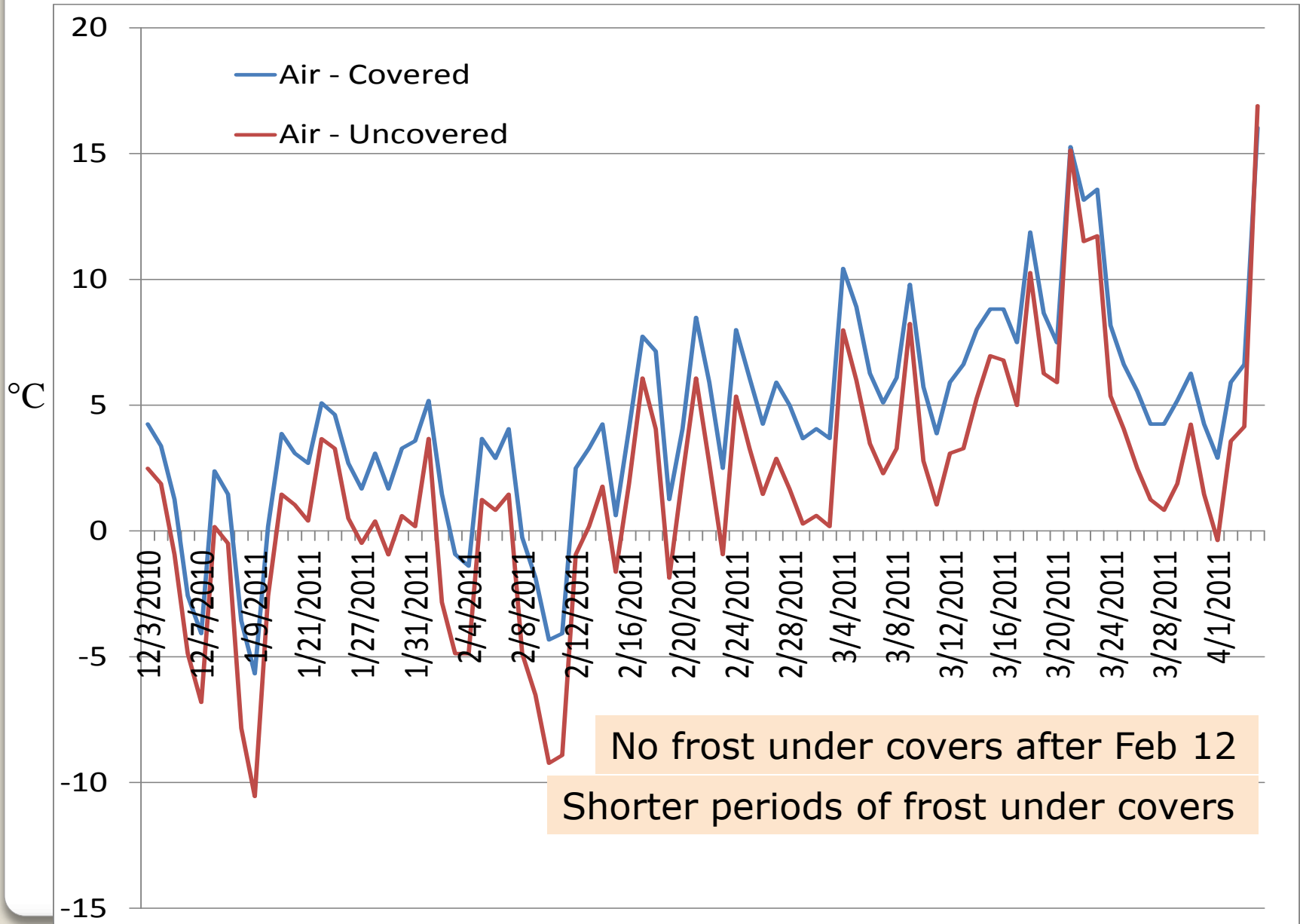
**Covers warm soil more at cool temperatures
Covered soil does not freeze**

Relationship between daily minimum air temps with and without row covers

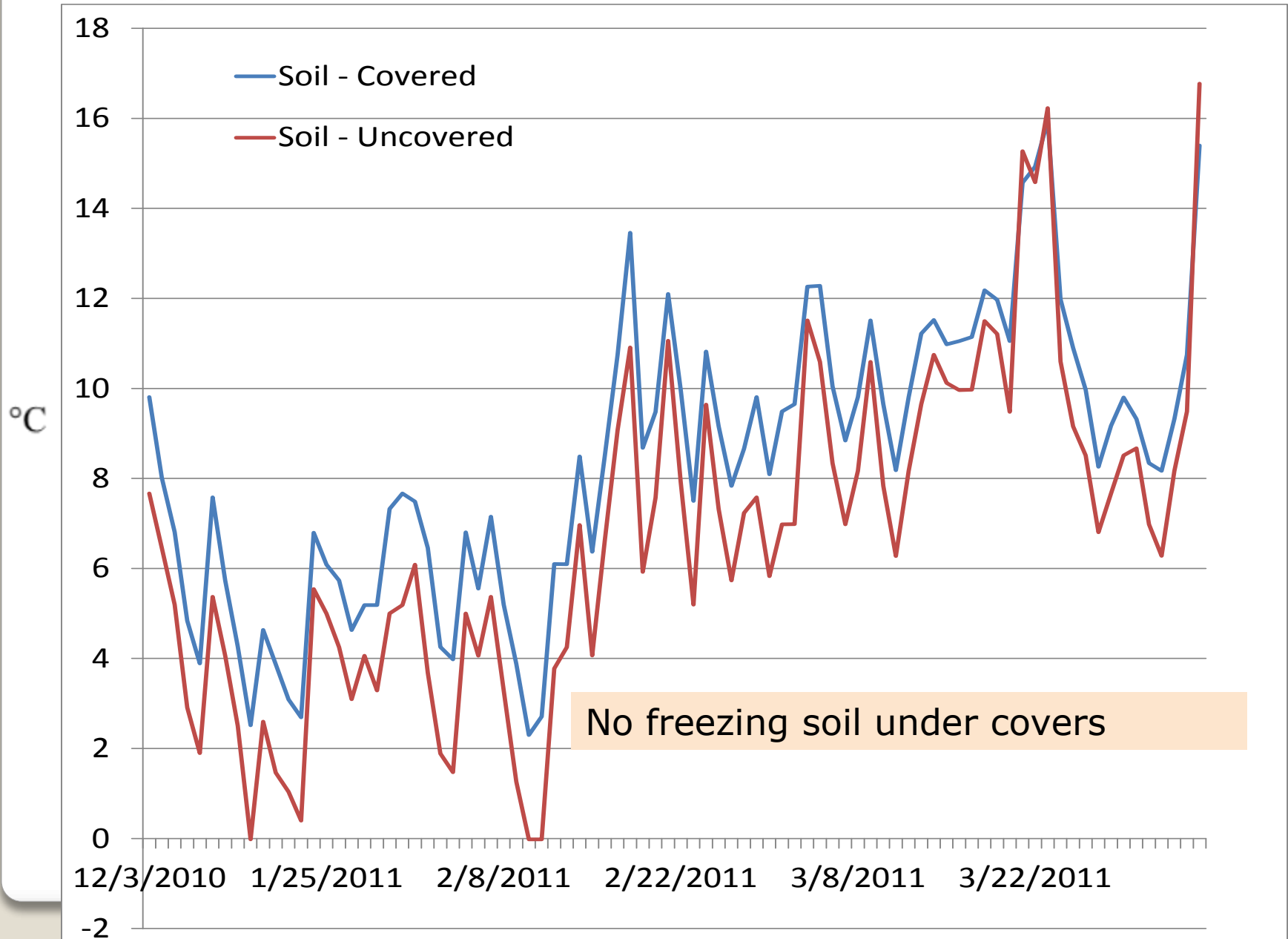


Covers warm air more at cool temperatures

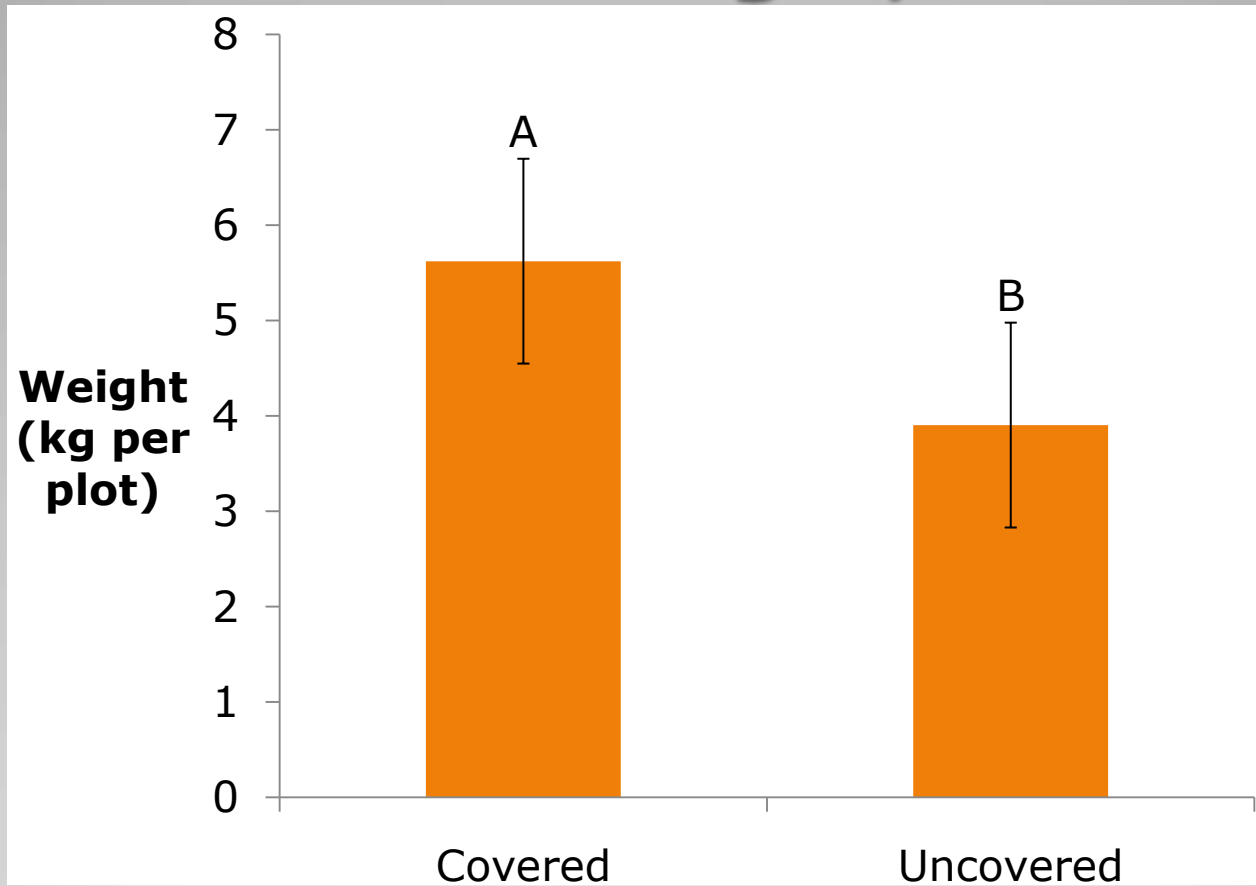
Daily Minimum Air Temperature, 2011



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 working in a high tunnel. The person is wearing a dark jacket and a hat, and is using a tool to work on the soil. The high tunnel is covered with white plastic, and the ground is covered with brown straw mulch. The structure is supported by metal poles. The background shows a bright, overcast sky.

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

