

Evaluation of Diallyl Disulfide and Biological Disinfestation for Controlling White Rot in Garlic

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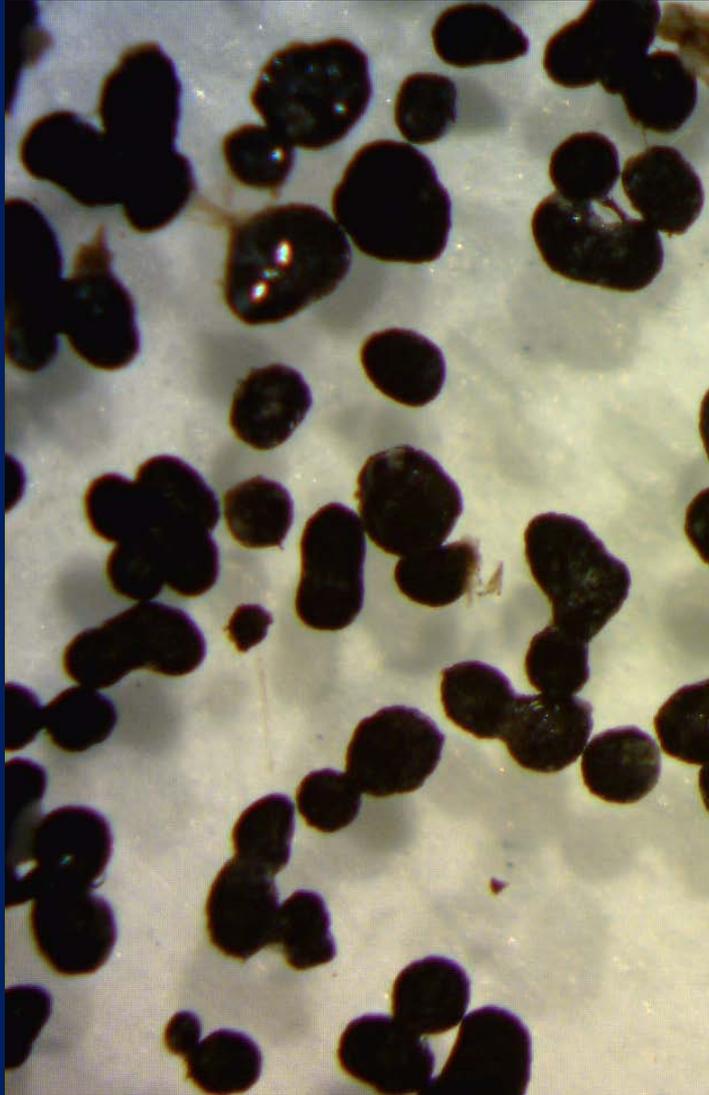
Introduction-Symptoms



Diseased Plants



Introduction-Sclerotia



Sclerotium cepivorum

Introduction-Epidemiology

- Sclerotia germinate and infect roots of garlic or onion plants
- Limited plant-to-plant spread within a season
- Considerable yield loss with just a few sclerotia in a liter soil
- Sclerotia become dormant in absence of *Allium* hosts
- The pathogen survives in soil for many years

Introduction -Control of White Rot

Garlic powder

Diallyl Disulfide (DADS)

Seed treatment

In-furrow fungicide application

Fumigants

Soil Solarization

Flooding

Cover crop, compost, and BCA

Introduction - Objectives

Evaluate treatments (incorporation of oat residue, solarization, DADS and their combinations) for:

- 1) reducing viable sclerotia in the soil
- 2) reducing white rot in the subsequent garlic crop

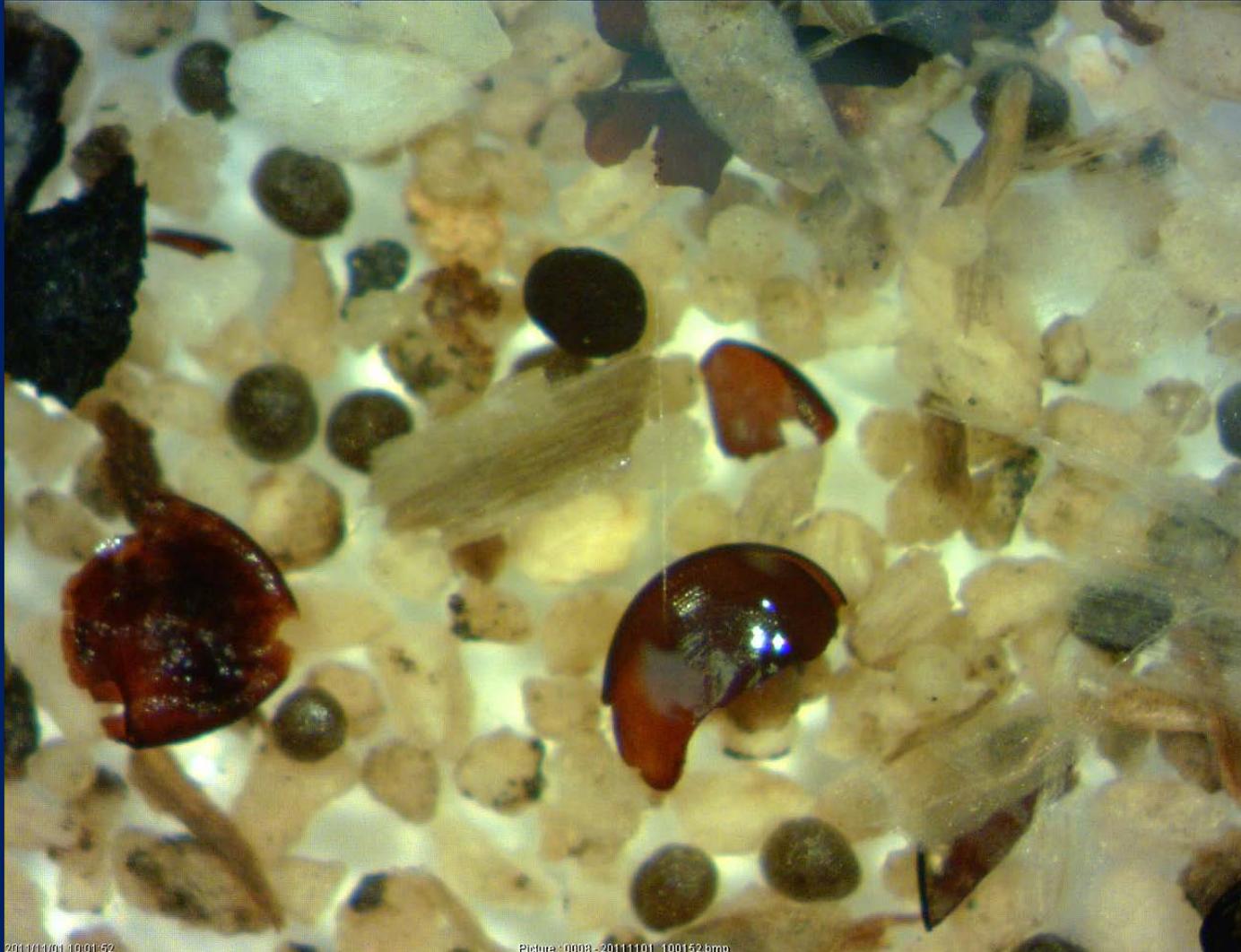
Field Trial at COARC

- Treatments in 2010
 1. Untreated control;
 2. DADS at 0.535 gal/A in May, 2010;
 3. Solarization: tilled, irrigated and covered with a 2-mil clear polyethylene film since July 30;
 4. Incorporation of fresh cut oat (5978 lbs dry weight per acre on July 30);
 5. Biological soil disinfestation: fresh cut oat incorporated on July 30, and then irrigated and covered with a film;
 6. DADS followed by BSD: DADS applied in May, fresh cut oat incorporated on July 30, then plots irrigated and covered with a film

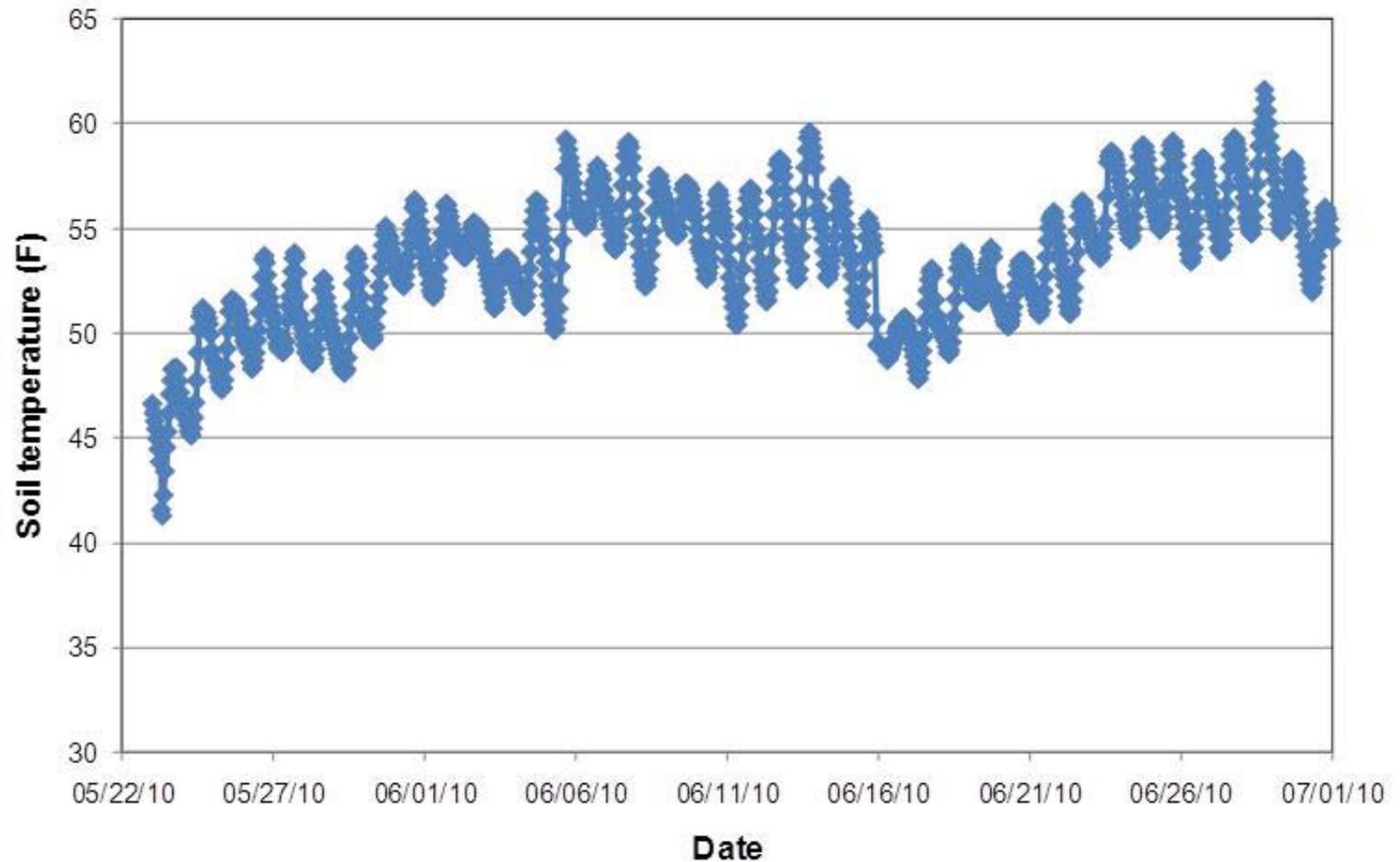
Data Collection

- Soil temperature at 5 cm depth;
- Soil samples assayed for sclerotia of *S. cepivorum*
- Sclerotia tested on water agar for viability
- White rot disease progress in the following garlic crop

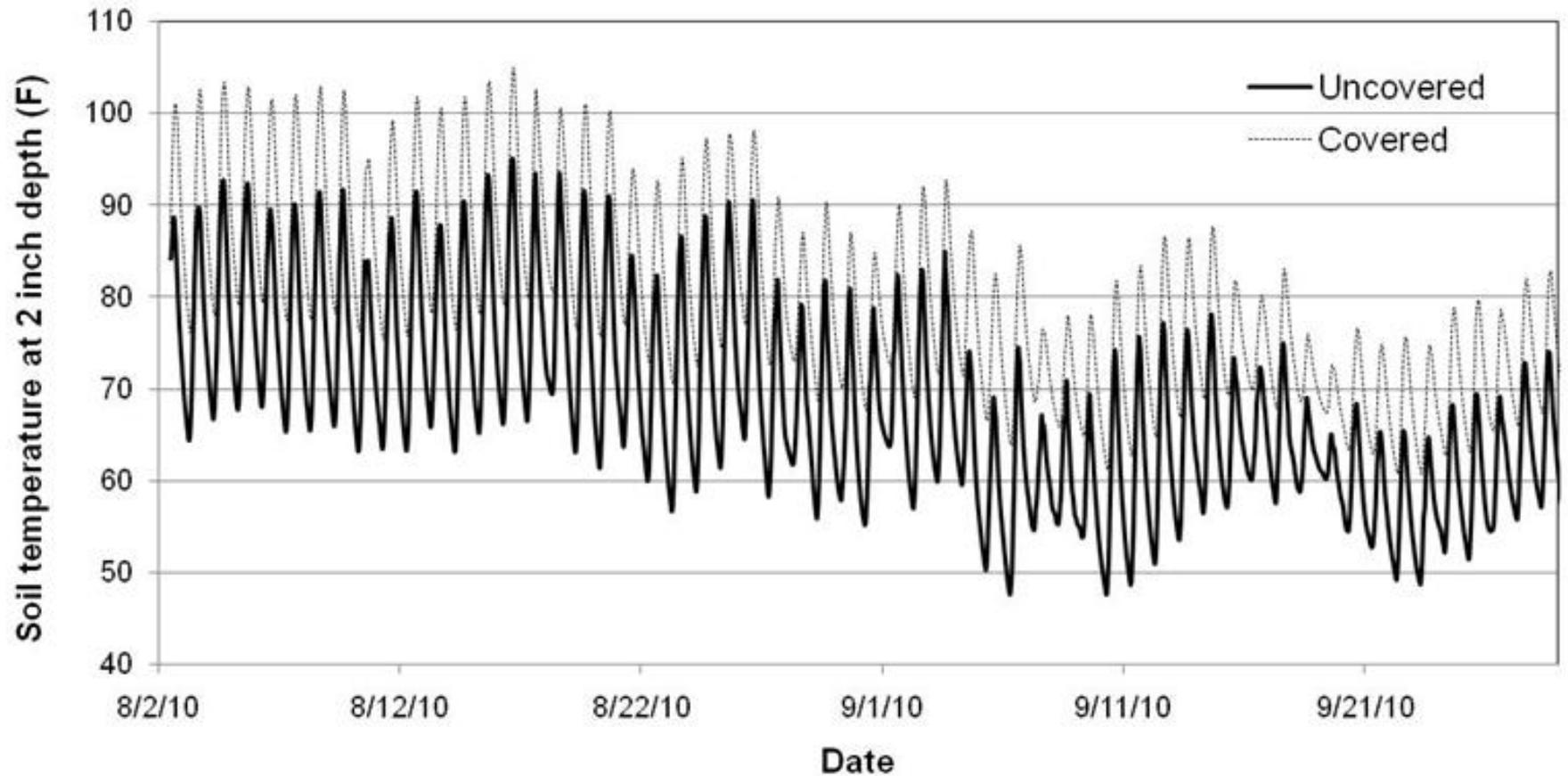
Soil Assay for Sclerotia of *S. cepivorum*



Results- Soil Temperature



Results- Soil Temperature



Results- Viable Sclerotia in the Soil

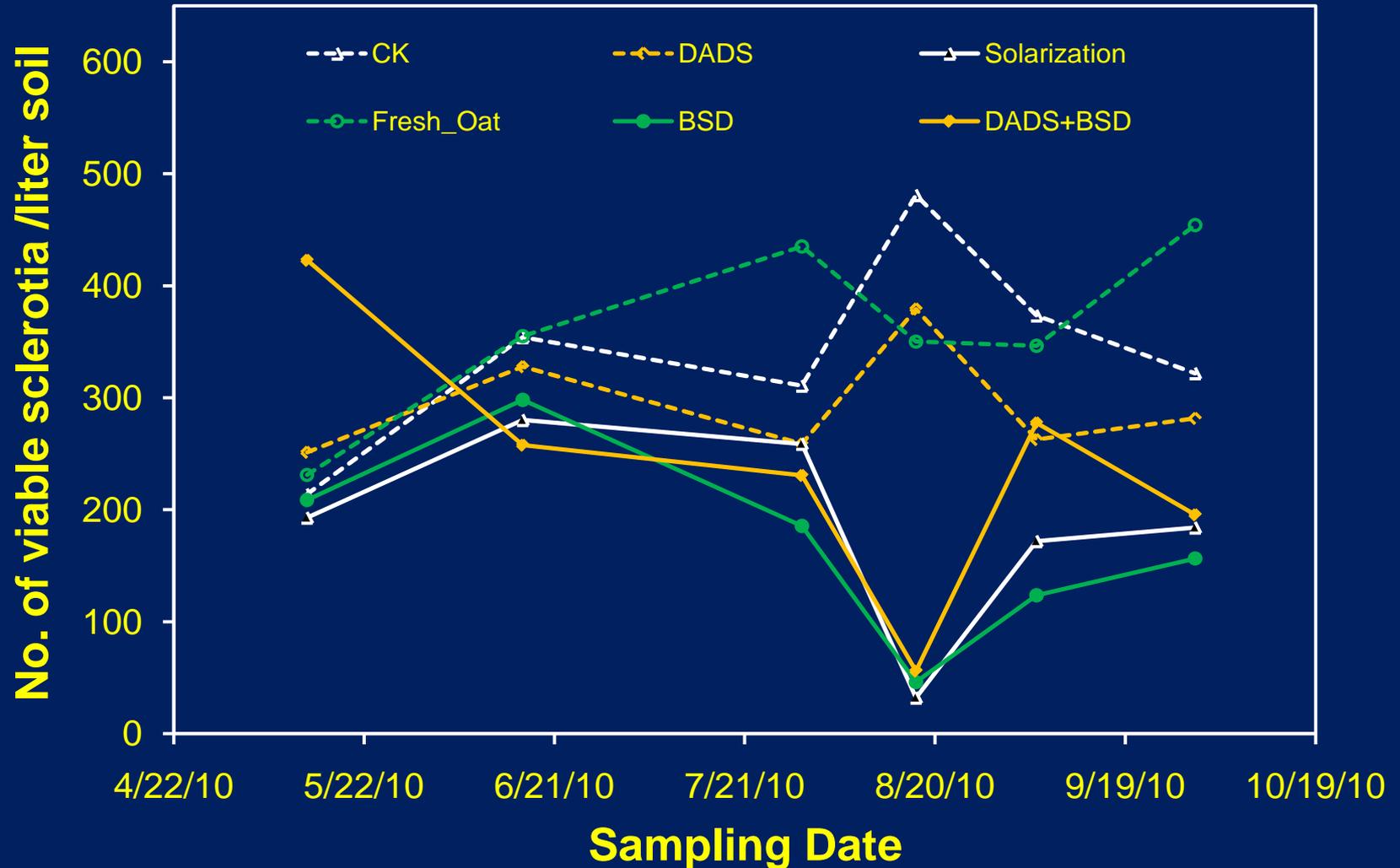
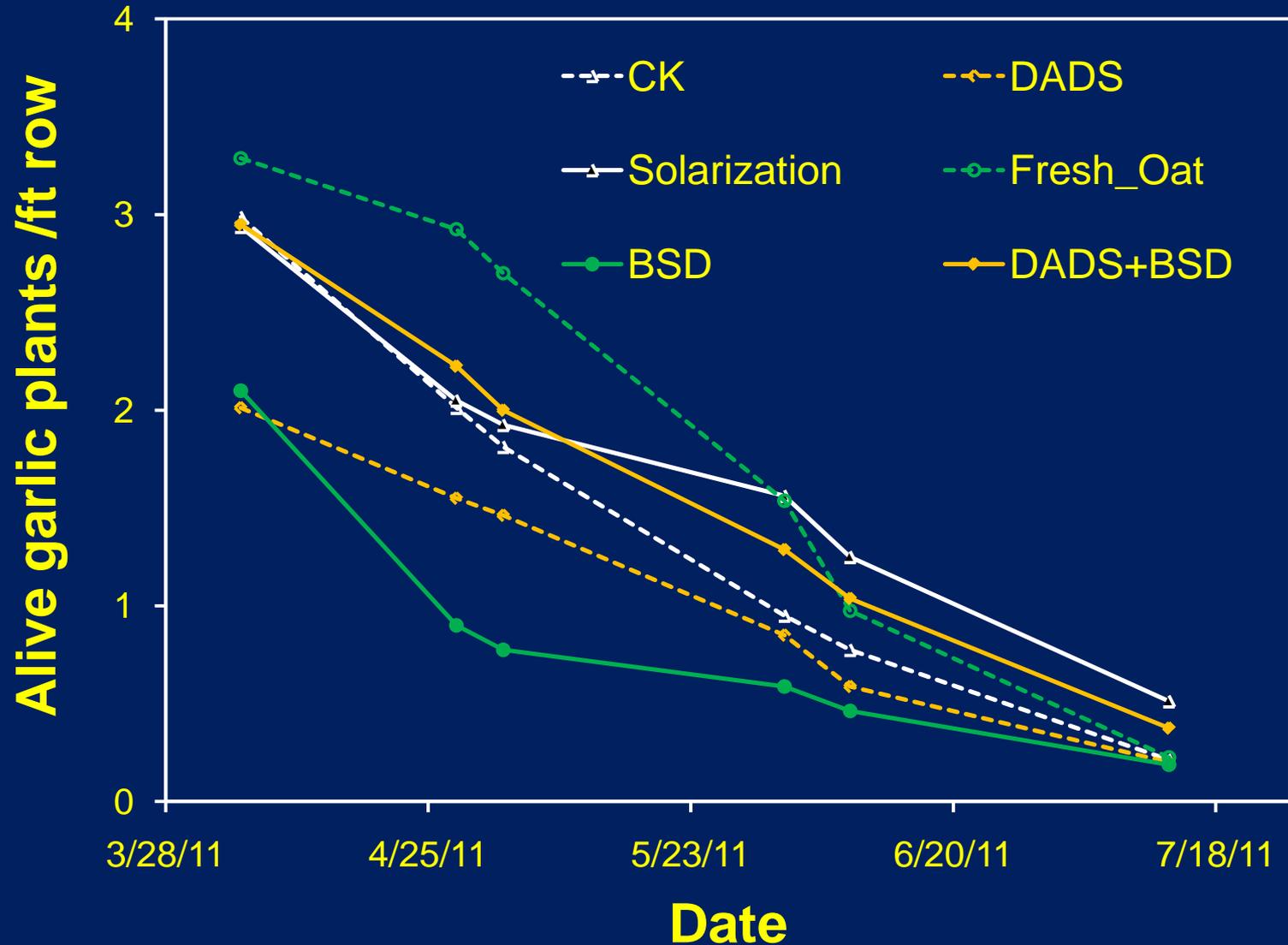


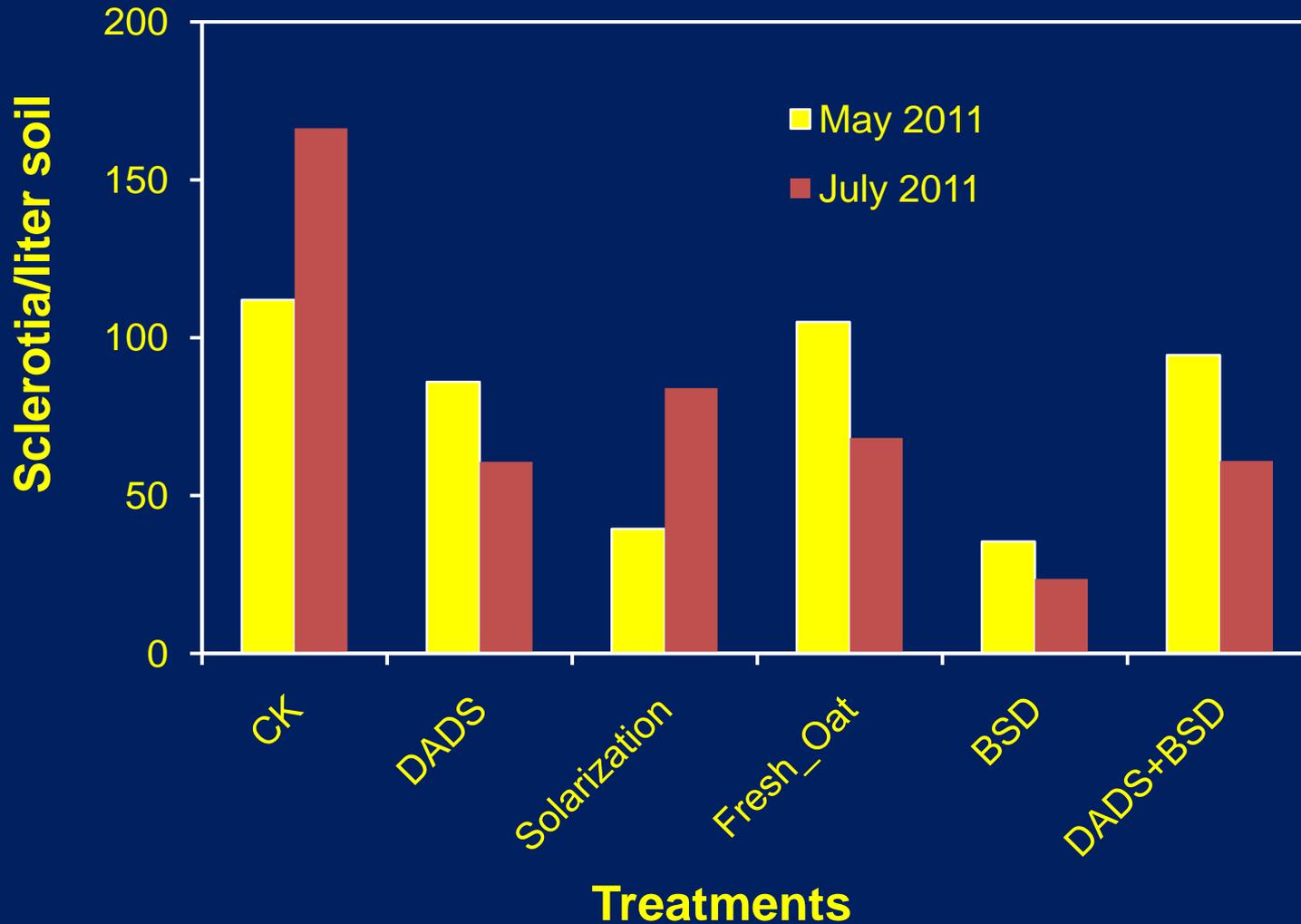
TABLE 1. Analysis of variance on viable sclerotia of *S. cepivorum* in plots subjected different treatments

Date	DF	Type III SS	Mean Square	F Value	Pr. > F
5/13/2010	5	9104.6	1820.9	0.71	0.6262
6/16/2010	5	2005.5	401.1	0.25	0.9347
7/30/2010	5	9318.4	1863.7	0.82	0.5561
8/17/2010	5	50676.3	10135.3	4.44	0.0111
9/5/2010	5	11757.0	2351.4	1.11	0.3963
9/30/2010	5	15619.2	3123.8	1.28	0.3252

Results- White Rot in Garlic



Results- Sclerotia in the Soil



Summary

- Soil temperature was higher in plots covered than in plots without coverage, but the high temperature last only about 3 weeks;
- No significant difference among treatments in number of viable sclerotia on all dates other than 8/17/2010;
- The sclerotium density was high at planting of garlic. Subsequently, almost all garlic plants were infected at harvest.

Discussion

- Why didn't DADS treatment reduce inoculum density as expected?
 - Incorporation of DADS
 - Soil temperature and moisture
 - Initial status of sclerotia
- Solarization on viability and dormancy of pathogen sclerotia?
 - Temperature
 - Duration
- Combination of cover crop and DADS treatments?

Thank you

Questions?