

Investigating San Jose scale in northwest Michigan sweet cherries



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San Jose scale in sweet cherries

- In 2007, damaging levels of San Jose scale (SJS) populations were found in NW MI sweet cherries.
- SJS infestation was masked by symptoms of phytotoxicity that were likely a result of ethephon applications in hot, dry summer conditions.
- Symptoms of SJS and ethephon damaged trees includes gummosis, yellowing of leaves, and premature dropping of leaves.





Extreme case of ethephon and San Jose scale damage, 2007

SJS life cycle

- Overwinter on tree as partially grown scales
- When sap runs in spring, SJS feeds and grows to reach maturity
- Winged males come out from under scale to mate with females
- Females produce a pheromone to attract males



SJS male



SJS Female, cover removed

Photo credits: E. Beers (top), H. Riedl (bottom),
Washington State University

SJS life cycle

- Females produce 150-500 offspring, “crawlers”
- Crawlers (mobile nymphs) attach to tree and suck sap with needle mouth parts
- After ~3 weeks, crawlers molt, lose old skins, legs, antennae
- Form immobile flattened sacs with waxy caps (scales) that remain attached to tree with mouthparts
- Two generations per year in MI

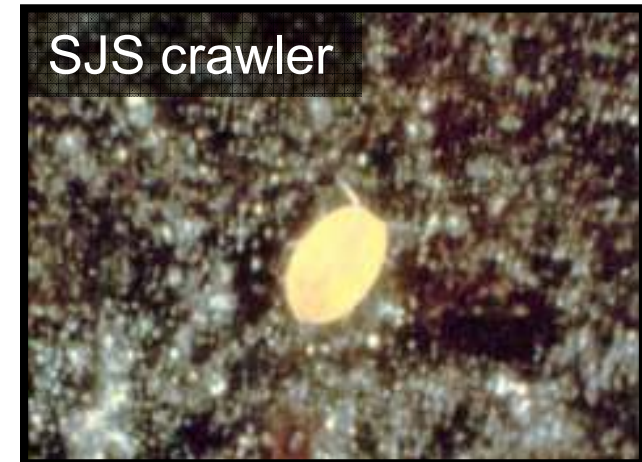


Photo credits: West Virginia University

San Jose scale on tree fruits



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San Jose scale on tree fruits



San Jose scale in sweet cherries

- Since 2007, SJS has been an ongoing issue in sweet cherry.
- Light varieties seem to be more infested or more impacted by SJS. Little known on variety preference or the extent of infestation in NW MI.

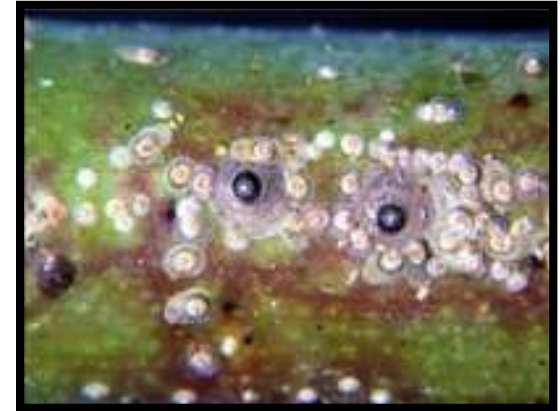
Objectives:

- 1) Determine the extent of SJS infestation in NW MI sweet cherries.
- 2) Investigate SJS on sweet cherry varieties.



Methods

- Grower cooperator sites:
 - Leelanau (1), Old Mission Peninsula (3), Grand Traverse (1), Antrim (1)
- Dormant monitoring: collected spurs, documented tree varieties, and counted scale on spurs
- In-season monitoring:
 - Males (2 flights) – pheromone delta traps; 5 per site; deployed ~200 GDD base 50°F, end of May
 - Crawlers – tape wrapped around branches, sticky-side up; 25 per site



Results – Number of spurs with overwintering scale on dark and light varieties

		# of spurs with scale	Total number of spurs	Percentage of spurs with scale	
Dark sweet cherry varieties	Cavalier	1	24	4.17	a*
	Hedelfigen	1	132	0.76	
	Regina	3	6	50.00	
	Sams	0	36	0.00	
	Ulster	58	306	18.95	
	Vans	22	24	91.67	
	Total	85	528	16.10	
Light sweet cherry varieties	Emperor Francis	11	59	18.64	b
	Gold	91	312	29.17	
	Napoleon	26	96	27.08	
	Rainier	50	84	59.52	
	Total	178	551	32.30	

*significantly different (ANOVA, p=0.05)



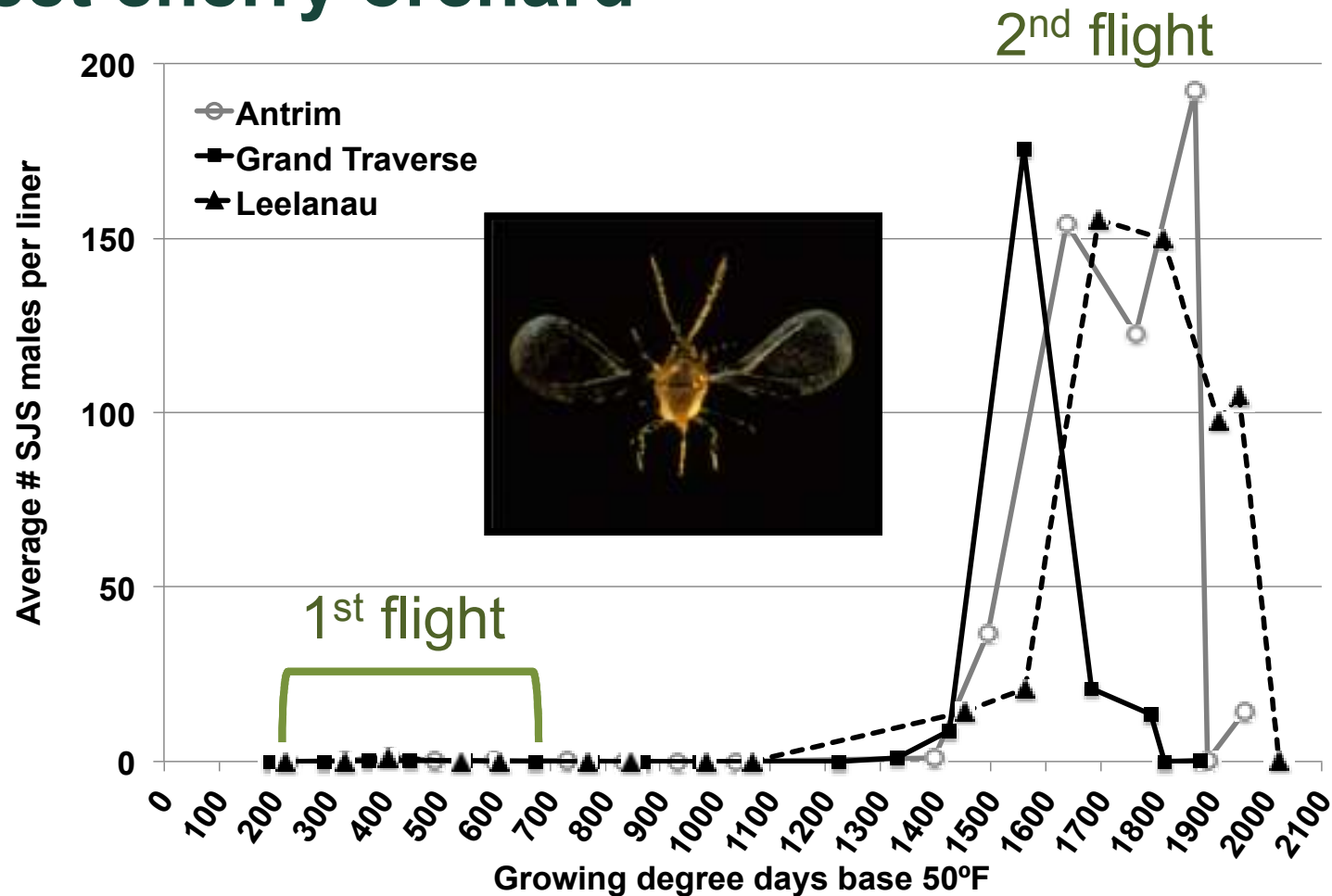
Results – Percentage of spurs with overwintering scale at each site, n=180/site

	Site A	Site B	Site C	Site D	Site E	Site F
Dark Sweet Cherry	0.0	76.7	1.1	11.5	1.4	25.5
Light Sweet Cherry	36.6	33.3	22.2	59.5	4.6	47.4

- At Site B, darks were primarily var:Ulster and the trees were stressed / in poor health.
- **Conclusion: Overall, light sweet cherry varieties have higher incidences of overwintering SJS. Tree age and health seem to be factors in SJS infestation.**



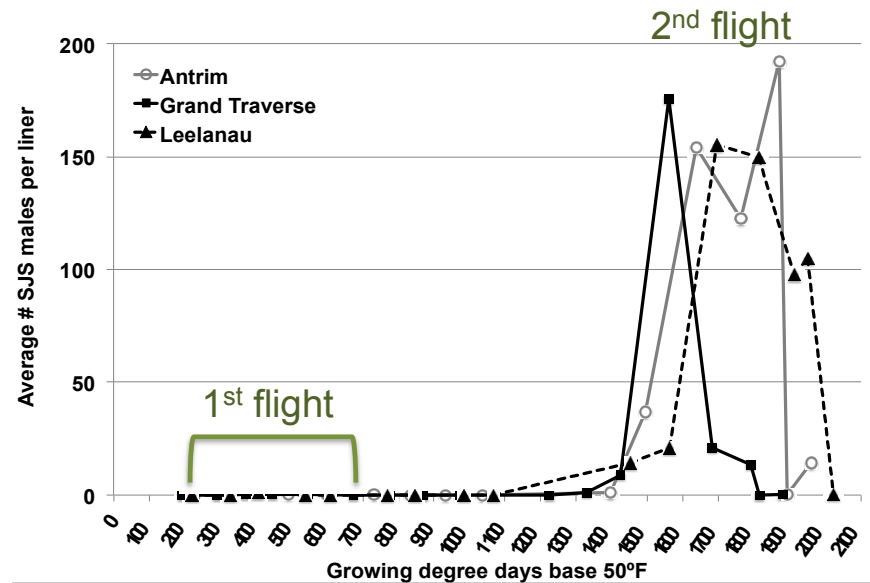
Results – SJS male populations in NW MI sweet cherry orchard



Results and Conclusions

We observed two male flights:

- 1st 225 – 673 GDD base 50°F; less than ~1.5 males per trap per sampling period
 - Previous data from apples, 1st flight occurs 205 – 498 GDD base 50°F
 - In NW MI sweet cherries 1st flight could last an additional 150-200 GDD base 50°F
- 2nd 1328 – 2023 GDD base 50°F; peak emergence 1425 – 2023 GDD base 50 °F
 - Previous data from apples, 2nd flight peaks 1390 GDD base 50°F



Summary of results

- Higher incidence of SJS on light compared with dark varieties.
 - Tree age and health seem to be factors linked with SJS infestations
 - Ethephon sensitivity likely contributes to stress, thereby predisposing trees to SJS infestations.
- Monitoring data indicate that SJS development is different in cherry compared with apple.
 - We did not detect crawlers using the standard sticky tape method. Monitoring methods need to be improved.



Next steps and questions for future work

- Since 2007, we have not observed SJS damage to cherry fruit. However, SJS could be contributing to tree decline by feeding on sap which would impede tree growth and kill limbs.
 - What is the relationship between 'dead wood' and SJS densities? (Began collecting this data in 2014)
 - What is the effect of SJS densities on tree vigor and yield?
 - Are there differences in SJS development in apples versus cherry in NW MI? If so, why?
 - How do current spray programs impact SJS?
 - What is the threshold for treatment and optimal management program to prevent damage?



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NWMHRC 2014 Field Crew
(From left: Blake Showers, Kelly Kobberstad,
Karen Powers, Heather Leach)



San Jose scale life cycle

