Pruning strategies to help reduce spotted wing drosophila (SWD) populations in Michigan cherry orchards

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- Establish pruning strategies in tart cherry to make orchards less suitable for SWD
  - Tart cherries grown on standard rootstocks
    - Large trees have dense canopies
  - Do SWD flies move out of canopy during heat or do they stay?
    - Hypothesis: SWD stay in canopy and egg-laying/infestation increases due to resource allotment

Pruning Treatments

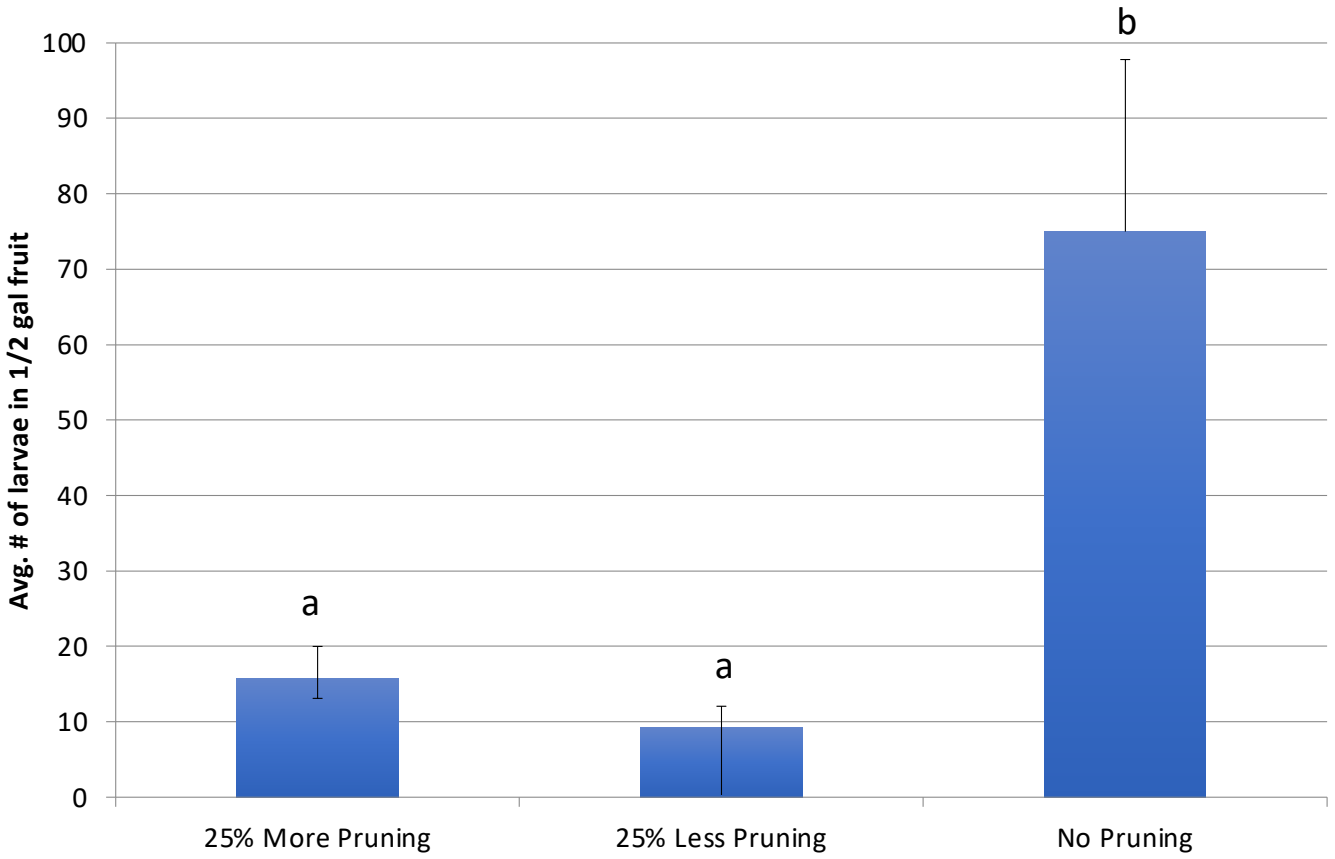
No Pruning:
No limb removal

25% Less Pruning:
Remove 6 limbs

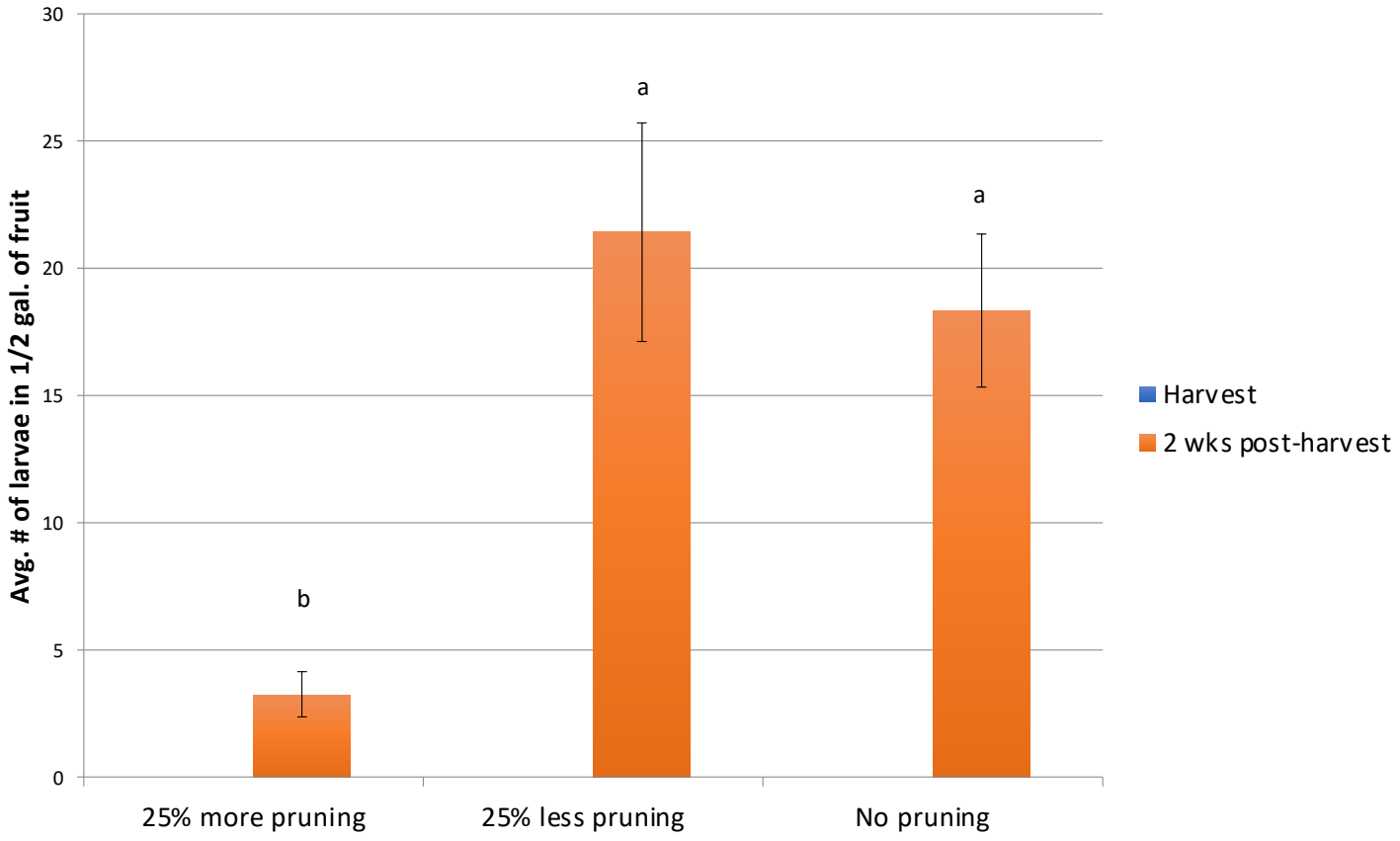
25% More Pruning:
Remove 10 limbs

Results

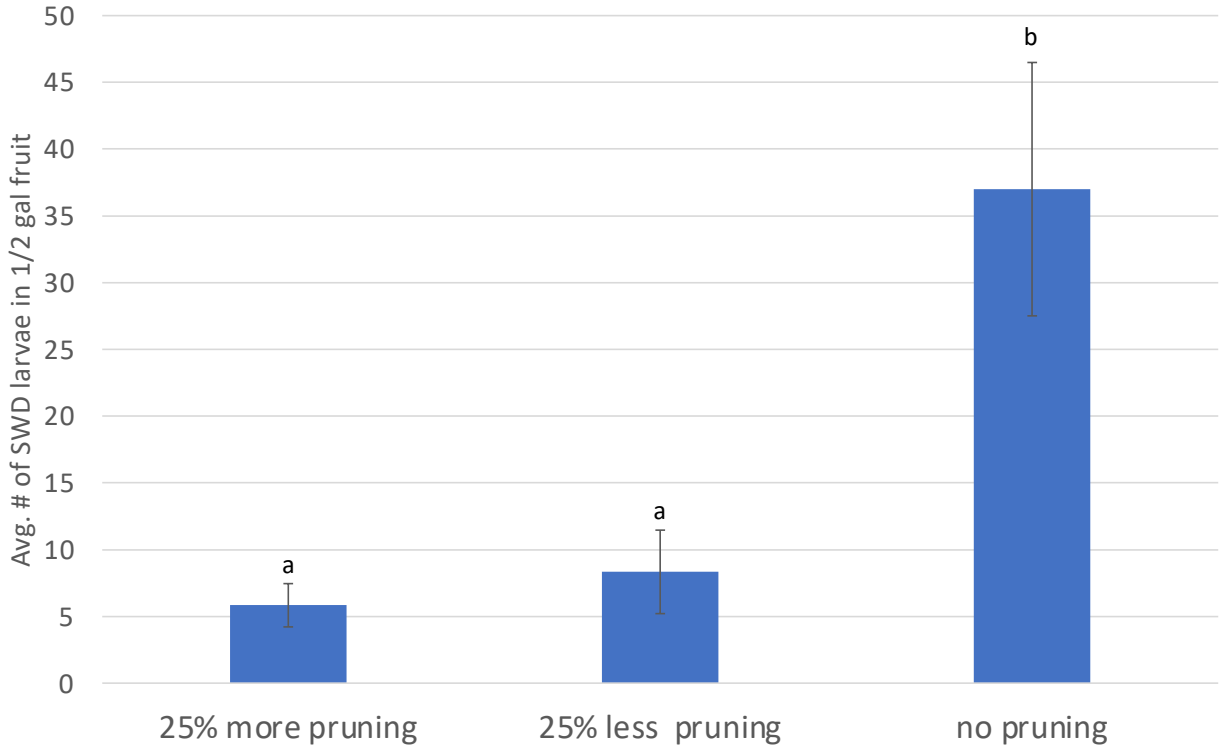
Pruning Treatments: 2017



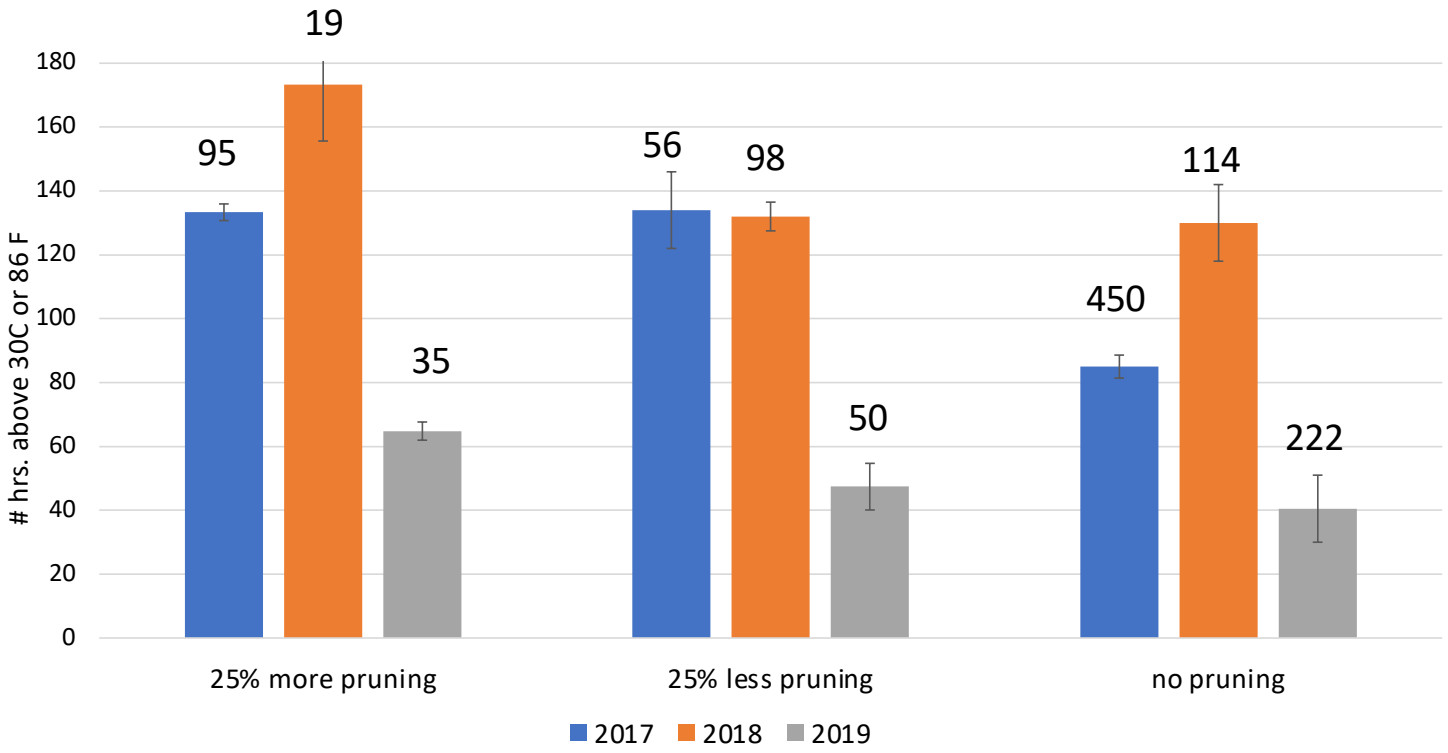
Pruning Treatments: 2018



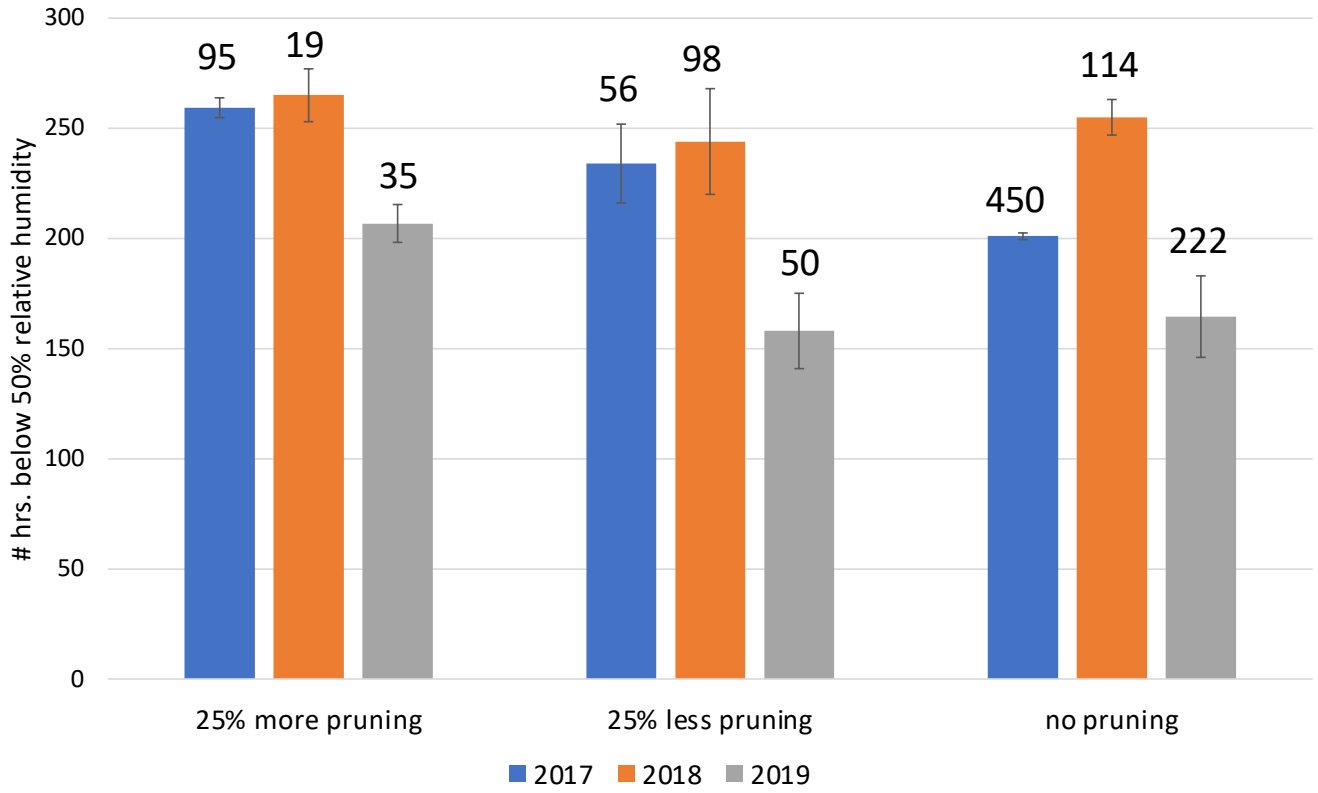
Pruning Treatments: 2019



No. of hours above 30C + total no. of SWD larvae

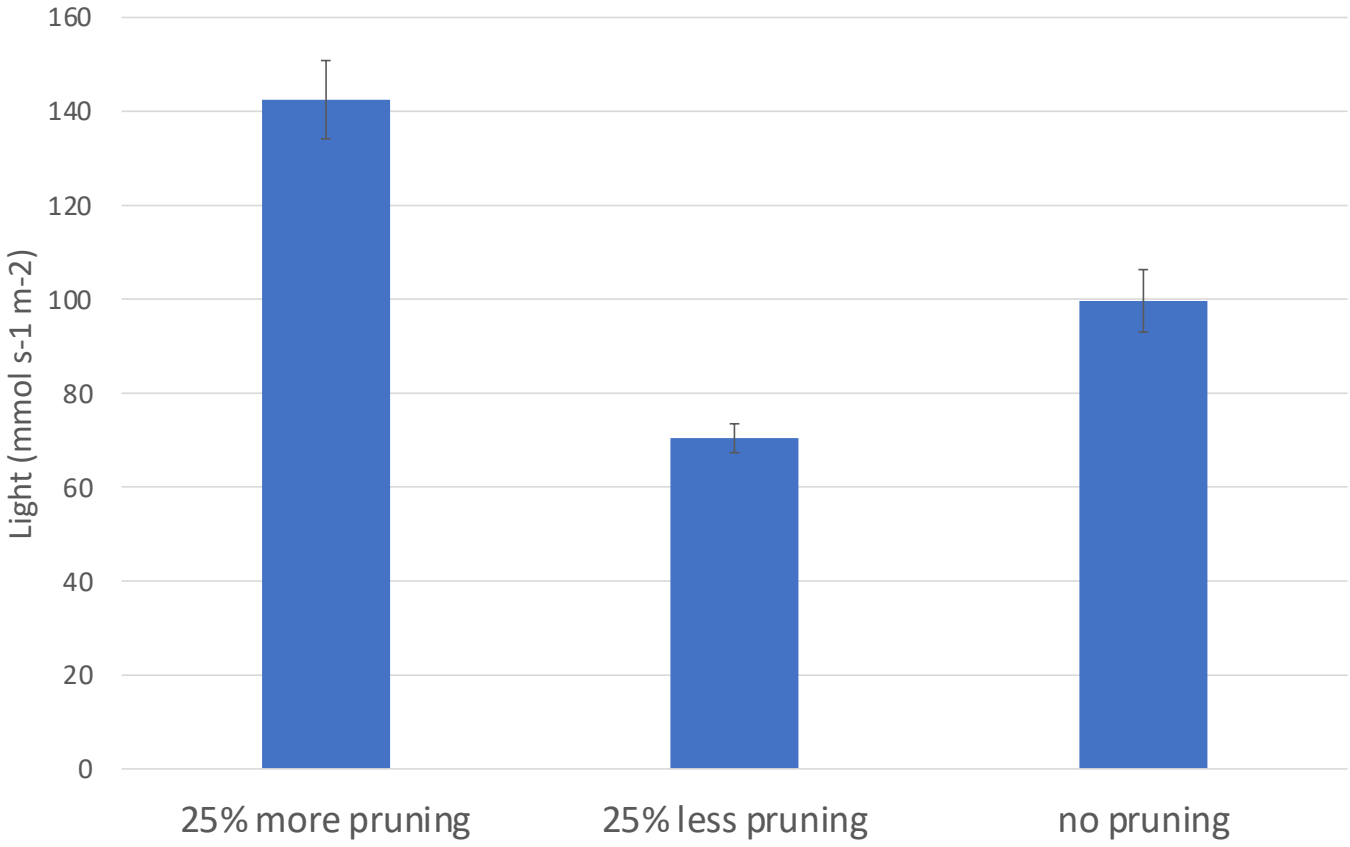


No. of hours below 50% RH + total no. of SWD larvae



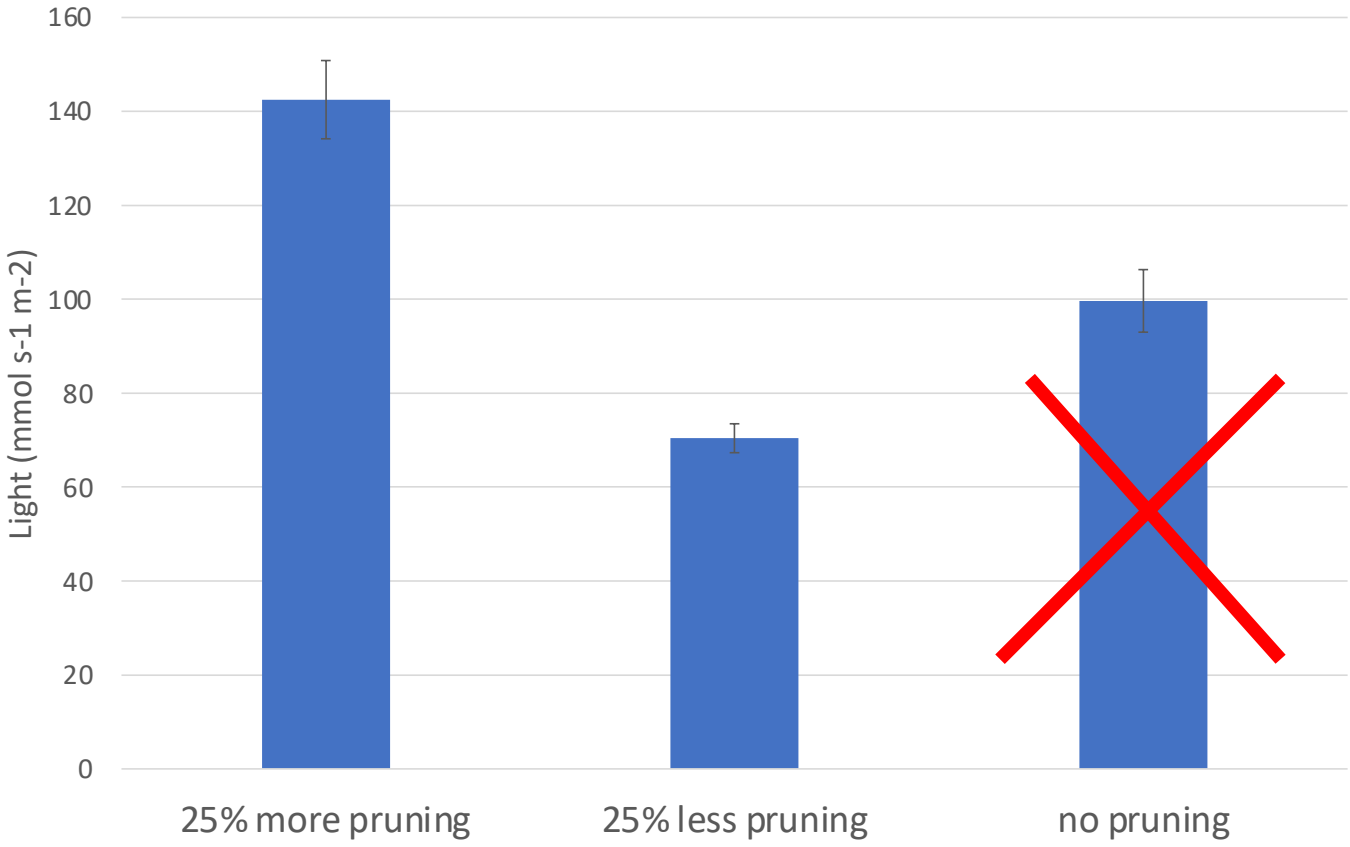
Light Measurements

- Li-Cor 250 light meter – line quantum sensor
- 10 replications in each pruning treatment
  - N/S and E/W just above first scaffold branches
- 4 samples in 2019: 7/1, 7/8, 7/17, 7/22



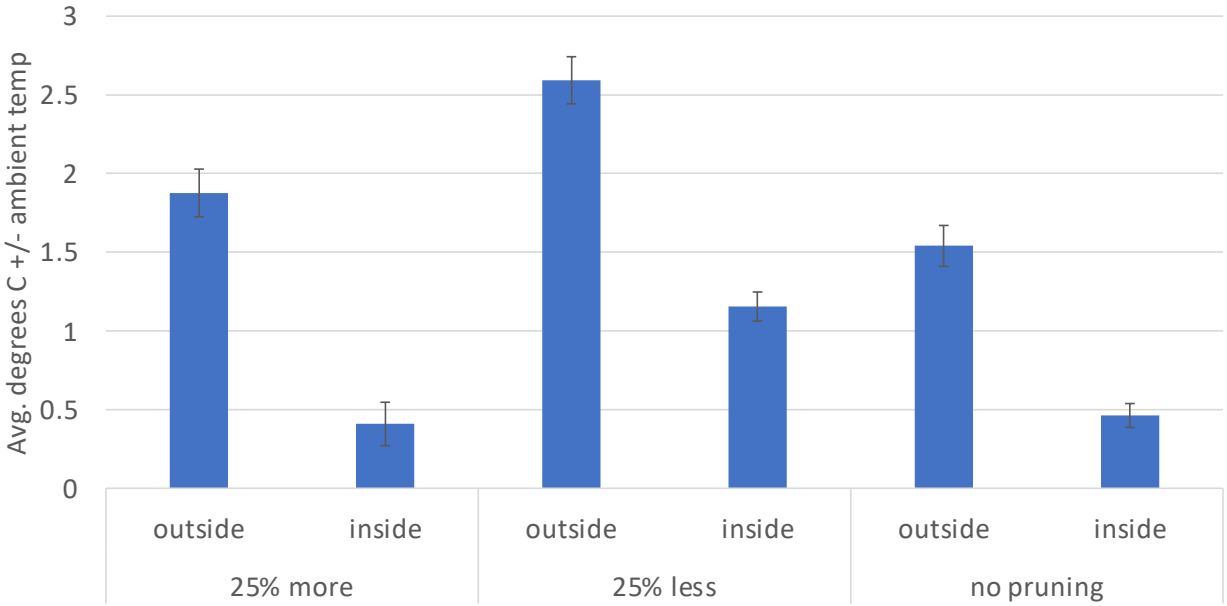
Light Measurements

- Trees in ‘no pruning’ treatment were on a sandy knob and had smaller canopies
- Need to repeat light measurements in 2020



In-Orchard Fruit Temperature

- Measured fruit surface temperature with dual laser infrared thermometer
  - 11x from 7/1 – 7/24
  - 5 fruit per tree, 3 trees per treatment



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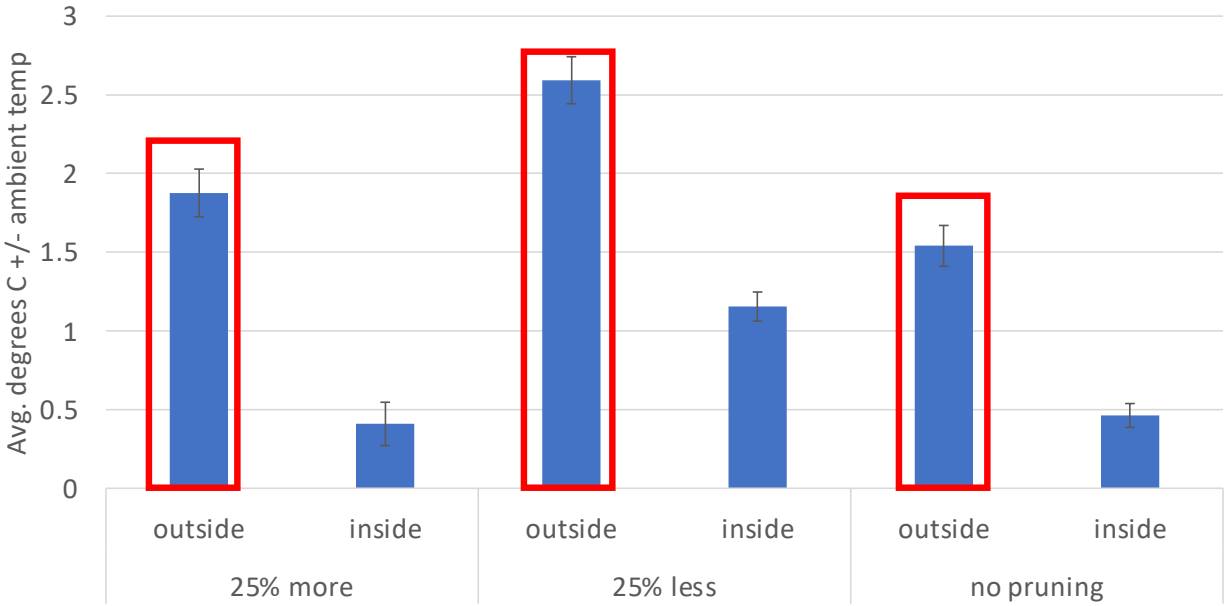
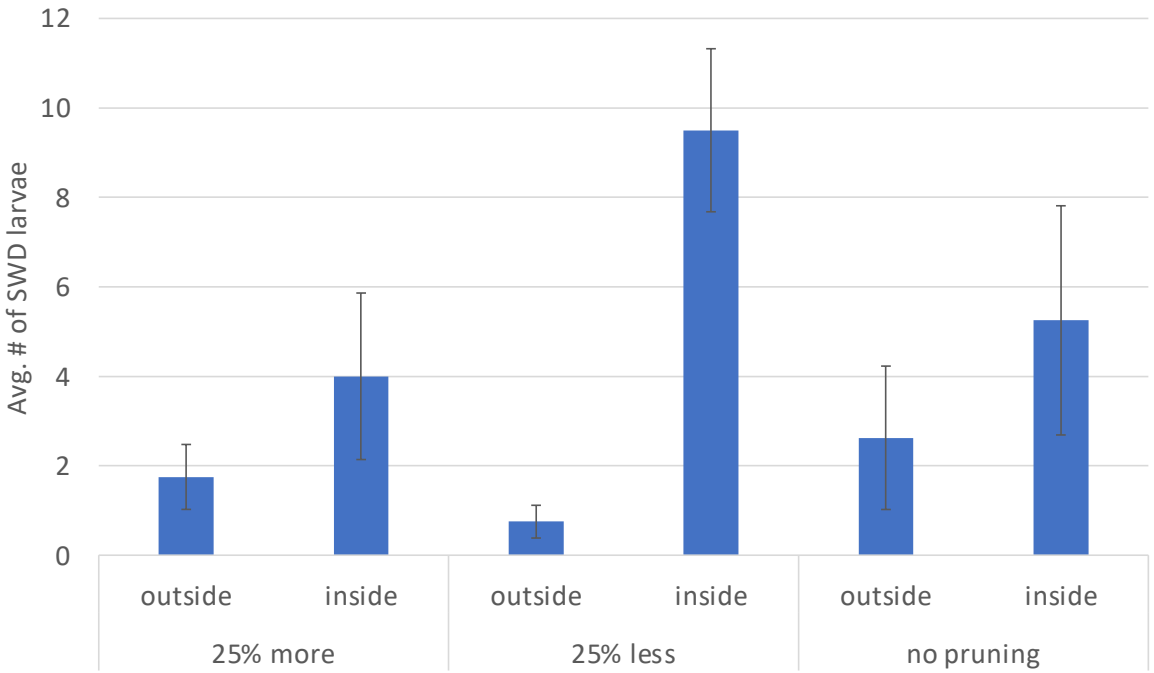


In-orchard Bag Bioassay

- Paint strainer bags placed around 5 inside/outside fruit
- 10 female and 10 male lab-reared SWD flies added to bag for 48 hrs.
- Number of SWD larvae found in fruit after 7D
- One replication in 2019; more data are needed



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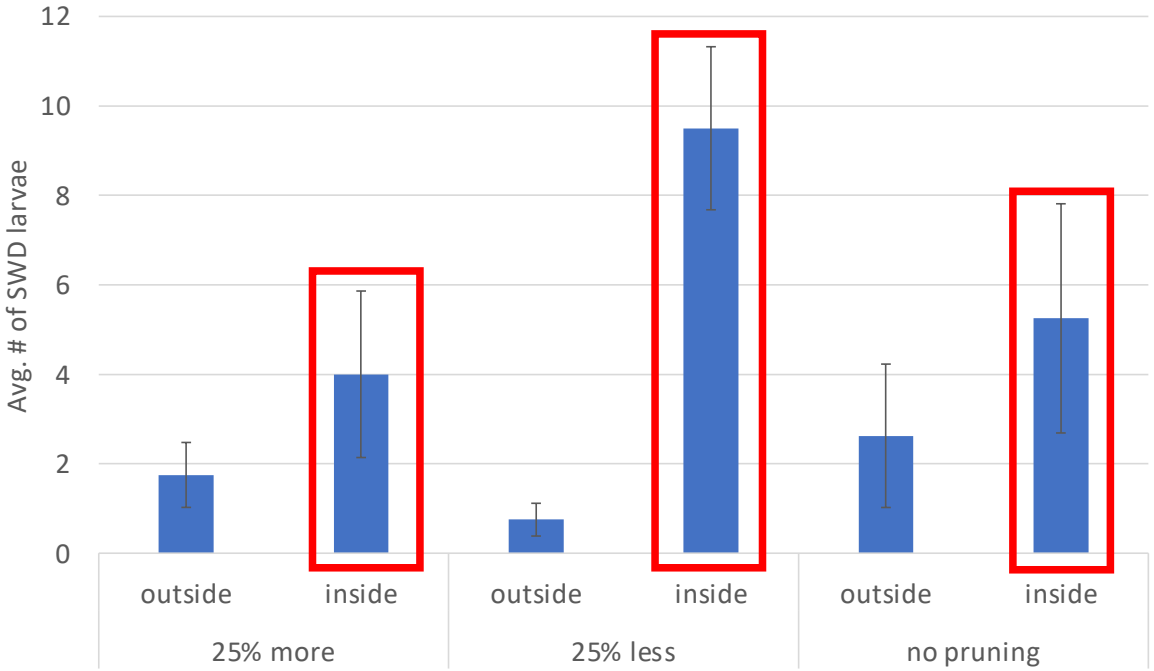


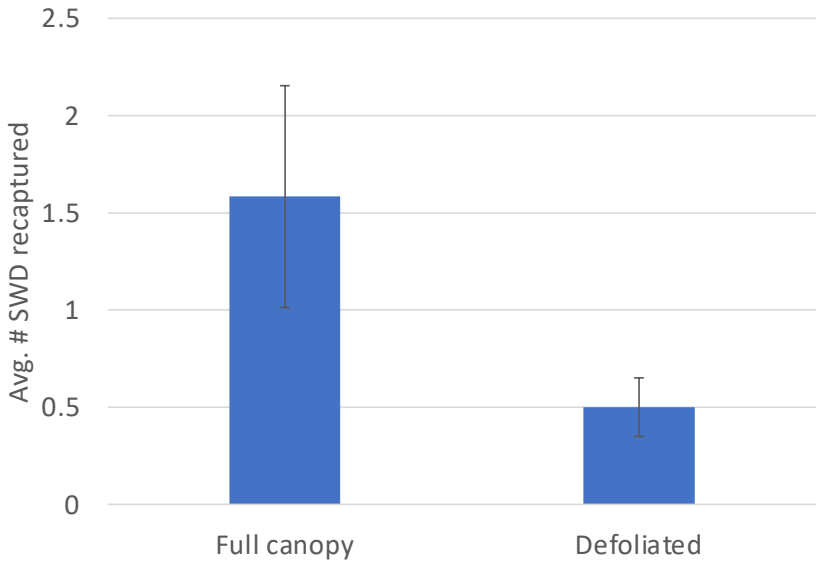
SWD Mark and Recapture Study

- Released ~7,700 lab-reared SWD marked with fluorescent dye in two blocks at NWMHRC

Release site 1 – CLS efficacy trial block

Released 3935 flies

				0	FULL Canopy Trees - 19 SWD recaptured				
1				0				0	
	1						1		
		0		5		0			
			5		2				
				4					
				0					
			1		1				
		0		1		1			
	1						0		
1				0				0	
				0	DEFOLIATED trees - 6 SWD recaptured				



Numbers indicate trap location and number of flies that were recaptured by baited red sticky traps

Conclusions

- Pruning can decrease SWD infestation
  - More intense pruning (10 limbs) is needed to decrease SWD infestation in hot and dry years
  - In ‘normal’ years with adequate moisture, 6- and 10-limb removal is adequate to reduce SWD infestation
- Pruned trees had higher temperatures and lower relative humidity
  - Resulted in lower SWD infestation in three consecutive seasons
  - Preliminary PPF data showed higher levels of sunlight in more intensely pruned canopy
- Mark and recapture study provided evidence that aligns with our theory that SWD prefer denser canopies

Future goals based on pruning results

- Develop pruning recommendations for growers
  - Quantify interactions of light, temperature, and relative humidity ranges that reduce SWD infestation
- Use data to develop hand-held technology that growers can use in the field to assess parameters to guide pruning to reduce SWD

Thank You!

- Rapid Outreach for Agricultural (ROAR) Program
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- Michigan Cherry Committee
- Michigan State Horticulture Society
- MSU Project GREEEN
- NWMHRC Staff