

# Exclusion Net to Control Spotted Wing Drosophila in Blueberry Fields



Agriculture, Pêcheries  
et Alimentation  
Québec 

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## Spotted Wing *Drosophila* in Quebec, Canada

- In Quebec, first observation of *D. suzukii* in 2010, but severe damages in 2012
- Registered insecticides: pyrethroid (Pyganic and Ripcord), spinosad (Entrust and Delegate) and organophosphate (Malathion)
- In blueberry fields, low insect pressure, low insecticide applications
- Growers asked for alternative control methods
  - Bioinsecticides, repellants, mass-trapping, net exclusion, etc.
- Physical barrier to SWD adults
- Blueberry fields
  - Small (many ca. 1 ha)
  - Permanent physical structure that supports net against birds
- Commercial availability of exclusion net for small insects





# Objectives

1. Evaluate the efficiency of a net to protect blueberry bushes from SWD adult infestations
2. Measure its impact on the fruits (caliber, Brix and yield)
3. Estimate its impact on other insect pests and diseases



# Materials and Methods

- Organic farm with Bluecrop variety
- Nets installed in late June at green fruit stage
- Mesh of 1.00 x 0.85 mm - 80gr/m<sup>2</sup> (ProtekNet)
  - Less than the median female body width of 1.04 mm (Kawase and Uchino 2005)
  - UV resistant
  - Light transmission 80%
  - Lifespan 7 years
- Treatments as a control measure
  1. Exclusion net
  2. Insecticide applications
  3. Untreated control
- RCB design with four blocks



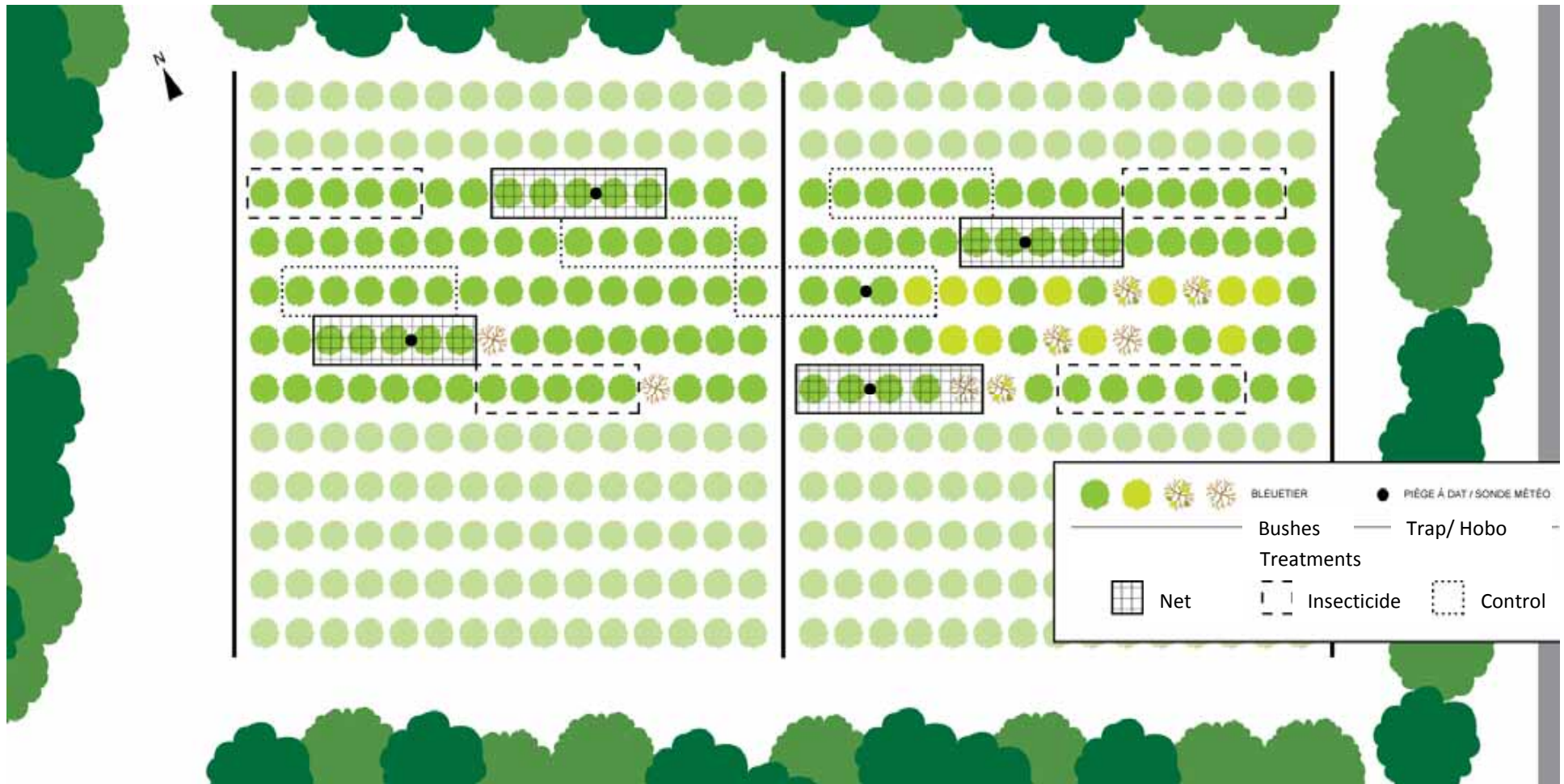
# Organic farm

Three treatments comparison: net- insecticide - control



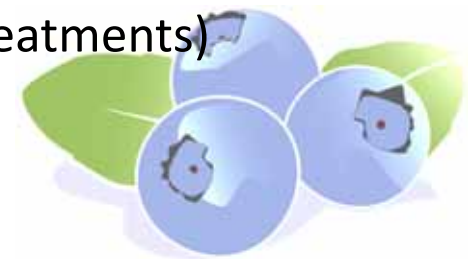
# Organic farm

Two treatments comparison: net- insecticide- control



# Materials and Methods

- SWD infestation
  - Adult population: 5 traps (bait: ACV + yeast) sampled every week
  - Larval population: 100 fruits/bush/treatment/harvest incubated at 25°C
- Caliber (fruit size)
  - Diameter of 50 fruits/bush/treatment/harvest
- Brix (sugar content)
  - Measure of 50 fruits/bush/treatment for 3/6 harvests
- Yield
  - Total weight of fruits produced/bush/treatment/season
- Other insects pests and diseases
  - 100 fruits/bush/treatment/harvest
- Harvest
  - Every 7 d from first maturity
- Statistical analysis: two-way ANOVA (factors: harvests & treatments)



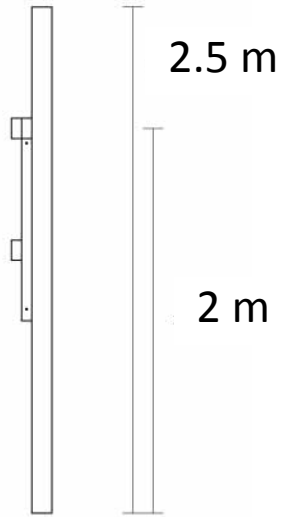
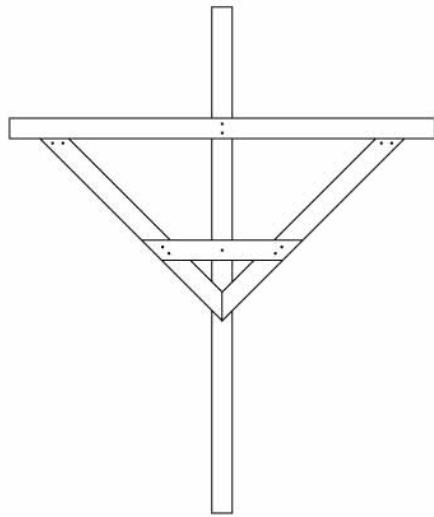
# Net Setup







# Net Setup



2.1 m

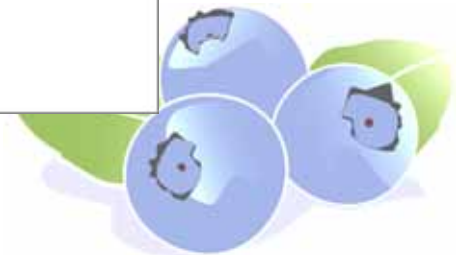
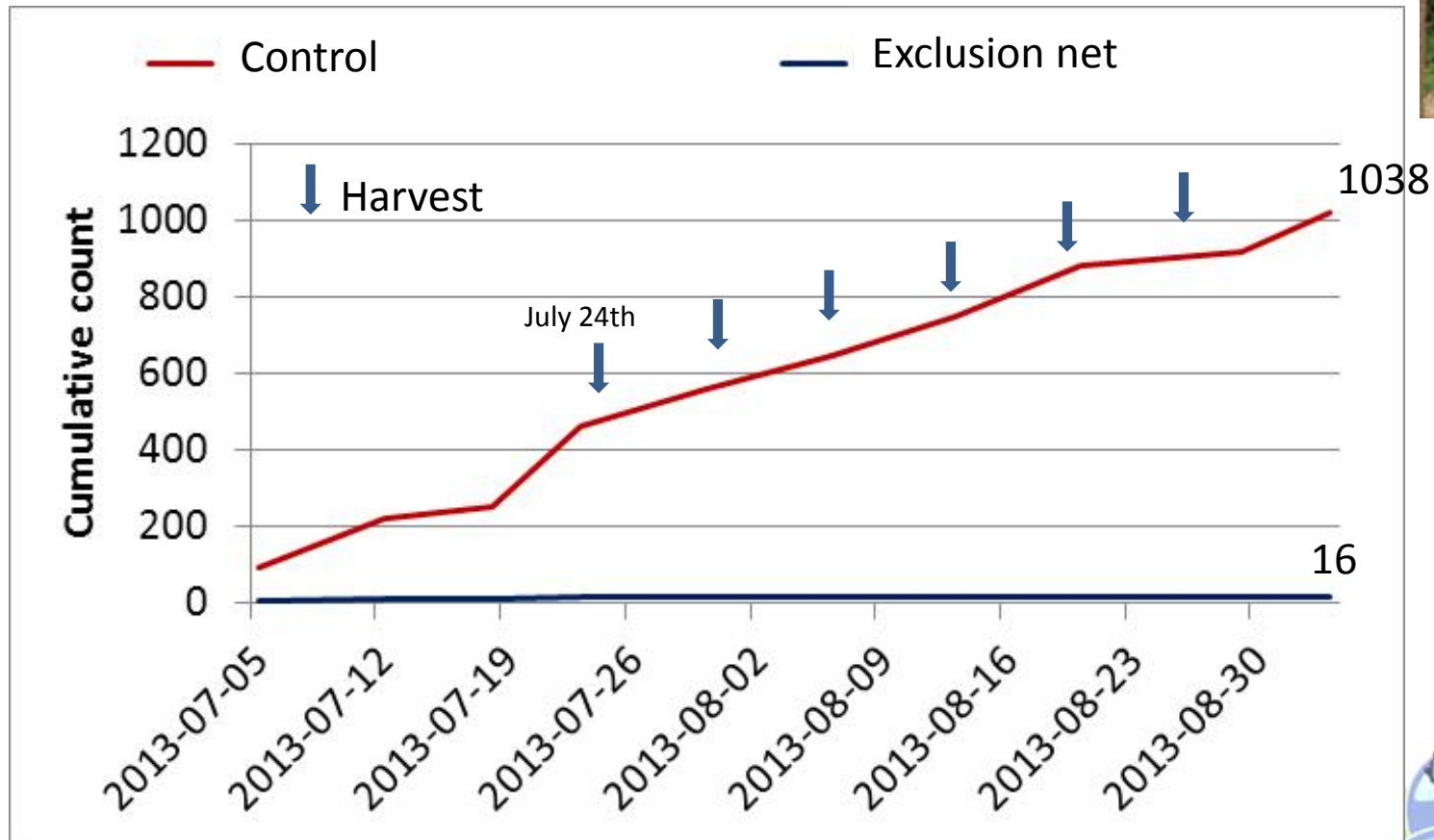






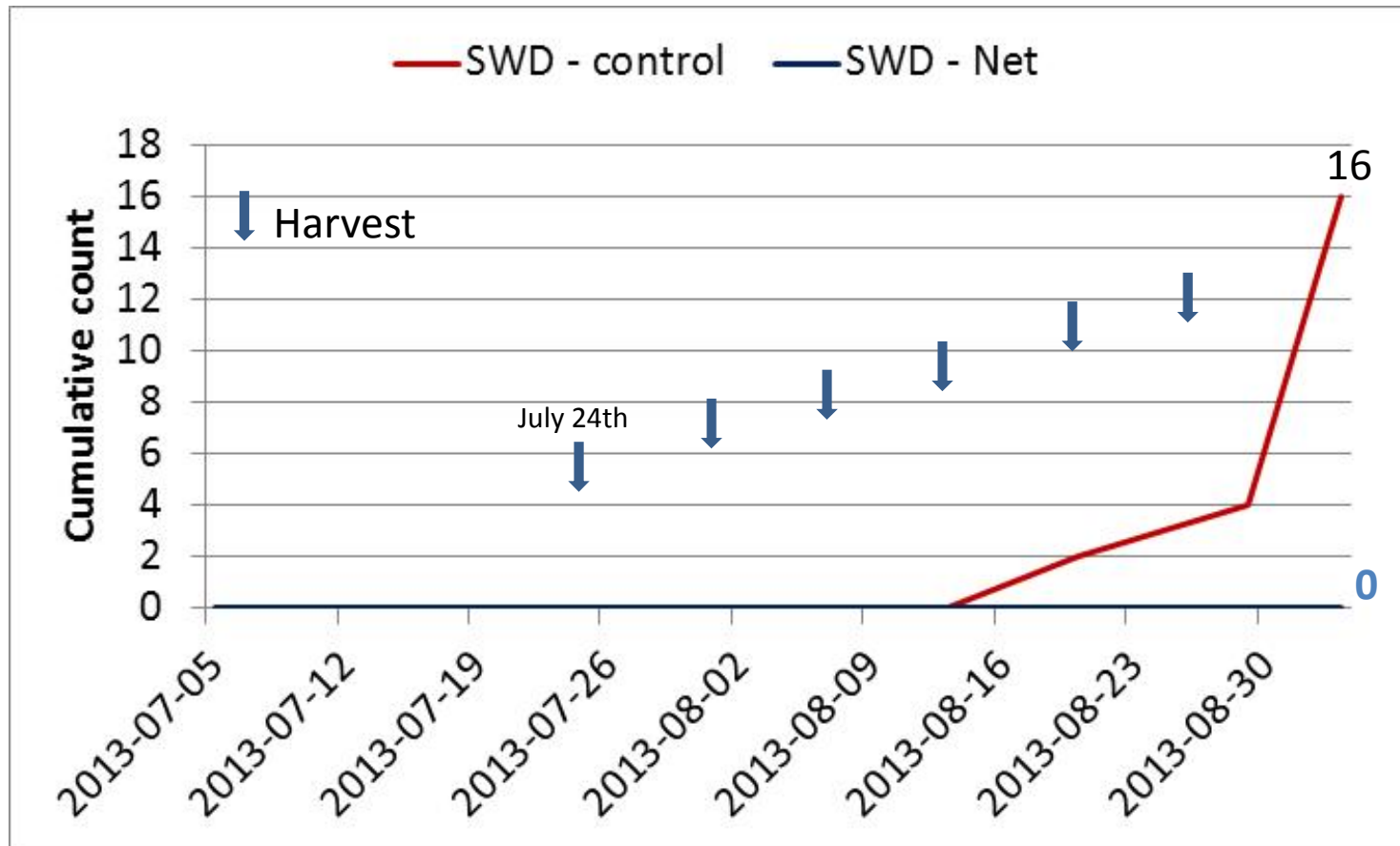
# Total Number of *Drosophila* spp. Caught

- Identified 5 *Drosophila* species

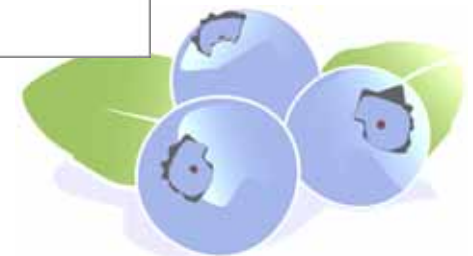


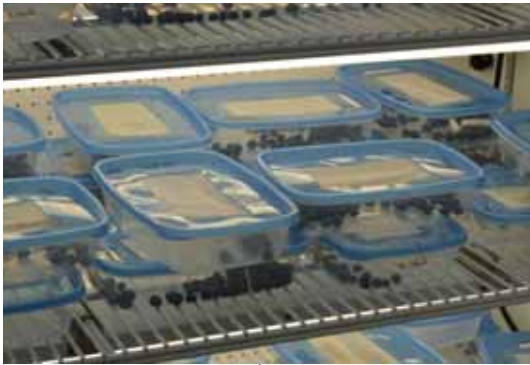


## Total Number of *D. suzukii* Adult Caught

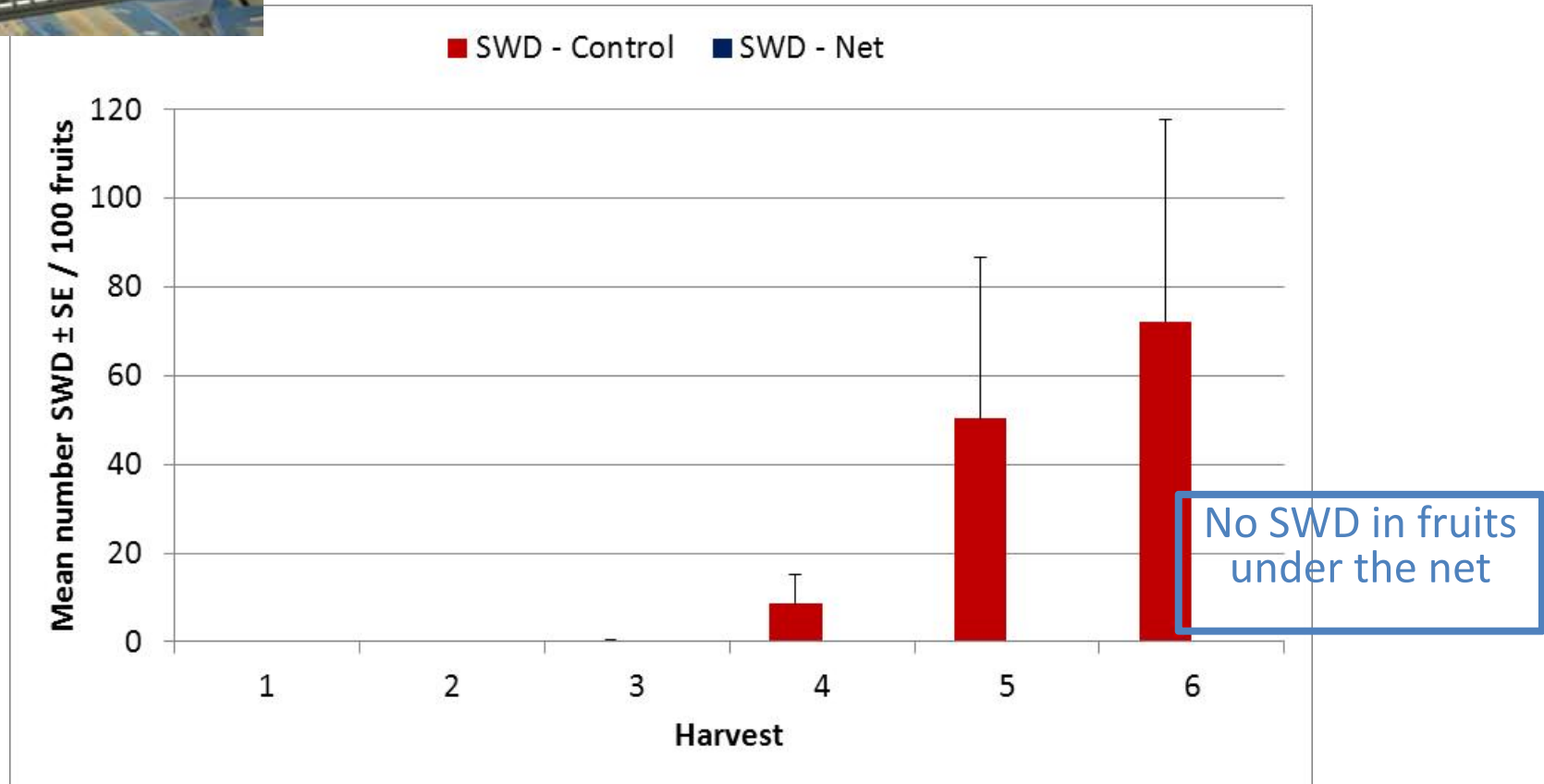


No SWD  
under the  
net





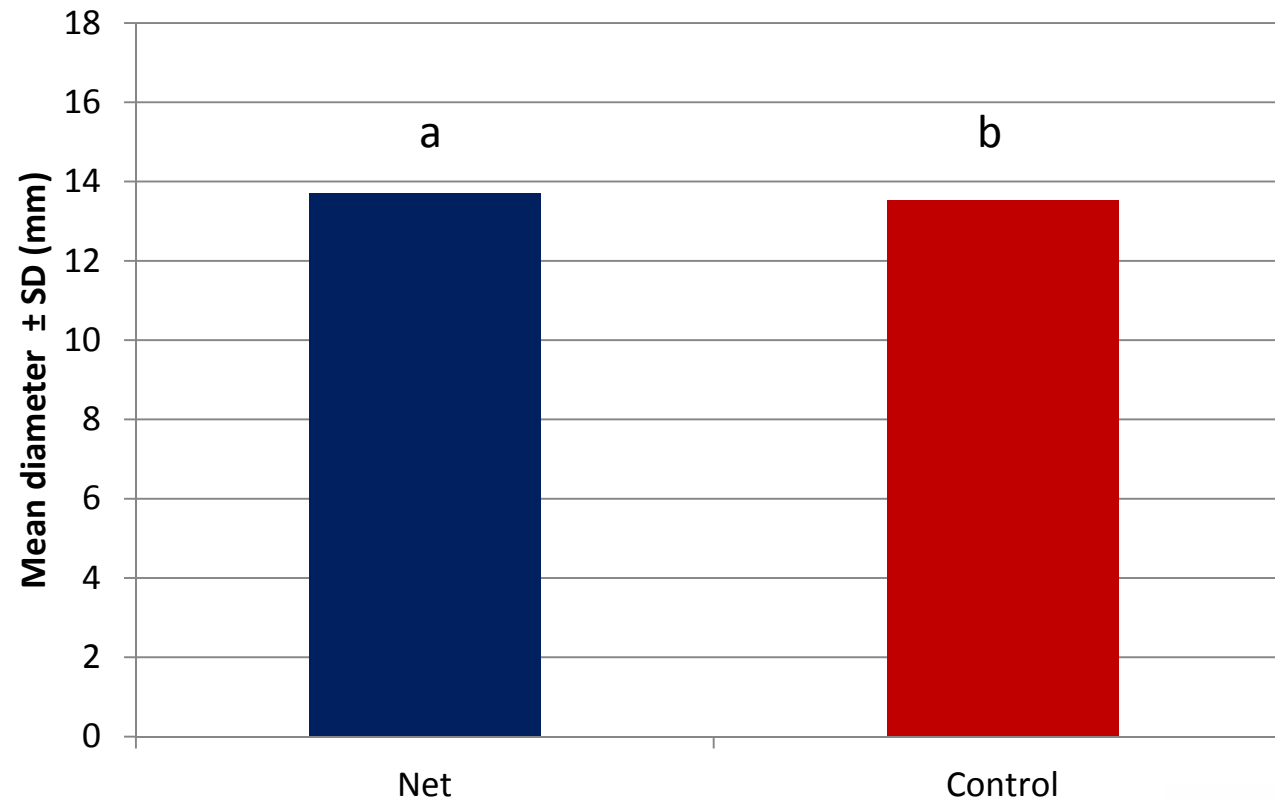
# SWD Larval Infestation in Fruits



# Blueberry Fruit Size

Net vs control:  $p < 0.0001$

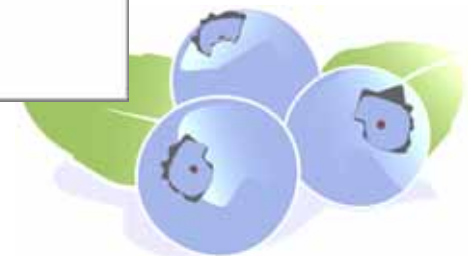
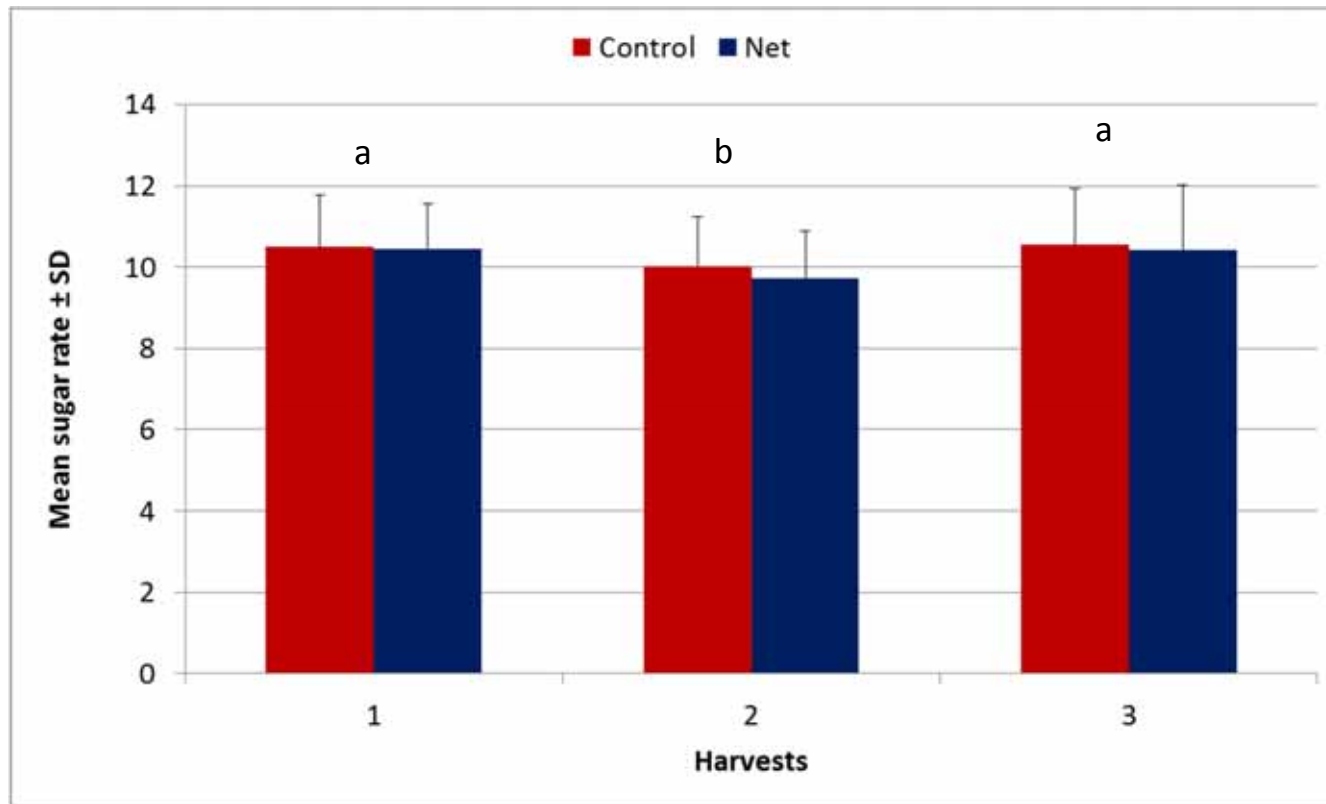
Harvest:  $p < 0.0001$



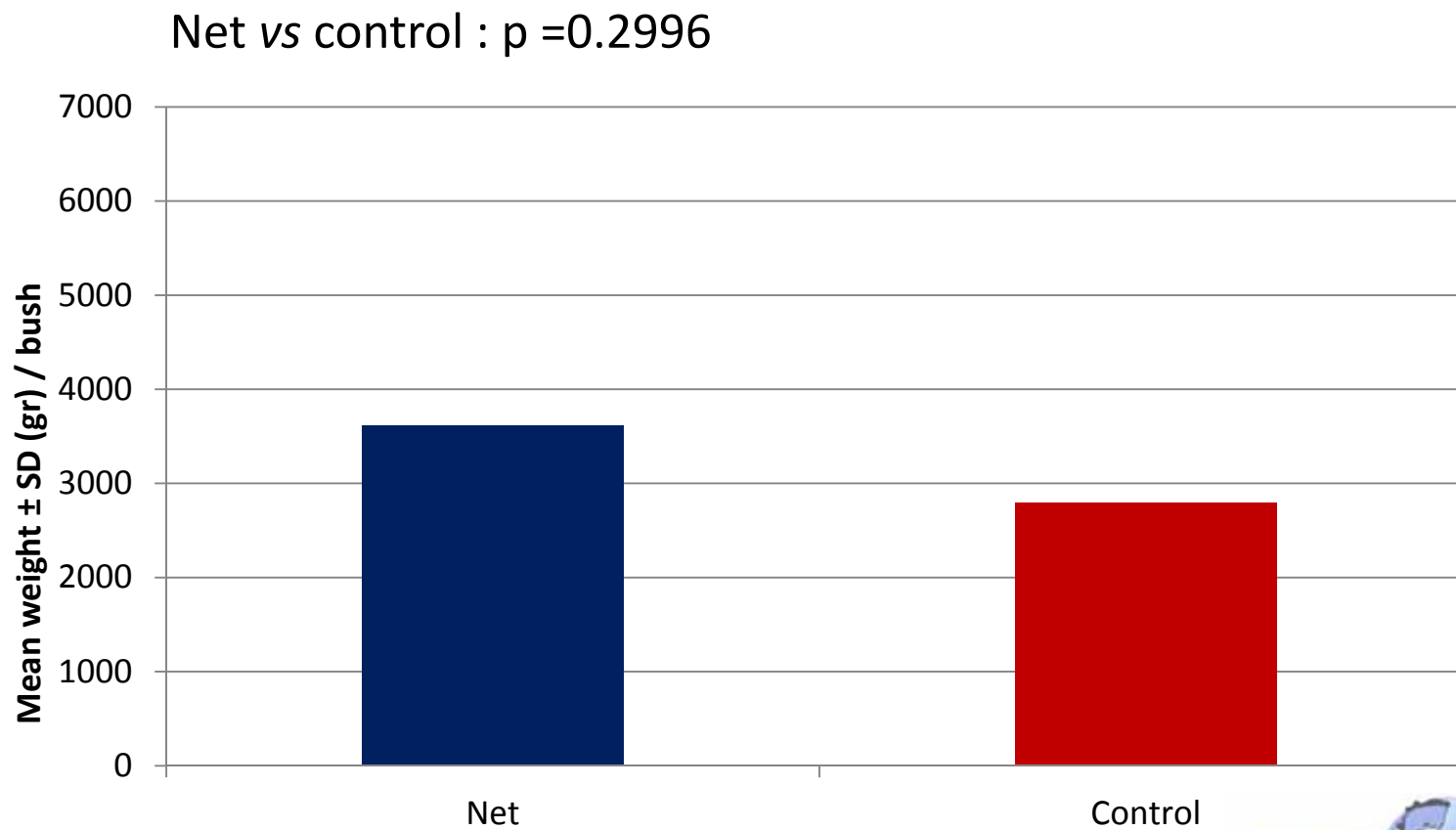
# Blueberry Fruit Sugar Rate (Brix)

Harvests:  $p < 0.0001$

Net vs control :  $p = 0.0818$



# Blueberry Fruit Yield

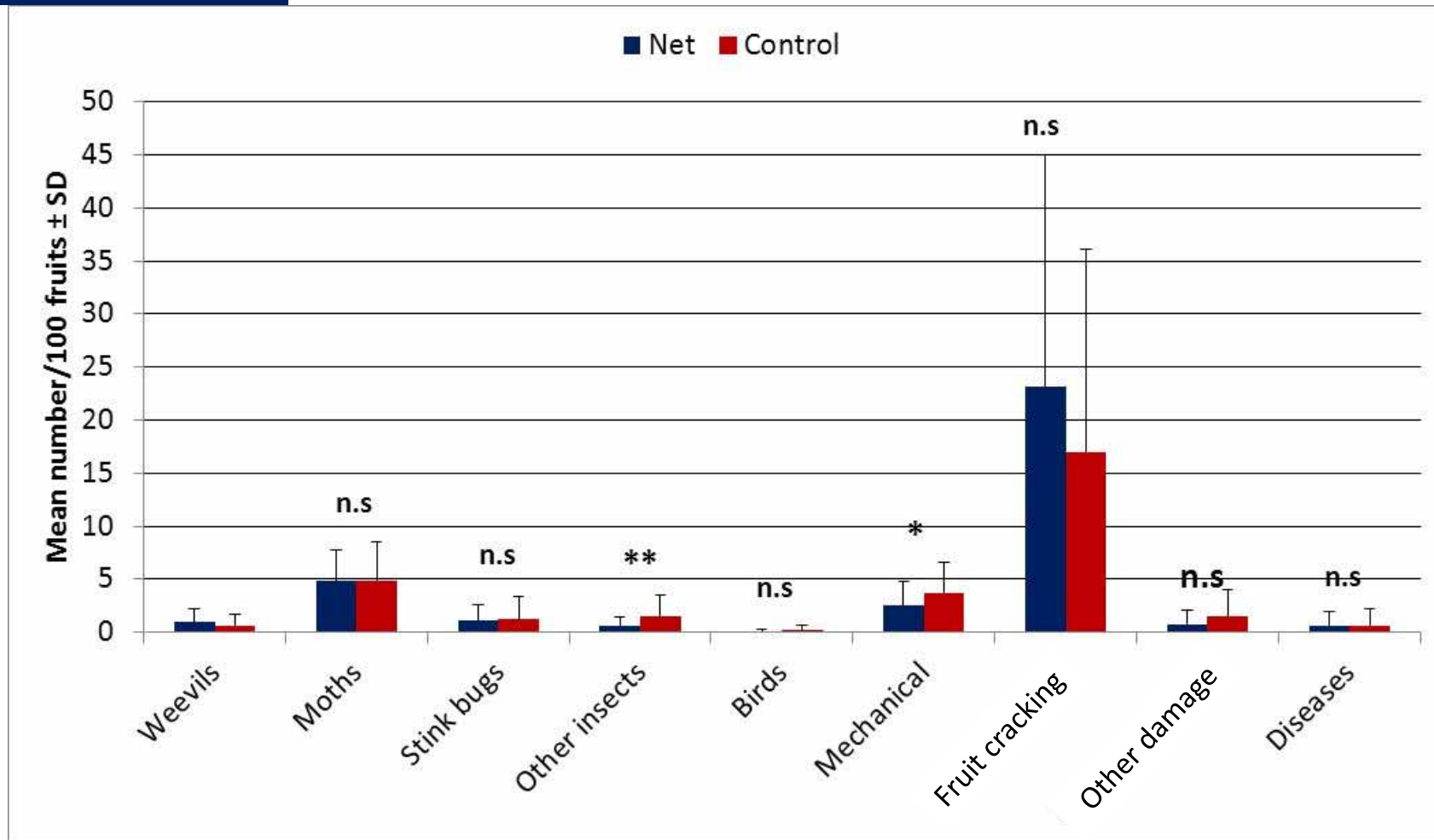




## Other Insect Pests and Diseases



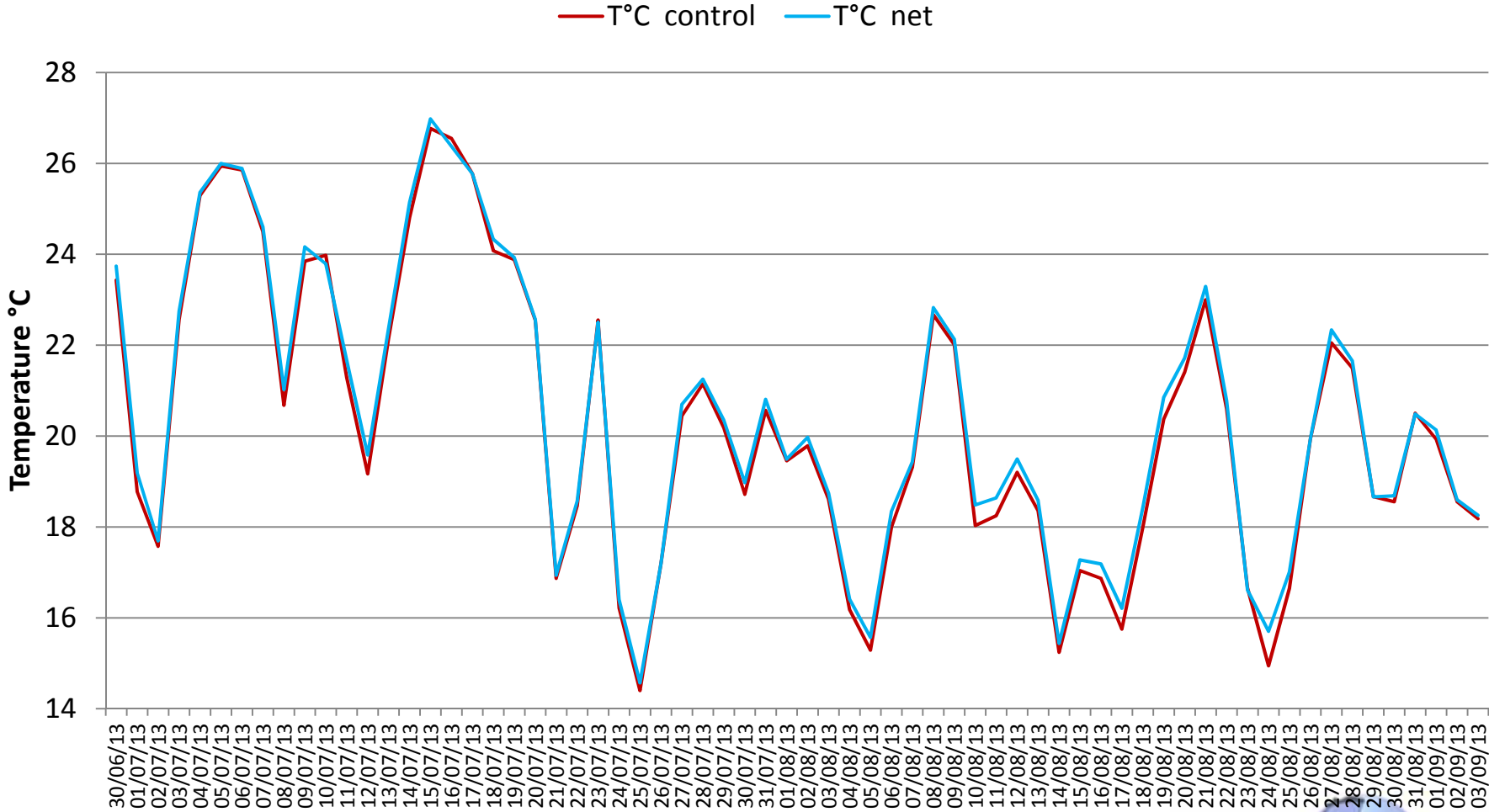
# Other Insect Pests and Diseases



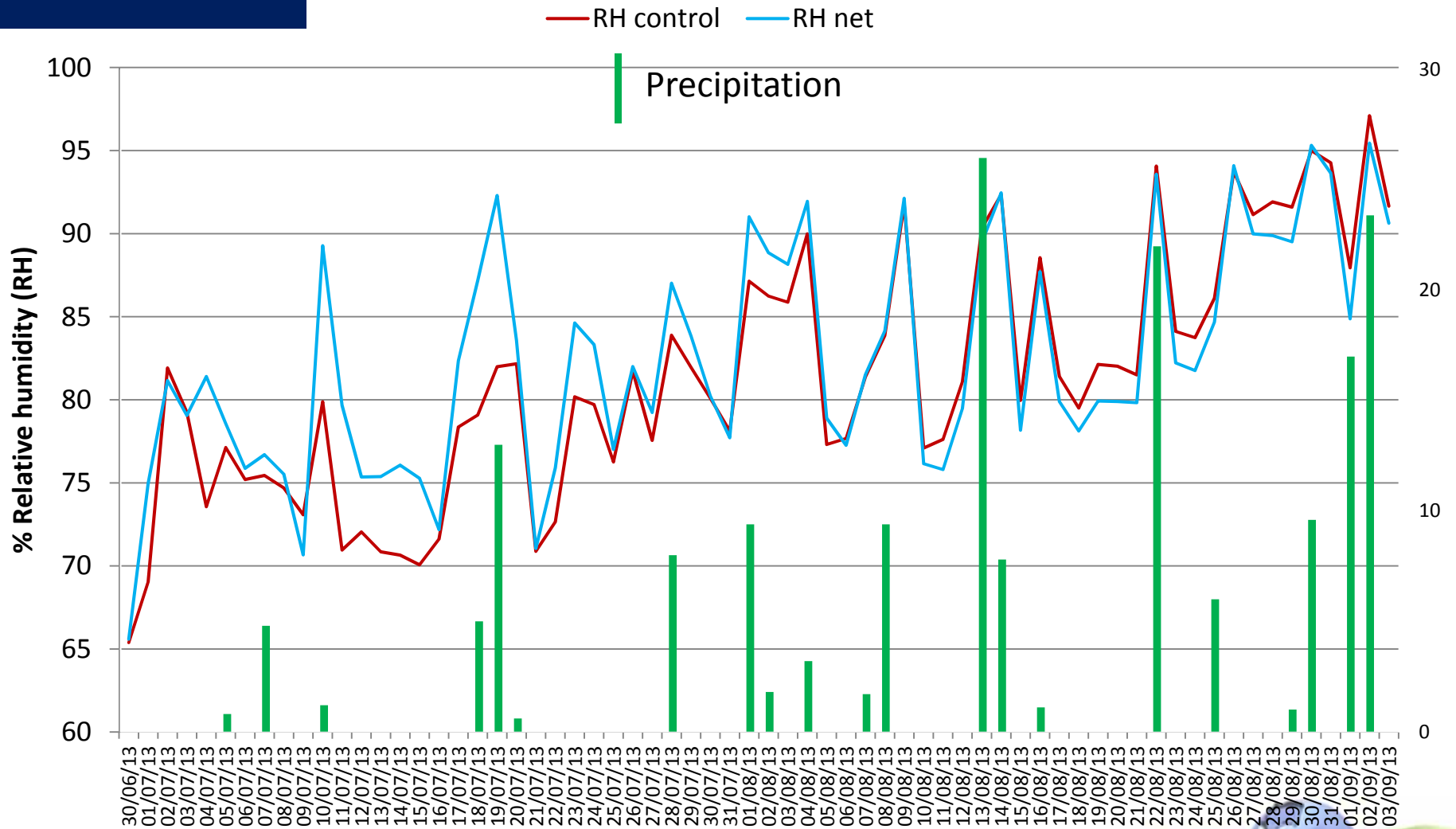
(\*  $\alpha = 0.05$ ; \*\*  $\alpha = 0.01$ ; ANOVA)



# Climatic Conditions - Temperature



# Climatic Conditions – Relative Humidity



## Conclusion

- First year with promising results
  - No SWD adults and larvae under exclusion net
- This year
  - Replicate data for temperature and humidity
  - Detailed identification of other insect pests and diseases
  - Measure the rate of photosynthesis
  - Evaluate economical value of net *versus* pesticides
  - Elaborate recommendations for growers to decrease risk of SWD introduction under the net
    - Picking management
    - Crop maintenance



# Acknowledgements

- Summer students and assistants in 2013
- Carole and Rémy Blais organic growers



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Thank you for your attention

