Risk-Based Survey Model Weighting

CPDPC SCIENCE SUBCOMMITTEE - 6/8/2023

Southern CA Risk-Based Survey

Variable	Overall Minimum	Overall Maximum	Proposed Lower Threshold	Proposed Upper Threshold	Suggested Weighting	Percent of Weighting	
Risk factor for introduction/spread	(Minimum and maximum predictive risk value for each factor based on 2022 collected data. 0 to 1 scale, 1 indicating greatest predictive power)		(Evidence-based suggested weighting range for each factor)				
Introduction Risk (Census Travel)	0.1980	1.000	0.58	0.96	0.6	16%	
ACP Density	0.4850	0.999	0.71	0.95	1	27%	
CLas+ Locations	0.0000	0.999	0.32	0.96	1	27%	
Plant Nursery & Big Box Store	0.3520	0.999	0.61	0.97	0.1	3%	
Citrus Road	0.0000	0.995	0.34	0.86	0.1	3%	
Packing House	0.0000	0.986	0.13	0.54	0.2	5%	
Farm Market (Swap Meets/Flea Markets)	0.1230	0.979	0.48	0.84	0.4	11%	
Organic Citrus	0.0000	0.899	0.00	0.30	0.3	8%	

In residential RBS, increase proportion of surveyed residential citrus in areas near commercial citrus



Central CA Risk-Based Survey

Variable	Overall Minimum	Overall Maximum	Proposed Lower Threshold	Proposed Upper Threshold	Suggested Weighting	Percent of Weighting	
Risk factor for introduction/spread	(Minimum and maximum predictive risk value for each factor based on 2022 collected data. 0 to 1 scale, 1 indicating greatest predictive power)		(Evidence-based suggested weighting range for each factor)				
Introduction Risk (Census Travel)	0.1980	1.000	0.58	0.96	0.6	12%	
ACP Density	0.4850	0.999	0.71	0.95	2	40%	
CLas+ Locations	0.0000	0.999	0.32	0.96	1	20%	
Plant Nursery & Big Box Store	0.3520	0.999	0.61	0.97	0.1	3%	
Citrus Road	0.0000	0.995	0.34	0.86	0.3	6%	
Packing House	0.0000	0.986	0.13	0.54	0.3	6%	
Farm Market (Swap Meets/Flea Markets)	0.1230	0.979	0.48	0.84	0.4	8%	
Organic Citrus	0.0000	0.899	0.00	0.30	0.3	6%	

Recent trends in HLB in California

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CPDPC Interim Science Subcommittee Meeting

June 8, 2023

Overview of recent trends

Based on laboratory results data provided by CDFA through mid-February 2023:

Detections of CLas+ trees and ACP
Percentage of plant and ACP samples positive for CLas
Bacterial load in ACP samples

Q: How much of this is being driven by intensive sampling in Orange County?



State of the State









Influence of Orange County



by quarter a 10% e of CLas+ Location - Orange -- Other counties 5% 0% 2015 2016 2017 2019 2022 2023 2018 2020 2021







CLas bacterial load





ACP



CLas+ load in California ACP samples



Log CN = 11.5 - (0.3 x Ct) or Log CN HLB (after Aug. 2017) = 11.5 - (0.27 x Ct) (McCollum et al. 2014)



Changing spatial patterns in sampling





Potential challenges to situational awareness

• Intensive sampling in smaller area (esp. Orange County)?

More finds but less able to infer changes in epidemic from them

Pause in SoCal risk-based survey

62% of CLas+ ACP were being detected by RBS

activities

Changes to grove trapping

Inconsistent trapping protocols throughout year = gaps inof locations where most needed to protect growers





ACP Trap Comparison

June 8, 2023



3D Trap Versus Yellow Panel Trap

Background

- Many ACP samples on yellow panel (YP) traps are not feasible for PCR analysis.
- UCR researchers developed 3-dimensional (3D) traps.
- This study compares the ability of detecting and capturing ACPs between yellow panel traps and 3D traps.

Yellow Panel Trap



3D Trap





From Snyder et al. (2022)

Study Locations



- 34 study locations in Riverside County
- One yellow panel trap and one 3D trap placed at the same tree on the opposite side randomly
- 12 cycles from mid-July 2021 to late July 2022
- Approximately 30 days interval
- Both traps were screened and the numbers of ACPs on the traps were recorded by field staff

Data Analysis

Number of ACP Collected Versus Number of Traps with ACPs

• Definition



Number of ACP Collected: 3

Number of Traps with ACPs: 1



Number of ACP Collected: 0

Number of Traps with ACPs: 0

- Comparison of the number of ACP collected and the number of traps with ACPs
- Shapiro-Wilk Test for Normal Distribution Test (P < 0.05)
- Wilcoxon signed-rank test as nonparametric test for the number of ACP collected and number of trap with ACP
- R Studio for all statistical analyses

Results



- 270 ACPs were collected in 3D traps and 1,287 ACPs were collected in yellow panel traps
- Number of ACP collected in yellow panel traps was 4.7 times higher than that in 3D traps (V = 484, P < 0.001)



- Number of traps with ACPs was 96 times in 3D traps and 183 times in yellow panel traps
- Number of traps with ACPs in yellow panel traps was approximately 1.9 times higher than that in 3D traps (V = 375.5, P < 0.01)

Seasonal Pattern



Section I Conclusion

- The results of this analysis indicate that yellow panel traps are more effective in detecting and collecting ACPs than 3D traps.
- However, determinations on the types of traps to use should be made on a case-by-case basis with additional factors considered (e.g., costs, sample preservation abilities, etc.).



No-Mess Trap Versus Yellow Panel Trap

Background



No-Mess Trap

Histo-clear, an orange-oil based clearing agent which facilitates the removal of trapped ACP for *C*Las testing

Study Locations



• Four Counties

- One no-mess trap and one yellow panel trap placed at the same tree on the opposite side randomly
- 5 to 6 cycles from mid-September 2022 to late March 2023
- Approximately 30 days interval
- Both traps were screened, and the numbers of ACPs on the traps were recorded by field staff

Data Analysis

Number of ACP Collected Versus Number of Traps with ACPs

• Definition



Number of ACP Collected: 3

Number of Traps with ACPs: 1



Number of ACP Collected: 0

Number of Traps with ACPs: 0

- Comparison of the number of ACP collected and the number of traps with ACPs
- Shapiro-Wilk Test for Normal Distribution Test (P < 0.05)
- Wilcoxon signed-rank test for Number of ACP Collected and Paired T-test for Number of traps with ACPs
- R Studio for all statistical analyses

Statistical comparison between No-Mess Trap and Yellow Panel Trap



(t = -0.46204, df = 19, P = 0.6493)

(t = 1.1567, df = 19, P = 0.2617)

(t = 0.15546, df = 16, P = 0.8784)

Seasonal Pattern

Riverside and San Bernardino

San Diego







Section II Conclusion

- The results of this analysis indicate that no-mess traps have a similar ability to detect and collect ACPs as yellow panel traps.
- Additional factors (e.g., sample preservations, costs, etc.) can be studied to determine if no-mess traps warrant expanded usage within CPDPD programs.
- No mess traps are approximately 5 times more expensive than yellow panel traps: \$1.39 vs. \$0.28 per trap (2020 cost).



Thank you