Development of Best Practices for Implementation of ACP Detector Canine Technology

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Year 1 of 1 (50% Complete)

Objectives

1. Develop data driven, best practices for implementation of Asian Citrus Psyllid (ACP) detector canine technology
2. Compare efficacy, speed and cost of canine assisted scouting to traditional ACP scouting through formal double-blind experiments

Problem and Significance

More effective and higher throughput methods for ACP survey are needed. ACP Detector Canines have been trained to locate this pest and have been successful in assisting pest control advisors where the pest is already established. However, they are needed in counties where ACP are not well established to assist with local eradication efforts. The main problem lies in the fact that training aids with live ACP are not allowed in these areas. Training aids are critically important in the use of detection canines in all disciplines.

Benefit to Industry

A more efficient search pattern was discovered which increases daily capacity by 26% for growers who wish to use this service. A system for working canines with pseudo scent in the San Joaquin Valley has been tested which will enable the canines to work in areas where ACP are not established and training aids are not allowed..

Progress Summary

In order to develop data driven, best practices for implementation of ACP detector canine technology, Canine Detection Services worked in Kern County with the Citrus Pest Detection Program which is managed by the Central California Tristeza Eradication Agency (CCTEA). CCTEA selected blocks to be inspected by their staff and K9s based on the high risk-based survey model and recent trap finds. However, the recent ACP trap find information was not real-time.

Findings:

1. Two different search patterns were tested in order to optimize the canine team's efficiency (Figure 1). Pattern 2 allows for an increase of 26% more trees per day.

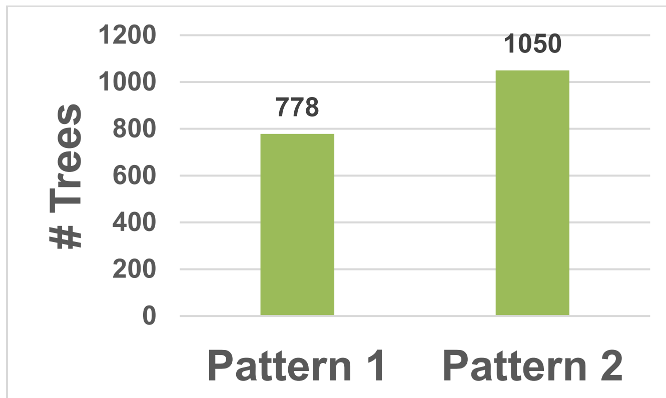

Figure 1. Trees/day by one handler with 2 dogs.

2. The canine's sensitivity (accuracy) with ACP pseudo scent during the trial was 71%. Sensitivity with live ACP is 92%. This is 21% lower accurate.

3. The performance of each of the six canines was assessed over time. Performance of each dog was consistent during the course of the trials as there was no evidence of systematic change in probability of alerts over the course of time.

4. There were no differences statistically between individual canine's performance or that of any canine/handler team combinations (Figure 2).

Figure 2. ACP Detector Canines Tango and Hunter.

5. 6624 trees were inspected during the course of the trial. The canines alerted on 42 of the trees for an alert rate of 0.63% (Figure 3). Live ACP were not visually confirmed at these locations, so the alerts are classified as non-productive. It is not possible to know for sure if the dogs were correct or incorrect with mature trees since the dogs sensitivity to one ACP is 90%, and it is not possible to examine every leaf. The false positive rate in controlled environments is 4% so perhaps this should inform our thinking about the non-productive alert rate of 0.63% in uncontrolled environment.

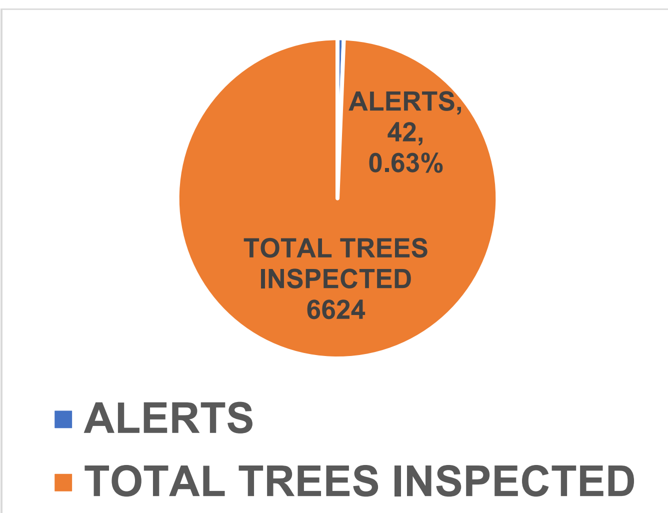

Figure 3. Alert rate (42 / 6624 x 100 = 0.63%).

6. The relationship between the numerical factors (set time of training aid, number of drops of pseudo, height of placement, planting density and tree height) and alerts and misses was examined using a combination of correlation analysis and logistic regression. Only the time interval between setting the pseudo training aid and the alert on the first pass, was correlated (negatively). This result indicates that when the interval between setting the aid and the first alert was low, the overall alert value was higher.

Correlation matrix plot indicating strength of relationships among seven numerical variables assessed in canine detection of ACP trials. The size and strength of correlation are indicated by color depth and orientation of the ellipse indicating the Spearman correlation coefficient. Perfect correlation is indicated by a black line sloping at 45 degrees, complete lack of correlation is indicated by an open circle (Figure 4).

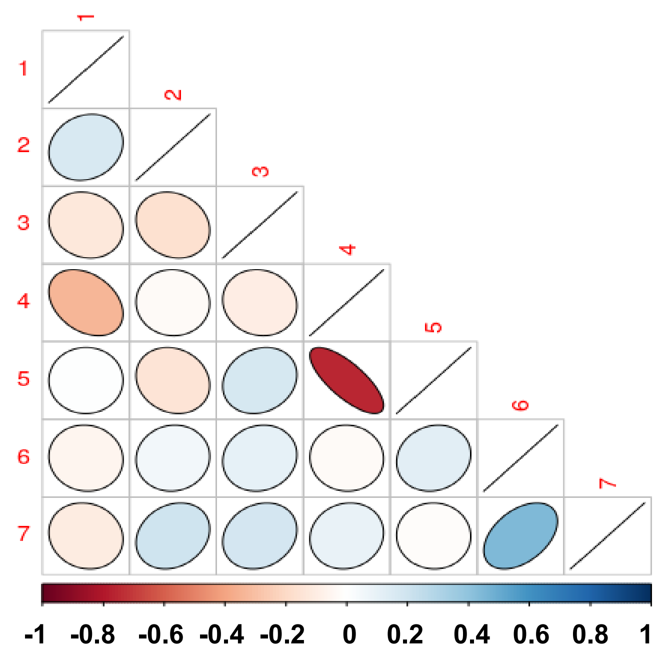

Figure 4. Variables are indicated by numbers as follows: 1- time between aid being set and first alert; 2- number of drops; 3- height of placement; 4- alert; 5- miss ; 6- pass between trees or not; 7- tree height class.

Conclusions

A more efficient search pattern was discovered which increases daily work capacity by 26%. The alert rate was only 0.63%. There were no differences statistically between individual canine's performance or that of the canine/handler team combinations. However, it appears the canines are not as accurate at locating pseudo scent on leaves as they are with live ACP on plant material in vials. It is believed the use of a pseudo scent is affecting the canine's accuracy. To receive the highest potential benefit from the dogs in zones ACP are not established, live ACP training aids should be used instead of pseudo training aids.

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Publications and Presentations

Finke, L. and Hajeri, S. (2022) 'Developing Best Practices for Use of ACP Detector Canines' *Citrograph* 13(1):50-54.