SAMPLING, SEASONAL ABUNDANCE, AND COMPARATIVE DISPERSAL OF GLASSY-WINGED SHARPSHOOTERS IN CITRUS AND GRAPES: SAMPLING PROGRESS REPORT

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INTRODUCTION

Decision-making in knowledge-based pest management depends upon sampling methods that provide reliable information on pest densities and distributions. Practical sampling methodology must balance sample precision with simple and cost-effective collection techniques. Four methods are currently being evaluated in citrus orchards as part of our effort to develop a sampling program for glassy-winged sharpshooter (GWSS). These include both hand (bucket and beat net) and gasoline-powered (D-Vac and A-Vac) samplers. In addition, yellow-sticky traps have been used simultaneously to determine the level of correlation between the foliage samplers and commonly used yellow-sticky traps. Data sets for each device will be analyzed for mean-variance relationships according to Taylor's power law and sample-size estimates generated according to fixed levels of precision. Ultimately, sequential and binomial sampling plans will be developed for the precise estimation or classification of population density of GWSS for research and pest management application.

It is well recognized that the major threat of GWSS populations is the potential for vectoring *Xylella fastidosa* to uninfected plant hosts, in particular grapevines in commercial vineyards. One practical application of a sampling plan would be to precisely estimate densities of GWSS within an orchard or vineyard and then determine what proportion are positive for *X. fastidiosa*. Accurate identification of individuals positive for *X. fastidiosa* is an essential part of an overall appraisal of the risk constituted by a particular population. Work began in April exploring ELISA, PCR, and culturing techniques for the detection of *X. fastidiosa* in GWSS. Sampling and evaluation of the proportion-positive among various southern California populations of GWSS is continuing.

OBJECTIVES

1. Develop, test and deliver statistically-sound sampling plans for estimating density and inoculum potential of GWSS for research and management applications.

RESULTS AND CONCLUSIONS

Evaluation of the four sampling devices continued in citrus orchards in Riverside, CA with the onset of the spring generation of GWSS nymphs in April, 2002. To date, a total of 500 Valencia orange trees have been sampled with each of the four devices to generate 25 data points (n=20 per point) that describe the respective mean-variance relationship for each device. The bucket sampler is the most versatile and easiest to use with its extendable pole allowing access to foliage 15-20 ft above ground. Samples obtained with the bucket sampler are also cleaner than those obtained with the beat net, the other hand-operated device, and therefore require less handling during sample processing. The mechanical devices are more expensive to purchase, more cumbersome to use, and do not yield superior results to the hand-operated devices. The range and mean counts of GWSS adults collected with the bucket sampler closely matched the counts obtained with the D-Vac sampler while generally exceeding those obtained with either the A-Vac or beat net samplers (Figure 1). Regressions of log variance upon log mean for each device (Figure 2 - two devices only) yielded the regression parameters a and b (Table 1) that will be incorporated into Taylor's power law ($S^2=am^b$). The results presented here are for adults, but similar processing and data development towards a final sampling plan will be completed for GWSS nymphs as well.

Figure 1. Range (defined by vertical lines spanning each set of points) and mean (intersection of the vertical and traversing lines) counts of GWSS adults collected by each of four sampling devices in Riverside, CA during 2002.

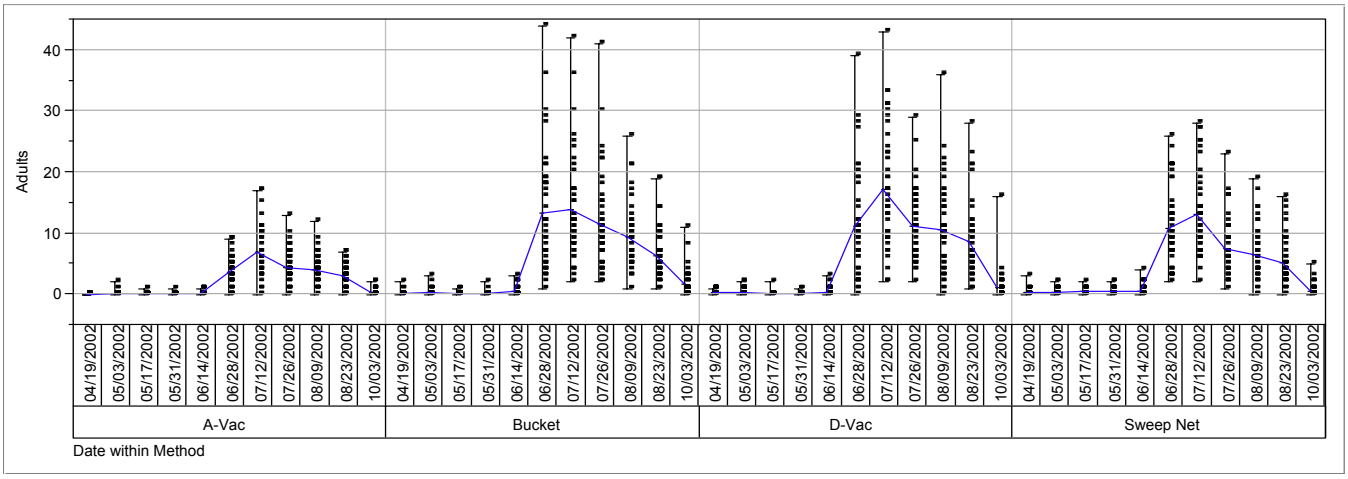
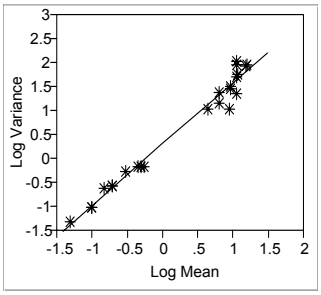


Figure 2: Mean-variance relationships for GWSS adults collected by the bucket (a) and D-Vac (b) samplers.

a) Bucket Sampler



b) D-Vac Sampler

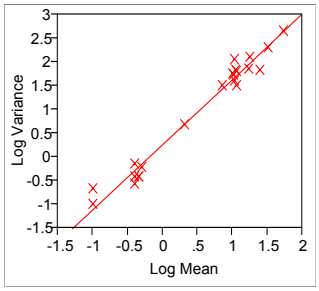
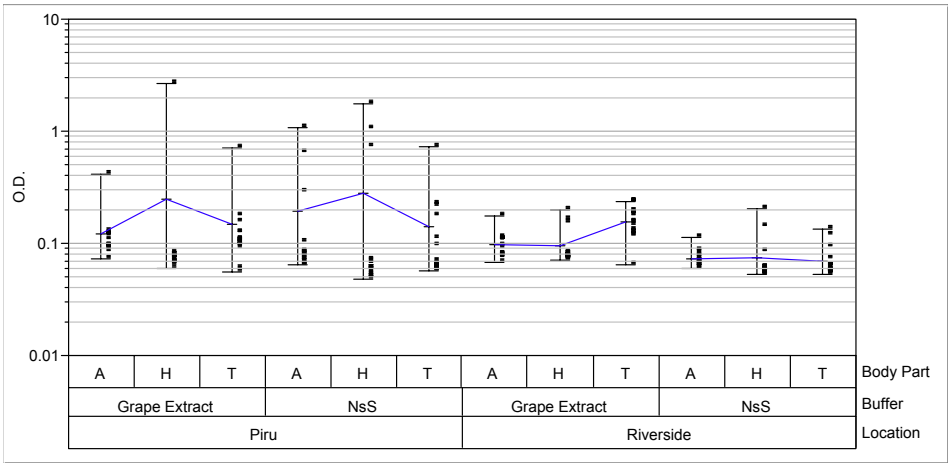


Table 1: Slope and intercept parameters generated by the regression of log variance on log mean for our sampling devices.

Device	Parameter a	Parameter b	R^2
A-Vac	1.18	1.15	0.98
Bucket	1.35	1.28	0.97
D-Vac	1.28	1.36	0.97
Beat Net	1.17	1.35	0.98

Samples of GWSS adults and nymphs were collected every two weeks from the sampling orchards and frozen for subsequent testing for *X. fastidiosa*. Various methods are being explored to determine the most effective detection system for *X. fastidiosa* in GWSS individuals. For ELISA detection using Agdia, Inc. (Indiana) reagents, different extraction buffers have been examined to determine which one controls nonspecific binding best without suppressing IgG binding to *X. fastidiosa.* When GWSS adult populations from Piru and Riverside were tested by ELISA using either grape extract or NsS buffers, lower optical density readings were obtained for negative controls using NsS buffer. There appeared to be no suppression of positive readings as a similar number of positives were obtained with the NsS buffer and the grape extract buffer (Fig. 3). A higher proportion of the population from Piru tested as strong ELISA positives for *X. fastidiosa* compared to the Riverside population (Fig. 3).

Figure 3. Individual GWSS adults from Piru and Riverside separated into abdomen (A), head (H) and thorax (T) seg-ments and homogen-ized in grape extract or NsS buffers. ELISA results are presented as optical density (O.D.) units. (See Figure 1 for details)



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