

Binomial Sequential Sampling for Management of Aster Leafhopper (Homoptera: Cicadellidae) and Aster Yellows Phytoplasma in Carrot: Impact of Tally Threshold on the Accuracy of Treatment Decisions

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ABSTRACT. We sampled aster leafhopper, *Macrostelus quadrilineatus* (Forbes), populations in 1996 and 1997 from central and southern Minnesota to develop a binomial sequential sampling plan for the leafhopper in carrot, *Daucus carota* (L.). Both conventional and organic farms were sampled with a sample unit consisting of 10 sweeps. Mean density ranged from 0.13 – 16.15 leafhoppers / 10 sweeps. Resampling simulation software was used with the Wald sequential probability ratio test to validate a binomial sampling plan from field data. Action thresholds were chosen based on aster yellows infectivity level (the proportion of individuals vectoring the phytoplasma) and varietal tolerance combinations. We used 2 infectivity levels (1 and 5%) and 3 varietal tolerance levels (resistant, intermediate, and susceptible) to represent 6 scenarios encountered in the field. Results from resampling validation analyses were used to select a final tally threshold (number of insects in a sample needed to consider the sample infested), based on the probability of making a decision to treat (i.e., operating characteristic). The operating characteristic was analyzed to determine which tally threshold provided the highest proportion of correct decisions. A tally threshold of 3 was selected as the overall optimum across infectivity level and varietal tolerance combinations. For the 6 possible infestation scenarios, 4 to 10 10-sweep samples were required to make a treat or no treat decision. Stop-line graphs are provided for field use for all 6 scenarios. Use of binomial sequential sampling plans should provide effective management of *M. quadrilineatus* in carrots and minimize sampling time and cost.

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