Dispersion pattern and sampling plan for Asian citrus psyllid, Diaphorina citri Kuwayama (Hemiptera: Psyllidae) in a citrus orchard

ABSTRACT

The ecology of the psyllid and its spatial distribution as the basis for the development of a reliable sampling plan are very important. The abundance and spatial distribution of Diaphorina citri (Hemiptera: Psyllidae) were studied in a commercial citrus orchard in southwestern Sarawak, Malaysia from April 2013 to December 2014. The spatial distribution of D. citri eggs, nymphs and adults were analysed using Taylor's power law and Iwao's patchiness regression. Taylor's power law fitted the data better and produced higher values of R2 than Iwao's regression model but did not work well with the egg populations. Based on both regression models, the field dispersion patterns of D. citri eggs, nymphs and adults were aggregated among flush shoots in individual trees as indicated by the regression slopes that were significantly >1. By homogeneity tests on both regression methods, the slopes of Taylor's power law and Iwao's regression model did not differ significantly for the D. citri population on honey tangerine for both years. The minimum number of flush shoots per tree required for estimates of D. citri densities varied from 2, 4 and 6 flush shoots for adults, nymphs and eggs, respectively, for the average density of each developmental stage obtained during our studies. Prediction suggested that a sampling plan consisting of 10 trees with the optimum number of six flush shoots per tree was required for reasonably accurate density estimation of the three life stages of D. citri acceptable enough for population studies and pest management program in citrus orchards.

Keyword: Diaphorina citri; Dispersion; Sampling units; Sample size; Citrus