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Abstract

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Effect of temperature on interspecific competition between *Eotetranychus sexmaculatus* Riley and *Oligonychus biharensis* Hirst (Acari: Tetranychidae)*

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Natural rubber is an important tropical crop. *Eotetranychus sexmaculatus* Riley has been an important phytophagous mite on rubber trees since the 1980s (Liu *et al*. 2022). In recent years, *Oligonychus biharensis* Hirst as presented an increasing trend of damage to rubber trees and has become another crucial phytophagous mite. These two spider mite species both inhabit and damage the leaves. They occur separately or together in the field and have high-overlapped ecological niches. Therefore, we hypothesized that interspecific competition existed between them, and their coexistence might inhibit the population growth of one or both species to obtain food and spatial resources (Li *et al*. 2018). Additionally, the outbreaks of these two spider mite species have often been found with high temperature and drought stresses. Therefore, focusing on whether there is competition between the two species of spider mites and how temperature affects them, the population dynamics of *E. sexmaculatus* and *O. biharensis* (female: male=1:1), and their mixed populations were assessed at 27, 30, and 33°C. For each treatment, 30 pairs of spider mites were used. There are five starting densities of *E. sexmaculatus* and *O. biharensis* individuals: 30 vs. 0, 0 vs. 30, 10 vs. 20, 15 vs. 15, and 20 vs. 10, respectively. The virgin male and female adult mites were picked and transferred onto the rubber leaves (96 cm^2). These mites were reared in climate chambers with different temperatures and the leaves were replaced regularly. The numbers of each mite stage were recorded every 5 days. The experiments ended when one of the spider mite species was extinct in the mixed populations. The results showed interspecific competition existed between *E. sexmaculatus* and *O. biharensis*. Either pure population of two spider mites was greater in numbers than the mixed populations. The populations of *E. sexmaculatus* were significantly suppressed by *O. biharensis*. The mean and peak values of the innate capacity of increase (r_m) were greater in *O. biharensis* than *E. sexmaculatus* in all treatments, indicating that *O. biharensis* was more competitive than *E. sexmaculatus*. Additionally, *E. sexmaculatus* was rapidly replaced by *O. biharensis* with the increased temperature, regardless of their starting densities. At 33°C, the highest interspecific competition coefficients were obtained (0.5695 and 0.6188, respectively) when the mixed populations of *E. sexmaculatus* and *O. biharensis* were 10 vs. 20 and 20 vs. 10. In conclusion, *O. biharensis* was more competitive than *E. sexmaculatus* at all tested temperatures, regardless of their starting densities.

Keywords: spider mite, temperature, interspecific competition, population dynamics

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