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Experimental approach in conservational biological control of *Spodoptera frugiperda* (Lepidoptera: Noctuidae): use of the prey detectability of arboreal tiger beetles in Sri Lanka

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Beetles in agroecosystems considerably contribute to natural pest control based on their different behavioral tactics in hunting and discriminating prey species. With highly specialized anatomical adaptations for predation, Arboreal Tiger Beetles (ATB) are voracious visual predators that feed on various small invertebrates. Though ATBs are frequently found in forest habitats with less vegetation, recent studies have recorded them from agroecosystems in Sri Lanka. Thus, this study aimed to identify ATBs' role using endemic *Derocrania scitiscabra* as a potential biocontrol agent of Fall Armyworm (FAW) larvae; a polyphagous pest in Sri Lankan agroecosystems. A laboratory-based cafeteria experiment was conducted to determine ATBs' choice on live vs. dead prey, the most preferred live prey, and the most favorable FAW larval instar stage. The effect of prey choice on larvae, in the presence of its most favorable prey was determined using Mann-Whitney (MW) U-test ($\alpha = 0.05$) in Minitab 19 software. The degree of individual diet specialization was quantified by experimentally testing individuals ($N = 9$) over time through repeated trials using minced meat, salmon fish, red fire ants (*Solenopsis geminate*), earthworms, and laboratory-reared 1-6 larval FAW as prey. ATBs' general feeding pattern preferred live prey over dead, and red fire ants were selected the most. The 2nd instars of FAW were the most preferable to the predator-prey body ratio as small prey is easier to manipulate & bite and shortens the handling time. According to the MW U-test ($w = 213$; $p = 0.66$), the presence and absence of red ants did not affect the prey choice of ATBs on 2nd instars in conditions having the same number of prey items, same observation time, and duration. As visual predators, ATBs' foraging decision is based on its evaluation of the overall size and the movement of prey. The larvae that displayed frozen behavior as an adaptation to mislead the predator, were avoided. This provides insights into biological control of FAW in Sri Lanka. However, field-based studies with a higher prey/predator density are vital to assess any harmful ecological implications of ATBs upon infested fields.

Keywords: *Spodoptera frugiperda*, *Derocrania scitiscabra*, arboreal tiger beetles, cafeteria test, predator-prey interactions

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