

Biology and ecology of the coffee berry fruit flies (diptera: tephritidae) at the University of Nairobi Farm, Kabete

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Abstract:

Past literature reveals that basic biological and ecological studies in Kenya on the coffee fruit flies were conducted nearly half a century ago. These studies were therefore initiated to update knowledge on the biology and ecology of the coffee berry fruit flies in view of changing farming practices and the influences of climate change. The experiments were carried out at the University of Nairobi farm at Kabete Campus and also laboratory studies were conducted at Kabete laboratory. The specific objectives of this study were to compare the life cycles of coffee berry fruit flies, to determine the timing of the emergence activities of both larva and adults and to determine the ovipositional behaviour of coffee fruit flies on coffee berries at different stages of their maturation. The flies were identified by analysis of their morphological features under a light microscope. Three species of coffee fruit flies were identified (*Ceratitis capitata* Wied, *Ceratitis rosa* Karsch and *Triethothrum coffeae* Bezzi) and their biology studied. Durations taken by the immature stages were studied and Friedman test used to test the hypothesis that there are no differences in the number of days required to complete development between the three species. The timing of emergence activities of *Ceratitis capitata* was studied by dividing mature larvae into two groups where one group was held indoors at a constant temperature of 20°C while the second group was studied outdoors under fluctuating temperature. To study ovipositional behaviour, five categories of berries namely; immature green, mature green, mature green-yellow, mature yellow-red and mature red berries were presented to gravid females. The oviposited berries were dissected under a microscope to examine for eggs. Statistical analysis by Analysis Of Variance (ANOVA) was used to test whether there were significant differences in the berry categories preferred for oviposition at $p \sim 0.05$ level. There were no significant differences in the number of days taken by eggs of the three species to complete development. The durations taken by larvae of the three species were different. There were significant differences at 0.05 level of significance in the number of days taken by larvae to complete development between the species (Friedman test $P < 0.05$). The pupal duration for the three species was similar as shown by Friedman test ($P > 0.05$). There were no statistical differences between the species in the number of days taken by pupae to complete development. There was synchronization in the life cycles of the coffee berry fruit flies with ripe coffee berries. The emergence activities of flies were observed to occur in the early hours of the day when temperatures were low which reduces mortality rate of the emerging larvae and adults. The emergence pattern of fruit flies was influenced by diurnal periodicity. The flies preferred to oviposit on mature ripe coffee berries compared to green berries. No eggs were oviposited in the immature green berries while in other categories, there were varying amount of eggs. In conclusion, there was no much change in the biology and ecology in the three species of coffee

fruit flies over the years. Most of the observations recorded in the life cycles were similar to those recorded by earlier authors. The synchronization of the life cycles of the three species of fruit flies provides sound ecological knowledge for planning effective management programmes. This makes control programmes cost effective and easy.