Makerere University

POPULATION DYNAMICS OF FRUIT FLIES (DIPTERA: TEPHRITIDAE) IN MANGO GROWING AREAS OF LUWERO AND WAKISO DISTRICTS, UGANDA

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DECLARATION

I, **Alex Mayamba** declare that the findings of this study are a result of my own original work, unless otherwise stated by reference and have never been submitted for any other degree award to any other institution of learning before.

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To the Almighty God who has brought me this far, my parents who worked tirelessly to see me achieve my goals, and to my dear wife Ruth Mayamba for all the encouragement and support you offered me during this time.

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LIST OF ABBREVIATIONS

IPS- International Pheromone Systems

DVDP - Dichlorovinyl dimethyl-phosphate

NARL- National Agricultural Research Laboratories

ANOVA- Analysis Of Variance

IAEA- International Atomic Energy Agency

ICIPE- International Center for Insect Physiology and Ecology

ME-Methyl Eugenol

MRL-Maximum Residue Level

NARO- National Agricultural Research Organization

MSI- Millennium Science Initiative

UNCST- Uganda National Council of Science and Technology

AFFP- African Fruit Fly Program

ABSTRACT

Population dynamics of major fruit flies (Diptera: Tephritidae) infesting mango orchards were monitored for 12 months using methyleugenol, trimedlure, terpinyl acetate and protein-baited traps in 2011 in Luwero and Wakiso districts, Uganda. Pupae recoveries from incubation of mango fruit samples were used to determine the fruit fly infestation levels. The trial was laid out in a split plot design with the months of trapping as the main plots and lures sub plots and replicated in four orchards. The effect of rainfall, relative humidity, temperature, mango plant phenological stages and alternative host plants diversity and abundance on the population dynamics of the fruit flies was also studied. The annual population of adult *Bactrocera invadens* (Drew) increased significantly ($F_{11, 0.091}$ =2.633, P = 0.003) from April and peaked in July, when mango fruits were ripening. It then started declining from August when the mango season was over. On the other hand, mango fruit infestation levels were also significantly different (H = 5.991, df =2, p-value < 0.0001), with highest infestation recorded in the period of April to May (peak of harvesting season) and June to July (period of late maturing fruit harvests). *Ceratitis* species were recorded in traps but did not emerge from the fruit samples. Highest trap catches for *Ceratitis* spp. were observed in the month of May but generally the populations fluctuated irregularly over the trapping period and their populations were extremely low. The results demonstrated that *B.invadens* is the most dominant species in the studied area. Regression analyses between fly populations with the biotic and abiotic factors indicated that percentage ripe mango fruits and alternative host plants abundance strongly influenced tephritid pest population in mango orchards. On the other hand climatic factors weakly associated with fruit fly populations. The results of this study have important implications on the decision-making process for safe, effective monitoring and management of major fruit flies in commercial mango orchards in the study area in Uganda. The results will also act as a biological calendar to anticipate the order and timing of management practices in line with the most vulnerable stages of mango fruits to fruit fly attack in central districts of Uganda.