ECOLOGICAL STUDIES ON SUBTERRENEAN TERMITE AND CONTROL AT ASMAILIA GOVERNORATE (EGYPT)

Submitted By

Amal Thabit Thabit Hussien

B.Sc. of Agricultural Sciences (Plant Protection), Faculty of Agriculture,
Cairo University, 2004

M. Sc. in Agricultural Sciences (Economic Entomology), Faculty of Agriculture,
Cairo University, 2012

A Thesis Submitted in Partial Fulfillment
Of
The Requirement for the Doctor of Philosophy Degree
In
Environmental Sciences

Department of Environmental Agricultural Sciences
Institute of Environmental Studies and Research
Ain Shams University

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APPROVAL SHEET

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This Thesis Towards a Doctor of Philosophy Degree in
Environmental Science has been Approved by:

Name Signature

1-Prof. Dr Ezzat Farag El-Khayat
Prof. of Economic Entomology
Faculty of Agriculture (Moshtohr)
Banha University

2-Prof. Dr. Yousef Az-Eldin Yousef
Prof. of Economic Entomology-Department of Economic Entomology
Faculty of Agriculture
Ain Shams University

3-Prof. Dr. Hassan Mohamed Ahmed
Head of Department of Wood Borers and Terming Unit
Institute of Plant Protection

4-Prof. Dr. Mohamed Salem Abdel-Wahed
Emeritus Prof. of Economic Entomology-Department of Economic Entomology
Faculty of Agriculture
Ain Shams University

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2-Prof. Dr. Hassan Mohamed Ahmed

Head of Department of Wood Borers and Terming Unit
Institute of Plant Protection
Agricultural Research Center (A.R.C.)

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ABSTRACT

All experimental of the study were conducted at Ismailia Governorate, Al-Qassasien location and laboratory of wood borers and termites department, Plant Protection Research Institute, these studies was aimed to survey and identifying the common subterranean termites species and their distribution at Ismailia Governorate, moreover, through the light on some ecological aspects of the most widespread subterranean termite species, Also, effect of some weather factors on different activities of the most common species; *Anacanthotermis ochraceus*, and finely, evaluation the efficiency of some Chemical insecticides, IGRs, Bio-pesticide and Co-formulated mixture under field conditions, the results obtained could be summarized as following: Two species of subterranean termites were found at Ismailia Governorate, the first and most widely distributed namely *A. ochraceus* (Burm.), while the second and less distributed namely *Psammotermes hypostoma* (Desneux). Data revealed that the harvester subterranean termite *A. ochraceus* (Burm.) had two peaks of activity annually in both two years of study. The first and the highest one took place between January and April while the second was relatively small size, took placed between August and October. The results obtained demonstrated that both of rain and relative humidity has a positive significant effect on subterranean termite *A. ochraceus* activity while the other tested factors (wind speed, solar radiation and mean temperature) has a highly significant negative effect in both two years of study. Data demonstrated that the different castes represented by 67.1, 32.7 ,0.18 and 0.0% for worker, nymphs, soldier and alates respectively, in the first year (2015/2016) and 72.9, 26.65, 0.226 and 0.15% for worker, nymphs, soldier and alates respectively, in the second year (2016/2017). Data revealed that the maximum of surface activity of subterranean termite occurred during the

moderate weather prevailing in November and early Spring (the maximum caught in the traps) while the minimum caught of the traps occurred in the hot months. The same trend of food consumption was observed in the same months, and finely the activity of soil translocation, which well-known fact that it is one of the most activity of subterranean termites, in this respect, data revealed that the highest rate of translocated soil occurred in April, reached 15.8 folds as food consumption, while the lowest occurred in February representing 2.41 folds as food consumption. Foraging activity of *A. ochraceus* in relation to changing of some soil physical and chemical properties were studied, the following results were obtained; an increased in the clay fraction, soil water stable aggregates, soluble salts and organic matter content tend to increase in materials of infested tunnels, infested traps, infested soil as compared to natural soil. Regarding soluble cations and anions, results showed that the distribution pattern of cations was found in the descending order of Mg^{2+}> Ca^{2+} > Na^{+}> K^{+} for the natural and traps soil while it changed to Ca^{2+}> Mg^{2+}> Na^{+}> K^{+} for the infested soil, for the tunnel soil it changed to Na^{+}> Ca^{2+}> Mg^{2+}> K^{+} . A wide range of insecticides belonging to Phenylpyrazoles group, organic phosphors (OP) (Chlorpyrifos), insect growth regulators (IGRs), Bio-pesticides and Co-formulated mixture group were evaluated under field conditions, using three concentration (half recommended, recommended and fold recommended). Results obtained revealed that the recommended and half recommended concentrations are sufficient to achieve agood results, and not need to use excessive concentration.

Keywords: Subterranean termite, *A. ochraceus*, foraging activity, caste composition, weather factors, control, soil properties

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