THE BIOLOGY OF THE FALSE SPIDER MITE *DOLICHOTETRANYCHUS FLORIDANUS*: A PEST OF PINEAPPLES IN CENTRAL QUEENSLAND

Richard C.D. Poli.
B.App.Sci. (Biol.)

1991

THE BIOLOGY OF THE FALSE SPIDER MITE *DOLICHOTETRANYCHUS FLORIDANUS*: A PEST OF PINEAPPLES IN CENTRAL QUEENSLAND.

A thesis submitted in part fulfilment of the requirements for the degree Master of Applied Science.

by

Richard C.D. Poli.
B.App.Sci. (Biol.)

1991
Biology Department.
School of Applied Science.
University of Central Queensland.

Table of Contents:

List of Figures Page

List of Tables: Page

Declaration:

I declare that the work described in this thesis is entirely my own and has not previously been submitted in any other form at any other university, institution or tertiary education centre for the award of a higher degree. The information derived from the published or unpublished work of any other person has been acknowledged.

Richard C.D. Poli.

Statement of Access.

I, the undersigned author of this thesis understands that the University College of Central Queensland will make this work available within the library, and that it will be accessible to library users and other approved libraries. This thesis should not be copied, or closely paraphrased without the consent of the author, and written acknowledgement of the assistance gained from this work. Beyond this, I do not wish to place any restrictions on this thesis.

R Poli

.....

Richard C.D. Poli.

Acknowledgements:

I would like extend thanks and appreciation to my supervisor, Dr. Robert Newby for his advice, guidance and encouragement through all phases of this research project. I am also grateful to the members of the Yeppoon Fruit Growers and Local Producers Association who provided funding, their time and knowledge. In particular I would like to thank, Bob Burrowes, David and Graham Clayton and Peter Hutton who willingly provide their land, time and resources to make the project a success. Thanks to Dr. E. Schicha, B.C.R.I. New South Wales Agriculture and Fisheries, for the mite identifications.

I must also extend thanks to Mr. Barry Cochrane for his statistical advice and assistance and to Mr. Dave R. Cardnell for his help and advice on computing matters. I would like to thank Dr. Keith Harrower for reviewing this manuscript. I must also thank the staff at the Biology Department of the U.C.C.Q. for their encouragement, and assistance.

Thanks also to Carol J. Brodie for the encouragement, moral support and friendship constantly provided.

Dedication:

Their wisdom and knowledge was bestowed on me, their courage and strength was not all they gave.

Dino and Rose Poli.

Abstract

The false spider mite (or red mite) Dolichotetranychus floridanus has been recorded on pineapple crops throughout the world. It reaches pest proportions sporadically, particularly in areas with hot dry weather patterns. In the late 1980's D. floridanus caused significant economic losses in the Yeppoon district of Central Queensland. Current literature on the false spider mite biology is limited with most publications orientated to taxonomy or records of presence/absence in crops. Anecdotal evidence is often vague or contradictory.

In the current study, field populations of D. floridanus and the predatory mite, Amblyseius benjamini were studied using three experimental regimes: normal horticultural practices, reduced pesticide treatment and reduced fertilizer treatments. Extraction and sampling procedures were developed to estimate field populations of all life cycle stages. Populations were sampled at six week intervals on 3 farms * 3 treatments * 5 plants * three leaves * 2 duplicates.

The false spider mites distribution along the axis of the pineapple crown was highly aggregated on the fifth and sixth basal leaf axils. The predatory mite A. benjamini did not develop substantial and aggregated populations within the leaf axils of the crown. In contrast it was prevalent on the subterranean stems and root material.

A high degree of seasonality within the false spider mite population was evident as population densities increased to damaging levels during the summer months and decreased in the winter months. The correlations of population densities with seasonal weather agreed broadly with anecdotal evidence but the statistical level of significance was not high. The coefficients of determination between mite numbers and rainfall, maximum and minimum temperatures were 0.28, 0.21 and 0.081 respectively.

The intra-plant variability and inter-plant variability were high when populations were low (during winter) but markedly less during periods of high population densities (summer).

Normal farming practice incorporates high levels of fertilizer application and use of a wide range of pesticides directed at various insect pests. Populations densities of D. floridanus were reduced by routine pesticide regimes, however residual populations are always present. Population densities were also lower on minimal fertilizer treatments. Juvenile stages were generally more sensitive to these treatments than the adult stages.

Predatory mite numbers were low in all treatments and probably exerted minimal control on the false spider mite populations. The pathogenic fungus Hirsutella sp. was sporadically present on false spider mites but exerted minimal control.

False spider mite dispersal in space and time is strongly linked with the use of crowns for plant propagation. New crowns are colonized early by mites from both the parent plant and adjacent plants. Storage of the crowns influenced both the condition of the crowns and the mite infestation levels.

Significant populations of false spider mites were found in soil and 'volunteer' plants. They provide intercrop and temporal dispersal. An additional important determinant of crop health and mite population densities is soil moisture. The level of which at planting and the time of year, may promote false spider mite infestations.

The results of the study provide foundations for future research into the effective control of the false spider mite. Further research is required on the detailed effects of temperature and rainfall (soil moisture and humidity) on population dynamics of D. floridanus. Such research will be required before an IPM program can be developed.