COLONIZATION AND ADAPTATION OF PREDACIOUS MITES

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APPROVAL SHEET

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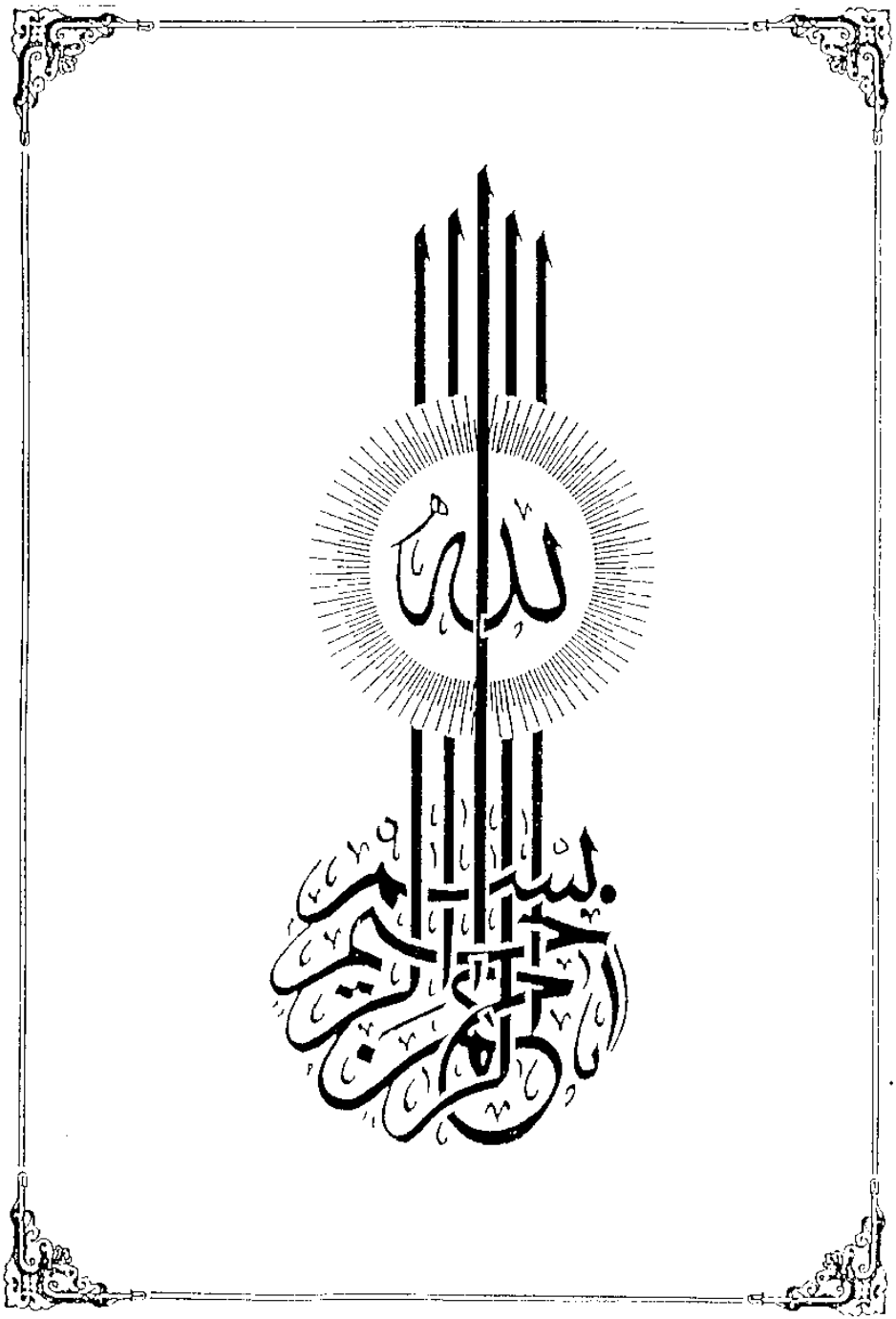

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GENERAL INTRODUCTION

One of the major problems that frequently faces fig growers in Egypt is how to control fig mites. There are many ways by which acarine damage may be restricted. The commonest is the application of toxic chemicals, but this method rarely produces more than a temporary reduction of the pest population. Thus, the dependence on biological control seems to be both the alternative and the inevitable solution to the control problem. The ecology of mite populations should be studied to gain understanding of the dynamics of the populations hoping that its mechanism may be revealed. It is hoped that the present study will lead to the understanding and the ability to manipulate populations of both mites and their natural enemies.

The present work was preceded by a preliminary survey, the result of which indicated the presence of three groups of mites which inhabit fig trees in this country, one group includes phytophagous species, the other predacious mites and the third scavenger mites. The most common of the phytophagous mites are Aceria ficus Cotte and Tetranychus arabicus Attiah. The predatory group is represented, mainly, by Phytoseius

plumifer (Canestrini and Fanzago) while the scavenger by Siculobata sicula (Berlese).

An attempt was made during the present investigation to gain an understanding of the following points:

1- The relationships between the main environmental factors (both physical and biotic) and the seasonal fluctuations in the populations of the fig tree mites.

2- The distribution of phytophagous and predacious mites on fig trees.

3- The effect of pollen feeding on the predatory efficiency of two phytoseiid mites.

4- Predator-prey interactions under greenhouse and nursery conditions.

PART I

THE RELATIONSHIPS BETWEEN THE MAIN ENVIRONMENTAL FACTORS (BOTH PHYSICAL AND BIOTIC) AND THE SEASONAL FLUCTUATIONS IN THE POPULATIONS OF THE FIG-TREE MITES

INTRODUCTION

This part of study was directed to obtain precise information concerning the relationship between the population density of each of *Aceria ficus* Cotte, *Tetranychus arabicus* Attiah and *Siculobata sicula* (Berlese) on the one hand, and certain weather factors on the other. The factors considered are the relative humidity, night minimum temperature and day maximum temperature. Furthermore, the population densities of the two phytophagous mites, *A. ficus* and *T. arabicus* were studied in relation to certain biotic factors. The analysis was based on data obtained from the different localities namely Borg-Elarab (Matrouh province), Beltan (Qaliubia) and Salah Eldin (Tahrcer) over two successive years (1968 and 1969).

REVIEW OF LITERATURE

A- The Effect of Weather Factors on Mite Populations

Kremer (1956), in Germany, reported that both Bryobia rubrioculus (Scheuten) and Panonychus ulmi(Koch) suffered high mortality under wet conditions.

Andres (1957) indicated that Tetranychus pacificus McGeregor to be less tolerant to high humidites than the two spotted spider mite, Tetranychus urticae (Koch), or atlantic mite, Tetranychus atlanticus McGeregor. Pacific mite, however, can be reared under comparable high humidities in the laboratory and greenhouse.

Boudreaux(1958) postulated that a favourable effect on reproduction and development under low humidities, as demonstrated in cases, results from increased feeding necessitated by higher water loss through cuticular evaporation.

Tanaka and Inoue (1959), in Japane, found that Oligonychus coffeae (Nietner) are subject to decimation following heavy rainfall.

Herbert (1962) related the differences in the rate of egg hatchability among overwintering mite populations in Canada to higher mean daily temperature.

Leigh (1963) noted that the absence of pacific mite, T. pacificus on cotton in certain areas of the eastern San Joaquin valley was due to higher humidities.

Oatman and McMurtry (1966) released phytoseiulus persimilis Athias-Henriot on T. urticae on strawberry in Southern California. They observed that weather factors (mean weekly maximum and minimum temperatures and total rainfall) during March and April had an adverse effect on the populations of both the prey and the predators.

Vrie et al. (1972) summarized the relations of humidity and humidity in combination with temperature in relation to spider mite densities and crop damage. Hot and dry weather had long been associated with outbreaks of certain tetranychids. It appears, however, that the same numbers of mites may cause greater injury during a hot, dry period than during a cool, humid one. Also, what is hot and dry for one species may not be so for another.

Rasmy et al. (1972) studied the effect of the daily mean temperature and relative humidity on citrus mites in Egypt. They showed that the daily mean temperature was positively correlated with the abundance of

Brevipalpus californicus (Banks) Eutetranychus orientalis (Klein) and Phyllocoptruta olivorus (Ashmead) while the relative humidity indicated a negative, but insignificant, correlation.

B- The Rôle of Natural Enemies and Competition in Reducing Mite Populations

i) Natural enemies (mainly predacious mites)

Several workers in Many parts of the world emphasized the rôle of the phytoseiid mites as predators of phytophagous mites.

Fleschner and Ricker (1954), in U.S.A., presented evidence indicating that Typhlodromus finlandicus Oudm. predated on Metatetranychus citri McGr., panonychus ceitri (McGr.) and Aceria sheldoni (Ewing).

Mathys (1958) working in Switzerland recorded 7 predators on P.ulmi, the most abundant of which Typhlodromus tiliae Oudm.

In Canada, Putman and Herne (1958) reported that Typhlodromus rehenanus (Oudm). attacked P.ulmi and Tetranychus telarius (L.). They added, however, that weather factors are probably equally important in their control.

Rambier (1958) regarded Typhlodromus aberrans Oudm., Typhlodromus solieger (Ribaga) and T.tiliae as the most important mite predators in the Mediterranean area, since they attacked all stages of tetranychid mites.

Ras and sudha (1964) suggested that the low population of P.citri in India was due to the activity of the predacious mites Typhlodromus largenoensis (Muma) and Typhlodromus aerials (Muma).

El Badry and El-Banhawy (1968), in Egypt, observed that Amblyseius gossipi El-Badry could develop and reproduce rapidly when fed on living individuals of Tetranychus cinnabarinus (Bois), E.orientalis and Oligonychus mangiferus (R. & S.).

Zaher et al. (1969) reported that, P.plumifer could develop and reproduce when fed on the different stages of the red spider mite, T.cinnabarinus.

Zaher and shehata (1971) showed that Typhlodromus pyri (Scheuten) fed on the different developmental stages of T.cinnabarinus.

(c) Competition

Lienk and Chapman (1951) suggested that the competition between P.ulmi and T.telarius might be an important factor in the early season suppression and the late