STUDIES ON FLORAL AND VEGETATIVE MALFORMATION OF MANGO TREES AND ITS RELATIONSHIP WITH ACERIA MANGIFERAE INFESTATION

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C O N T E N T S

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INTRODUCTION

Although mango trees are considered of the tropical trees, yet the area cultivated with mango in the U.A.R. has enlarged widely since one tree of mango was imported by Mohamed Ali Pasha in the year 1852. The area cultivated is now estimated as 21327 feddans (Ministry of Agriculture Statistics 1964). More than 50 % of this area is located in Sharkia and Giza governorates. An area of about 2,000 feddans of the new reclamated land at Tahreer Province was recently added to mango plantations.

Abnormal symptoms in vegetative growth in mango trees were first recorded in Egypt in the year 1930 and were attributed to infestation with thrips ((Ziayadi and Serowr, 1930). The Apical buds are affected, stop growing and hence many lateral buds grow giving a stunting appearance to the branch. Later on, another phase of malformation in floral growth was observed. This phase includes abnormal type of panicles which are round and compact instead of the raceme shape of sound panicles. Some later workers attributed these symptoms to the effect of an eriophyid mite Aceria mangiferae Sayed, living in the buds of the trees.

Conflicting results were obtained by research workers concerning how much success is gained in stopping or even reducing the abnormal vegetative and floral growth following control of the eriophyid mite in diseased trees. From that date many other factors were suspected to have a role in causing the abnormal symptoms.

As the above phenomenon affects the economy of mango cultivations by affecting the yield of diseased trees, it was deemed desirable to study the relation between the existance of Aceria mangiferae and the the phenomenon of malformation in different locations and different varieties of mangoes. In this work this correlation, as well as the density of the mites inside the buds allover the year are studied.

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REVIEW OF LITERATURE

The phenomenon of malformed vegetative growth of mango trees in the U.A.R. was first recorded and described by Scrowr and Ziayadi, 1930, and was attributed to infestation with Scirothrips (Thysanoptera). Hassan (1944), stated that young trees of mango are liable to abnormal malformed vegetative growth, and he attributed its cause to the attack of an eriophyid mite which he gave the name Briophyes mangiferae.

Sayed (1946), described the mite as Aceria mangiferae Sayed, and stated that this mite attacks the terminal buds of young and old mango trees in both heavy and light soils. Due to the infestation of the mite, the buds dry off and stop growing, other lateral buds grow but they will be also infested. Finally the stems appear stunted and deformed. He also described another phase of infestation concerning floral growth; infested flowers tend to be round in shape instead of the ordinary raceme type.

Attiah (1955), described a second eriophyid mite Vasates mangiferae Attiah infesting mango trees. He stated that symptoms caused by infestation with Vasates mangiferae are different from those caused by Aceria mangiferae. "The latter is slow in both effect

and motion, it weakens the terminal bud and consequently, many lateral buds around it grow up forming a stunting appearance. Ultimately, infested buds die and hence growth is hindered. Vasates mangiferae on the contrary, is much more active and causes a quicker effect on the bud which dies without producing any lateral buds."

Vegetative and floral malformation on mango trees are considered two phases of the same disease. Tripathi (1954), studied the correlation between both symptoms on different varieties and found a high positive correlation between both. He therefore concluded that both malformation of vegetative growth which he called "bunchy top" and floral malformation, could be considered as symptoms of the same disease which he gave the name 'mango malformation."

Volk oil (Hassan 1944) and wettable sulfur (Ministry of Agriculture recommendations), were both suggested as means of control for the bud mite Aceria mangiferae and the phenomenon of mango malformation in Egypt. Yet it was noticed for several seasons that no improvement concerning mango malformation was gained after using the previous methods. For that

reason Attiah (1959), tried different acaricides of which Systox 50 % at the rate of 75 cc/100 litres water at 15 or 21 day intervals during the period of vegetative and floral growth was found to be very effective against the mite living inside the buds, yet no improvement was gained concerning symptoms of disease. For that reason he suspected that a virus disease might be responsible for the phenomenon of malformation.

Argument all over the areas cultivated with mangoes were raised. Causar (1959), stated that symptoms of malformation and damage in mango trees are attributed to a virus. Singh and Jawada (1961), found that malformation in grafted plants of over than 100 varieties varied with the variety. They also stated that malformation appeared to be connected with infestation with the mango hoppers; pruning and removing the affected panicles did not cure the trees. Singh et al.(1961), stated that malformation does not appear to be caused by nutritional dificiency; efforts to isolate bacterial or fungal pathogenes failed. They were also incapable of transmission of the disease by sap inoculation, inarching, bark patch budding or by insect. "However"

they stated "symptoms of malformation were induced by three species of mites, viz. Aceria mangiferae, Typhlodromus asiaticus and Tyrophagus castellinii. It was not established whether the malformation was due to the activities of the mites themselves or to the transmission of a virus disease." Deral et al. (1962), stated that the mite damage was almost completely eliminated by spraying with either 0.1 % Folidol or 0.1 % Ekatin after removing the affected inflorescence; removal alone was 98 % effective in one year. On the other hand, Prahsad et al.(1965), stated that they could not control the disease by any acaricidal spray starting before the bud burst stage or by pruning the diseased panicles. They also found no difference between the population of Aceria mangiferae harbouring healthy or malformed terminal buds, hence no correlation between the population of the eriophyid mite and the disease could be established. They reported that," in a complete fertilizer trial there was an indication that at lowest levels of both P and K along with increasing levels of N, there is a decrease in the percentage of malformed panicles."

Jagirdadar and Jafri (1966), suggested that the disorder in mango growth is related to the balance of

auxins and anti-auxins in plant at the time of floral differentiation, which might be indirectly caused by factors as pests, diseases and nutritional dificiencies.

Osman (1966), stated that spraying with a mixture of Thiocron and mineral oil for three times each two weeks from the beginning of March was the leading treatment regarding mite control, giving an average yield 9 times that of the untreated. Also Ral and Singh (1967), stated that bunchy top in mango scaplings associated with infestation with Aceria mangiferae, was reduced by spraying with Diazinon emulsion.

On the other hand Attiah et al.(1967), and Attiah and Kodirah (1967), carried out many experiments using different methods including spraying, fumigation and soil treatments against the bud mite Aceria mangiferae on different varieties of mango in different locations. Compounds used were Tedion Thiovite + Orthotran, Systox, Wettable sulfur + Orthotran, Zineb, Chlorobenzilate, Kelthane, Thiocron, Delnav, Metasystox, Temec granules and fumigating with Hydrocyanic gass on the varieties Company, Hindy and Taimour. They stated that some of the

previous compounds were successful for controlling the bud mites, but no treatment was effective against malformations.

No much work has been done concerning the biology of eriophyid mites. Kido and Stafford(1955), studied the population density of the bud strain of the mite Eriophyes vitis (Pgst.). They found that the overwintering forms were predominently adult females, and stated that," the high level of adult forms during the fall and winter months in comparison with the number of eggs laid can best be explained by assuming that the mites survive for several months."

It is of great interest to mention that the ovoviviparous Way of reproduction was found in two different species of eriophyid mites;Hall (1967), observed hatching larvae inside the body of the females of Vasates quadripeds and recorded that Shevshenko (1961), observed living larvae inside the body of the female of Eriophyes laevis (Nalopa). However, Hall stated that the egg-laying habit is more pronounced in both of them.

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MATERIALS AND METHODS

Three different locations of the U.A.R. where mango orchards are wide spread were chosen to represent different climatic conditions and soil structures. In each location only one orchard was selected. These orchards and their locations were: Dranit at Beheira Governorate, Anshas at Sharkia Governorate and Barrage at Kaliobia Governorate. In each orchard a certain number of economic varieties of mango trees were chosen.

Two different studies were undertaken :

1- Correlation between numbers of mites Aceria mangiferae Sayed existing in the buds of mango trees and percentages of malformed flowers in different varieties.

A certain number of mango trees was chosen from each variety in the different locations. Six buds were collected at random regularly on intervals of one month from each tree and the numbers of bud mites were counted by means of a stereoscopic microscope. Collecting of these buds lasted for two seasons beginning on 26.1.1965 and ending on 26.9.1967 at Dranit, and beginning on 2.8.1965 and ending on 2.7. 1967 at Anshas. In the barrage samples were taken

for one season only beginning on 13.8.1966 and ending on 13.7.1967. In each season the total numbers of flowers carried by each tree were counted during April while the numbers of malformed flowers were counted during June, i.e. after the setting of fruits. The percentages of malformed flowers to the total number of flowers carried by each tree were then calculated. Correlation between these percentages and the numbers of mites existing in buds of each tree in each month were calculated. Also the correlation between the total number of mites existing in buds of each tree during each whole season and the percentages of malformed flowers was calculated. As the differentiation of flowering buds and inflorescene development generally occur during a period of six months from August to February of the following year (Azzouz 1961), a third correlation between the total numbers of mites existing in the buds of each tree during the previous period and the percentages of malformed flowers was also calculated.

For the previous studies the following varieties and numbers of trees were chosen in the different orchards :