

EFFECT OF HOST PLANTS ON THE SUSCEPTIBILITY OF SOME LEPIDOPTERA TO MICROBIAL DISEASES

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ARABIC SUMMARY

I. INTRODUCTION

The past two decades have witnessed a marked revival of interest in the microbial method of insect pest control. This resulted from a growing realization that supplements and alternatives to other control methods, particularly the chemical insecticides, are needed to overcome some of the faults and weaknesses now recognized as inherent in chemical control methods.

The scope of microbial control investigations is now considerably extended. Such extension is expressed in many ways, mostly recognized in the increasing use of entomopathogens against various insect pests. It is also noticed in the increase in basic research dealing with the pathogens themselves, their virulence and the factors influencing their efficiency ...etc.

Food is an important factor that seems to play a considerable role in the susceptibility or resistance of insects as well as the virulence of the entomopathogen. Extremely little reliable information is available relating to how nutrition of phytophagous insects affects their susceptibility to entomopathogenous microorganisms

AIM OF THE PRESENT WORK

The present work deals with the study of the following points :

1. Testing the action of foliage extracts and juices of a number of insect host plants on several members of the entomopathogenic bacteria in vitro.
2. Evaluation of the action of plant foliages in the form of gut contents, after being ingested by the tested insects, on different entomopathogenic bacteria in vitro.
3. Testing the plant foliage that show antibacterial activity (without being treated with the bacteria) in order to detect any possible toxic action of the plant itself upon the insects.
4. Testing the susceptibility of three serious insect pests (the cotton leaf worm) Spodoptera littoralis, (the lesser cotton worm) Spodoptera exigua, and (the imported cabbage worm) Pieris rapae, and one beneficial insect (the silk worm) Bombyx mori, to different entomopathogenic bacteria as affected by their host plants.

5. Testing the effect of foliage extract on the development of different strains of the bacterial entomopathogens.

6. Testing the effect of volatile substances released by plant foliage on the growth and cultural characteristics of the tested entomopathogenic bacteria (Crystalliferous spore-forming Bacillus).

7. Determination of the bacteriostatic and the bactericidal concentrations of foliage extracts of plants that proved to have inhibitory activity on the Bacillus strains.

8. Studying some factors affecting antibacterial activity of foliage extract such as :

- i) Extract concentrations.
- ii) pH values.
- iii) Foliage age.
- iv) Anaerobic conditions.

9. Determination of the chemical nature of the substances having antibacterial activity in foliage extracts by fractionation, separation, purification and identification methods.

CHAPTER II
LITERATURE REVIEW

II. LITERATURE REVIEW

On the Antibacterial Characteristics of Some Plant Extracts

Biological control of phytophagous insects by disease-causing organisms depends on the understanding of interrelationships between host insect, pathogen and plant.

The occurrence, chemical nature, and dynamic role of antimicrobial substances in host plants in such relationships is poorly understood. The antibacterial substances present in phytocides of higher plants are attracting increasing attention, not only on the field of medicine, but also in various specialized fields of biology.

Osborn (1943), reported that various plant species contain antibacterial substances protecting such plants against microbial diseases.

Gaumann (1950), cleared that antimicrobial substances are found in the leaves, stems, and roots of a number of plant species.

Such substances have been considered primarily as protective agents against attack on the plant by bacteria or fungi.

The nutritional state of insects, as well as of other animals, is of a great importance in determining their degree of susceptibility to disease. However, the precise role that nutrition plays in this respect is generally not understood. Steinhaus (1954), stated that there exists extremely little reliable information relating to how nutrition affects the resistance and susceptibility of individual insects or small group of insects to disease.

Heimpel (1955), pointed out that the mid-gut of moulting larvae of the larch sawfly, Pristiphora erichsonii Hartig, is usually devoid of food and rather foliage. It may be that bacteria are better able to grow in the gut-contents of such larvae than in those of feeding larvae, so that if they can enter the insect's gut when it is not feeding, or can remain after the food is gone, their chance of growth is much better.

Garber (1956), in his "nutrition - inhibition hypothesis" suggested that pathogenicity must always be defined as a two component-system, the host-parasite relationship. He stressed that only the combination of adequate nutritional and ineffective inhibitory environments can result in virulence of a pathogen to the susceptible host. He noted that for a plant, (or the other) pathogen to grow it must : (a) find sufficient nutrient material in the host, and (b) not to be inhibited by either its mechanical or chemical environment in the host.

Ferenczy (1956), mentioned that antibacterial compounds occur in the seeds and fruits of many plant species. Such compounds were considered mainly as protectors of the plants against disease-causing bacterial organisms. Gukasian (1958) studied the influence of coniferous foliage on Bacillus dendrolimus Talalaev, and Serratia marcescens Bizio.

Heimpel and Angus (1958), pointed out that the presence of antibacterial substances in the insect gut might be detrimental for the development and multiplication of the ingested bacteria.