PERSPECTIVE

Fitness, behaviour, and detoxification are affected by both monoculture and polyculture. the *Bemisia tabaci* metabolism (*Hemiptera*: *Aleyrodidae*)

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ABSTRACT

At Different herbivores react differently depending on the degree of plant diversity present. Highly polyphagous herbivores like *Bemisia tabaci* Gennadius (*Hemiptera: Aleyrodidae*) do significant harm to a variety of crops. Here, using both preferred and less preferred host plants such as Chinese cabbage *(Brassica rapa L.),* tomato (*Solanum lycopersicum L.*), kidney bean (*Phaseolus vulgaris L.),* and summer squash, we raised this species in both polyculture and monoculture (*Cucurbita pepo L.*). Trends in oviposition and survival were noted, and the effects of plants on the growth and development of *B. tabaci* were investigated, with a focus on the insects' enzymatic activity for digestion and detoxification. We discovered that the monoculture treatment for Chinese cabbage had the highest survival rate. In the setting of polyculture, more eggs were seen in each of the four plant species tested. The activity of Superoxide Dismutase (SOD) and Alkaline Phosphatase (AKP) in B. tabaci fed in a choice situation was significantly lower than in those fed with tomato monoculture, indicating a diluted level of toxicity with a multi-plant diet compared to a less desirable host plant diet.Additionally, there was a bad correlation between the SOD quantity of whiteflies and the survival rate of B. tabaci in monoculture. Chinese cabbage's Polyphenol Oxidase (PPO) and Catalase (CAT) activities were lower in the polyculture than in the monoculture in the plants infected by whiteflies. These findings suggested that multi-plant treatments would be less hazardous to polyphagous herbivores and include fewer secondary metabolite compounds.

Key Words: *Rhizosphere*; *Rhizoctonia*; *Pseudomonas-specific*; *Rhizoctonia Diseases*;

INTRODUCTION

Numerous studies have demonstrated the advantages of a varied diet for different species, especially herbivores. The size, movement, information-seeking capacity, brain structure, and habitat of an insect can all have an impact on the range of its diet. A complex sensory environment might also make it harder to choose a meal or divert attention away from eating.

Insects can be classified as monophagous, oligophagous, or polyphagous depending on their variety of hosts. Studies on the interactions between plants and herbivores suggest that oligophagous insects run the risk of starvation if the preferred host plant is not available, while polyphagous insects benefit from reduced time spent searching for food, a wider variety of options, a greater likelihood of enemy-free spaces, nutritional complementation, and toxin dilution.

Bemisia tabaci (Gennadius) is a *Hemiptera: Aleyrodidae* insect that is found all over the world in tropical and subtropical climates as well as certain temperate settings. It is incredibly polyphagous, feeding on more than 900 different plant species. It poses a threat to the development of vegetables and crops and results in significant financial losses for agriculture. The quantity and distribution of preferred or non-preferred hosts, however, have a substantial impact on the food source selection behaviour and suitability of polyphagous insects, which have a variety of both preferred and less-preferred host plants. Therefore, it is crucial to comprehend how B. tabaci reacts to host polyculture since doing so could help build a stronger case for environmentally friendly pest control.

According to research, herbivores may consider host compatibility, host distribution, interspecific competition, and predation, as well as their prior feeding experiences, when choosing which plants to consume. The optimal oviposition theory and the optimal foraging theory are the two main hypotheses that have been put forth to explain how evolutionary and ecological factors influence host plant choice. To understand their evolutionary ties, researchers have concentrated on the behaviour or biochemical response of herbivorous insects to a particular plant or multi-plant diet. One illus-

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-tration is that *Schistocerca americana L.* grows more quickly in a combination of plants than in a monoculture. Additionally, *Malacosoma castrensis L.* and *Nezara viridula L.* may benefit from polyculture.

These observations have generated some discussion. One theory is that when given options in the host plant, polyphagous individuals make erratic decisions. In this circumstance, the lengthened time spent foraging results in a shorter amount of time spent eating, which has an effect on colony growth. Because *B. tabaci* has been living in monoculture for a longer period of time, its performance has improved. An alternative theory, however, contends that the high fertility of *B. tabaci* is caused by feeding on the most advantageous host plants, even within plant combinations. It might be assumed that females prefer ovipositing on the species, which might improve the chances of their progeny faring better. Both insect herbivores and the plants that serve as their hosts are developing resistance mechanisms at the same time. Whiteflies have a range of enzymes that are involved in the nutrition, development, and adaptation of the insects to their host plants. The digestive enzymes' activity in B. tabaci reflects how well-suited they are to the specific host plant present. The amount of digestive enzymes secreted by insects can be changed by secondary metabolites in plants, either increasing or decreasing it. Testing the digestive and detoxifying processes in *B. tabaci* and the host plants is crucial because the results will reveal how polyphagous insects react to the presence of numerous hosts.