Plant resistance towards detrimental and damaging insect species is often a natural phenomenon based on the self-defence mechanism of plants. However, desired resistance towards specific pests can be attained by suitable technological interventions. Primarily, plant resistance to pests results from coevolution of insects and plants, and it is crucial for their co-existence also. However, many a times, during the domestication process of certain plants, some important features of plant resistance may be inadvertently removed or lost by the plant breeders which can increase the susceptibility of domesticated strain towards insect damage. These factors then necessitate the additional selection of insect resistance factors in plants. In agricultural scenario, insect resistant varieties often serve as a boon as the insect-resistant crops can sustain more damage and tend to yield more than a vulnerable/susceptible crop when encountered with insect pest invasions.

1. Effect of Insect Pest-Plant Host relationship

   There are two major effects of Insect Pest-Plant Host relationship.

   a. The Insect resistant crops have the capacity to suppress the abundance of their insect pests upon usage.

   b. Insect resistance traits elevates the tolerance level of plants towards insect inflicted damage.

   In other words, insect resistant plants alter the relationship which an insect pest shares with its host plant.

2. Types of insect resistance and mechanism

   The relationship between insect and plant depends on the type of insect-resistance harboured by plant species. Mainly, there are three types of insect resistance in plants: Antibiosis, Antixenosis or Non-preference and Tolerance.
The mechanism of these three methods was explained by Painter in 1951 and is described below.

a. Antibiosis

Antibiosis is the process of insect-resistance in which there is an adverse effect of host plant on the biology i.e. survival, development and reproduction of insect pests and on their resulting progenies which also get affected because of the biochemical and biophysical factors released.

Antibiosis severely affects the entire biology of associated insects, so the pest abundance as well as subsequent damage is hugely reduced. Antibiosis resistance often results in increased mortality or reduced longevity and reproduction of the insect pests.

At larval stage, antibiosis is manifested by death of the larvae, abnormal larval growth etc.

Antibiosis may occur due to presence or release of toxic substances by the plants in the surrounding environment, absence of sufficient amount of essential nutrients and/or due to imbalance or improper utilization of nutrients (Figure 1).

![Antibiosis in plants](image1)

Source: Pratibha, P. et al., 2013. In book: Sustainable Agriculture Reviews

**Figure 1: Antibiosis in plants**
b. Antixenosis or Non-preference

Antixenosis insect-resistance affects the behaviour of an insect pest and is usually expressed as non-preference of the insect for a resistant plant variety as compared with a susceptible crop variety.

Antixenosis is the response of the insect for the characteristic of a plant which make it unattractive to the insect for its life processes such as feeding, oviposition or shelter.

This type of insect-resistance may occur due to the physical nature or chemical composition of such resistant plants e.g. presence of trichomes in plants which affects insect oviposition (Figure 2).

![Figure 2: Antixenosis in Plants](image)


c. Tolerance

Tolerance is the method of insect-resistance in which plant is able to withstand the damage or able to successfully recover from the explicit damage caused by the insect pest as compared to the susceptible variety. Tolerance is a way of plant’s response towards an insect pest.

So, in tolerance, the damaged plant swiftly repairs its damage and initiates quick development of new tillers, roots, foliage etc.

Thus, Tolerance resistance completely differs from the antibiosis and antixenosis resistance in how it affects the insect pest-plant host relationship.
Antibiosis and antixenosis resistance cause an insect response when insects attempt to use the resistant plant for food, oviposition or shelter whereas tolerance checks the plant’s capacity to withstand any damage caused by its voracious pests.

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