

Role of Toxins in Pathogenesis

The literal meaning of toxin is poison. In plant pathology the term toxin is used for substances ,usually, not invariably of pathogen origin which are injurious to plants and directly or indirectly play a role in disease development(pathogenesis).De Bary (1886) showed that plant pathogens produce toxins but experimental proof to support this hypothesis came only in 1913.Roux and Yersin (1888) first evidenced toxin production in the disease caused by *Corynebacterium diphtheriae*. In fact the role of toxin in disease development was established in animal system.

A toxin can be defined as a substance of microbial origin involved in host pathogenesis. A phytopathologist Gaumann(1954) stated “ Micro-organisms are pathogenic only if they are toxigenic: in other words the agents responsible for causing disease can damage host only if they form toxins-microbial poisons –that penetrate into the host tissue.Dimond and Waggoner (1953) regarded toxin as a phototoxic compound secreted by a microorganism. Graniti (1972) said that toxins should be directly toxic to cells, which even in low concentration can induce disease.Graniti used the term Phytoaggressin in place of toxin. Sometimes the term phytotoxin is used to specify it for plants reference.Dimond and Waggoner (1953) a term Vivotoxin as “ a substance produced in the infected plant by the pathogen and/or its host which functions in the production of disease,but is not itself the initial inciting agent of disease.” Their explanation is based on the Koch’s postulate with some modifications. According to Dimond a vivotoxin must fulfil the following criteria:

1. It must be isolated from diseased host but not present in healthy one.
- 2.It must be characterized chemically
3. When reintroduced in pure form into a healthy host,it must produce the symptoms of disease or a portion of the syndrome.

Toxins are proteins which are antigenic in nature and have antitoxins. They are different from enzymes in that they do not attack the structural integrity of the host tissues but affect the metabolism. Toxins act directly on the protoplasts of cells and substances with the same end effect but an indirect method of action are not toxins..Some times as in the case of *Clostridium welchii*, an enzyme lecithinase is a toxin because it disrupts cell membranes. Such enzymes are toxins.

Classification of toxins—

According to Wheeler and Luke (1963), there are three types of toxins, namely Phytotoxins, Vivotoxins and Pathotoxins.

Phytotoxins are compounds produced by microorganisms which are toxic to plants. These are non specific, incite few or none of the symptoms that are incited by the pathogen, and in most cases, show no relation between toxin production and pathogenicity e.g. Lycomarasmine and Alternaric acid