

Bt-Protein and its Action

***Bacillus thuringiensis (Bt)* is a spore forming bacterium commonly found in soil, that produces crystals protein (cry proteins).**

Bt- Proteins require certain specific conditions for them to be active against the insect. *Bt* has to be eaten to cause mortality. The *Bt* toxin dissolve in the high pH insect gut and become active. The Protein requires an alkaline gut with a suitable pH(9.5 and above) for its activation. It has no known effect on wildlife such as mammals, birds, and fish.

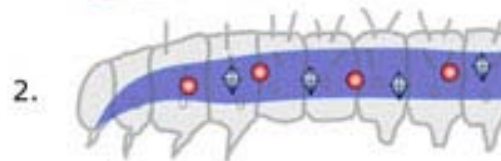
The toxins then attack the gut cells of the insect, punching holes in the lining. The *Bt* spores spills out of the gut and germinate in the insect causing death within a couple days.

Action

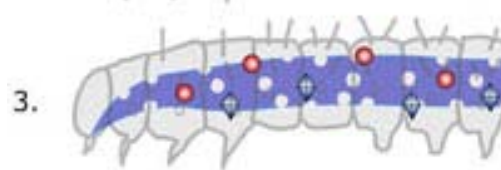
1. Insect eats *Bt* crystals and spores.



2. The toxin binds to specific receptors in the gut and the insects stops eating.



3. The crystals cause the gut wall to break down, allowing spores and normal gut bacteria to enter the body.



4. The insect dies as spores and gut bacteria proliferate in the body.



In Bt Cotton Plants, the expression of Bt protein is constitutive i.e., the protein is expressed in all parts of the plant. When the Larvae feed on Bt plants they ingest Bt protein along with the plant tissues. If it is a susceptible insect like Bollworms, the Bt proteins get activated in the mid-gut. Interaction between the activated Bt protein and the receptor results in holes being formed in the insect intestine, causing destruction of the gut lining. The haemolymph (insect blood) carrying ions and vital nutrients leak into the intestine. This leads to the paralysis of the insect gut and as a result the insect stops feeding.

