

How Larvicides Work – Jeff O’Neill

- a) Microbial larvicides
 - 1) Must be ingested
 - 2) Toxins unravel and bind to surface membranes in the larval gut
 - 3) Makes the gut leaky
 - 4) Particles that sink down through water column
 - 5) Bti attaches to a lot of sites
 - (i) 4 major toxins
 - (ii) Works on many mosquito species
 - 6) Bs attaches to a few sites
 - (i) Two major toxins
 - (ii) Both must be present to cause toxicity
 - (iii) More persistent – recycles
 - (iv) Narrow species spectrum
 - (v) Sub-lethal effects
 - (a) Decreases emergence
 - (b) Prolonged larval and pupal development
 - (c) Reduce energy stores in adults
 - 7) Resistance management
 - (i) Use alternate modes of action
 - (ii) Mix Bti with Bs (1:10 ratio) to synergize activity
 - 8) Practical considerations
 - (i) Water temperature
 - (ii) Species and stage
 - (iii) Sedimentation
 - (iv) Number of larvae vs AI units (density)
 - (v) Wet-dry intervals
 - (vi) Storage
 - (vii) Alternate food supplies
 - (viii) Depth of water
 - (ix) Other
- b) Insect growth regulators (IGRs)
 - 1) Methoprene
 - (i) Juvenile hormone mimic
 - (ii) Interferes with insect growth and development
 - 2) Insect brain secretes juvenile hormone to suppress RNA synthesis
 - 3) Shuts off during last instar so embryonic cells can develop
 - 4) Adding methoprene stops cellular division so insect starves in pupa without being able to develop
 - 5) Dissolves into solution in all directions
 - (i) Releases slowly into water
 - (ii) Lighter than water
 - 6) Most issues seen with microbials are not seen with IGRs
- c) Spinosid

- 1) Mixture of fermented chemical compounds
 - (i) Two active ingredients
 - (ii) Tetracyclic ring with attached amino sugars
- 2) Not easily dissolved in water
- 3) Works more like an OP
 - (i) Binds to acetylcholine receptors
 - (ii) Hyper-excites the nervous system
 - (iii) Quick kill
- 4) Resistance develops very quickly (within a few years of use)
 - (i) Also get resistance to Bs at the same time
 - (ii) Be very careful using this product