

Investigations Related to Bti Efficacy and Larval Black Flies - Elmer Gray

- a) UGA - black fly colony
 - i) Established 1981 at Cornell
 - ii) Moved to Clemson in 1991
 - iii) Now the only established black fly colony in the world
 - iv) Supported by Abbott Labs - now Valent BioSciences
 - v) 9 tanks currently in place
 - vi) Currently over 2 million flies in colony
- b) Projects
 - i) Basic research
 - ii) Quality control
 - iii) Special requests
- c) Black fly
 - i) Attach to substrate
 - (1) Silk glands - spin a silk pad
 - (2) Attach by hooks
 - ii) Filter feed in current
 - iii) Indiscriminate filter feeders
- d) Control
 - i) Bti
 - ii) Challenges
 - (1) Flowing water
 - (2) Habitat change through length of waterway
 - (3) Water quality
- e) Efficacy Study - Antibiotics
 - i) Susquehanna River
 - (1) Threatened system
 - (2) 2 branches join to form a main stem
 - (3) Many different kinds of input
 - (4) Antibiotic issue (Broderick et al 2006) from agricultural contamination
 - ii) Study protocol
 - (1) Larvae exposed to antibiotics for 48 and 72 hours in shakers
 - (a) Exposed at rates in river
 - (b) Exposed in combination
 - (c) Exposed at higher rates
 - (2) Exposed to Bti
 - iii) Results - no loss of efficacy
 - iv) Paper accepted for publication
- f) Efficacy Study - Turbidity
 - i) Suspended solids causing a reduction of >30% in Bti efficacy
 - ii) Dissolved particles had no effect on efficacy
 - iii) Re-suspension of solids also caused reduced efficacy
 - iv) Data suggest that there may be feeding competition between Bti and suspended clay particles
 - (1) Bti binds to clays
 - (2) However, adding clays to bioassays did not lead to reduced efficacy

- g) Efficacy Study - Cations
 - i) Could these affect Bti proteins?
 - ii) No effect seen
- h) Efficacy Study - pH
 - i) Ranges from 7-9 in the river
 - ii) No pH effect was seen during bioassay
 - iii) Some report increased efficacy at higher pH
- i) Efficacy Study - Algae
 - i) Previous published work shows that green algae can reduce efficacy
 - ii) Appears to be related to particle size
- j) The work continues!