

7/29/04 NDSU - Fargo

Gary Brewer, Chair of Entomology
Butterflies + Bt corn

1. Corn -
2. Monarch
3. Bt

More monarchs Now -

Milkweed host to monarchs - edges
of fields

- Corn - European corn borer
\$ Millions damage

Monarch

- close to national insect

1000's mi insect

only feeds on milkweed

Bacillus Thuringiensis BT

Soil bacteria - Common

1st noticed in Thuringen, Germany,
in stored wheat

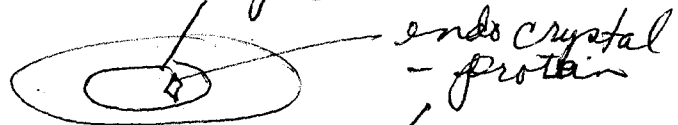
Bacteria

Spor forming bacteria

Stress → produces spores

- can pass through harsh
conditions - Storage

→ endospore



toxic to insects

- must be eaten

lots of types BT

Some effective against:

Lepidoptera - butterfly/moths

Diptera - aquatic flies - Mosquitoes
(Israel)

Coleoptera - beetles

Bio-engineers interested in

Lepidoptera

simple 1 gene → Crystal

More one gene to Corn, which
produces crystal

BTs used in gardens for years -

- Safe + effective

Specific to species
Organic farmers use it

Connection between
borer + Monarch

Cornell Study 1999

Lab Study - pollen from common
milkweed leaves
pollen killed monarchs
- no surprise

But no one had thought about it

Non-target effect

No one even thought about this

Other studies -

What happens in corn field?

- where does pollen go?

Milkweed near corn fields

Does it get milkweed - yes/no

How much + how long effective
breaks down rapidly

in most case M's not exposed
 Still problem (?)
 effect on Monarchs - very little
 Alternative
 insecticide (?) any other alternative
 - greater impact
 probably harder

Bio Engineers trying to fix problem
 Technological fix

Solution - Bt Corn but not in
 pollen - not yet
 specific expression
 (?) effect on soil?

* Biggest hazard to Monarchs
 - herbicide resistant corn
 - Round up Ready Corn

Round up ready corn would
 result in Round up spraying
 ↓ would eliminate
 Milkweed

Stacked Gene - Lepidoptera +
 Coleoptera

We don't know target ^{problem}

Large experiment - we'll have
 to see what happens

www.ars.usda.gov/sites/monarch
www.monarchwatch.org

EPA vs FDA
 Bt corn - allergen
 (?) Cost
 Control
 of Co.
 Benefits
 Golden Rice
 Vit. A

QA

1. effect on Gut / Labeling - Sociology + Politics
2. Price difference - GMO crops
 - more expensive - Comparable
 to regular plus herbicide
 - price different in diff. parts of
 Co.
3. Time? (farmer advantage)
 - easier to manage
4. Borer to plant?
 tunnels through stalk
5. Will they become immune?
 - yes - ex - Motu on cabbage
6. Bt effective to Borer now
 - insecticides - no 100%
 → 80-90%
 Bt Corns - 100%
 high level of toxin
7. in Soil -
 danger only when
 Coleoptera comes on
 - year or so - kill beetles in soil
8. Safe to humans
9. gene transfer - escape into
 wild - almost a given
10. Carried on to next generation
 farmers by new seed every
 year

Development of resistance
 Monsanto has patent
 = Pioneer

Bt Corn
 70%
 farmer - (company)