# Biology and Management of Western Bean Cutworm In the Great Lakes Region

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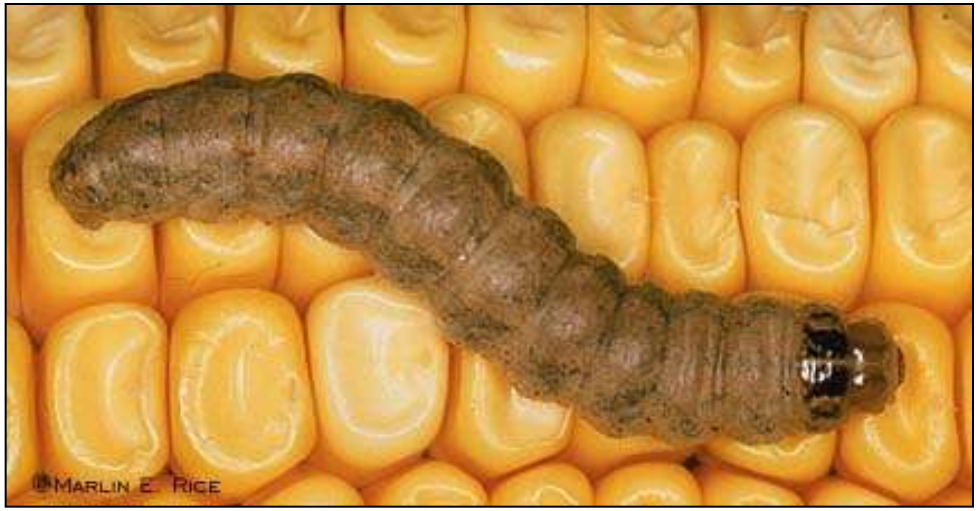
Project GREEEN

THE MICHIGAN BEAN COMMISSION

# Western Bean Cutworm ~ Brief background

- Native to states in the western plains

- Movement east since mid-1990s
- Pest of both corn & dry beans




- Loss in yield and quality (fungus)

# The Great Lakes Region may favor WBC:

*High % of acres in reduced & no-till*

*Many areas with sandier soil*

*Lake-effect snow cover*

* Increased overwintering survival?

*High humidity*

* Increased egg, 1$^{st}$ instar survival?

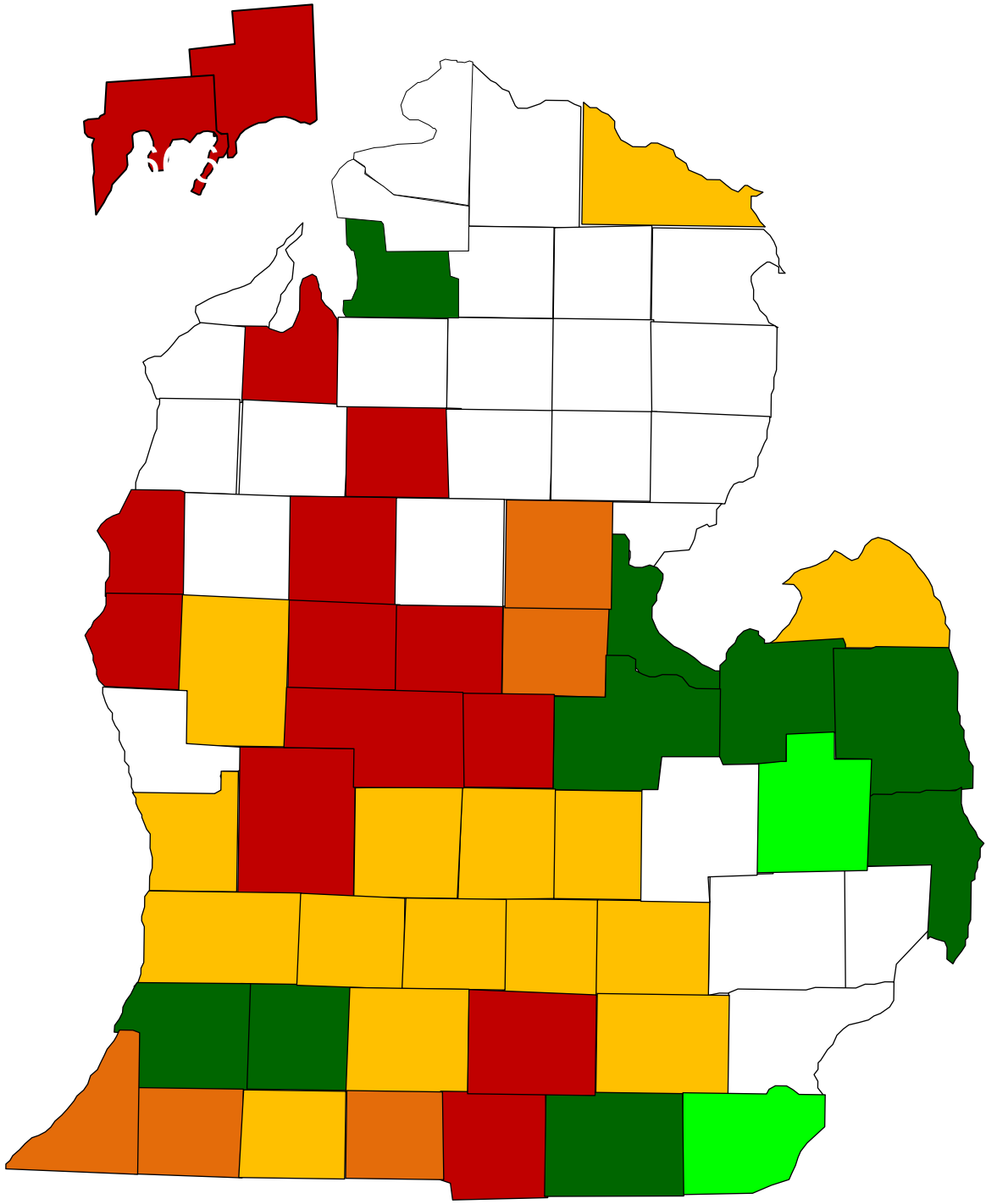
*Multiple host crops*

* Larger overall population?

# Moth captures in Michigan

| Year | total | avg/trap |
|---|---|---|
| 2006 | 3 | <1 |
| 2007 | 54 | 2 |
| 2008 | 1,730 | 21 |
| 2009 | 28,344 | 102 |
| 2010 | 38,009 | 110 |
| 2011 | 42,783 | 206 |

# 2010
# Hot spots



- 0 moths
- 1-50 moths
- 51-100 moths
- 101 – 200 moths
- 201 – 300 moths
- > 300 moths

# WBC Biology egg hatch

2007-2009
100%

2010 = 78%

- predators
- entomopathogens (fungi)

2011 = 80%
- parasitism
- reduced fert.?

# Larval Distribution and Development

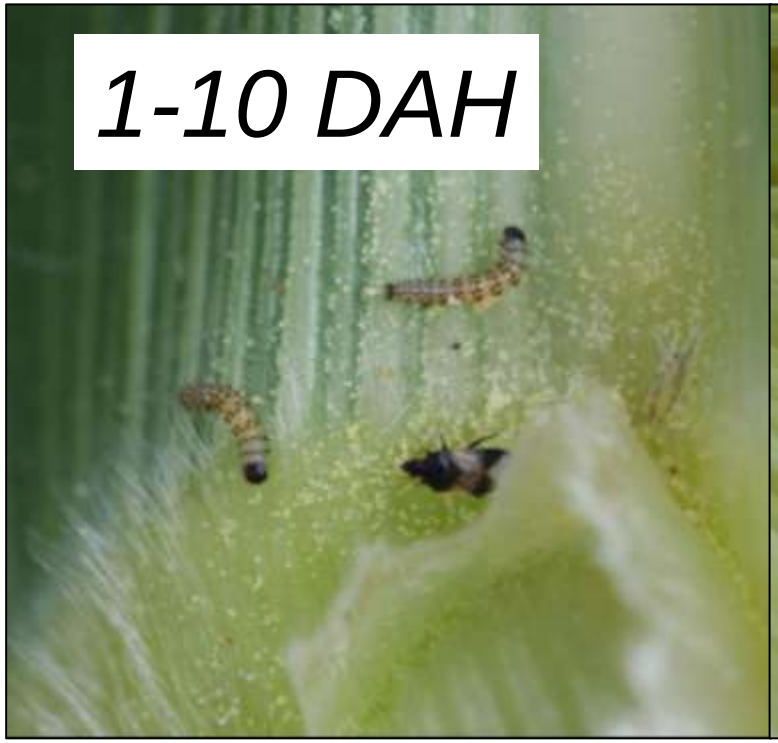
Individual plants infested with egg masses

Sets of plants sacrificed 1, 5, 10, 14, 21, 28 *Days After Hatch*

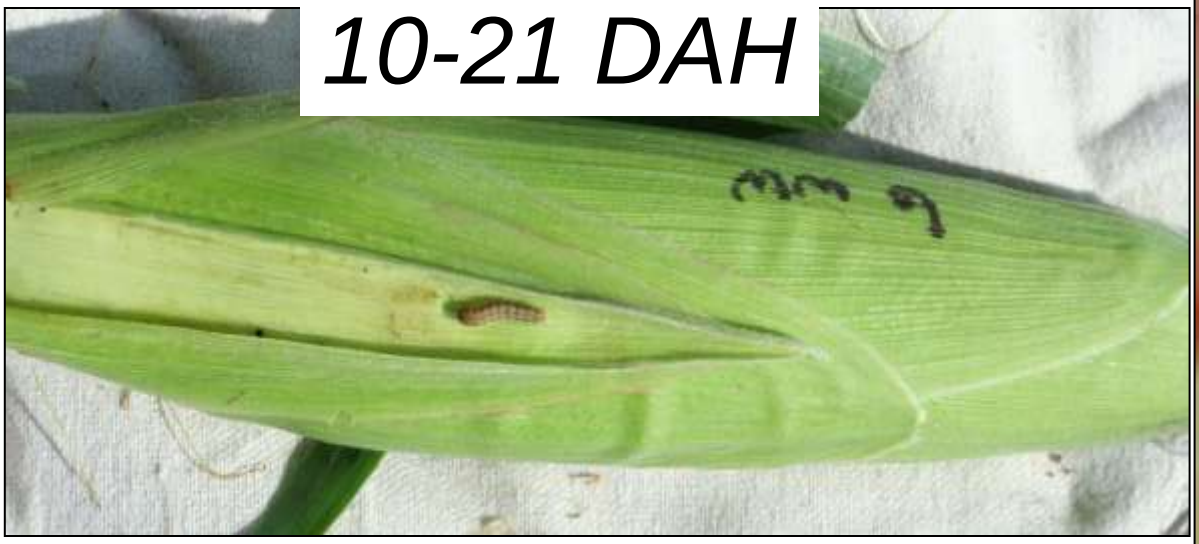
Larvae recovered & staged

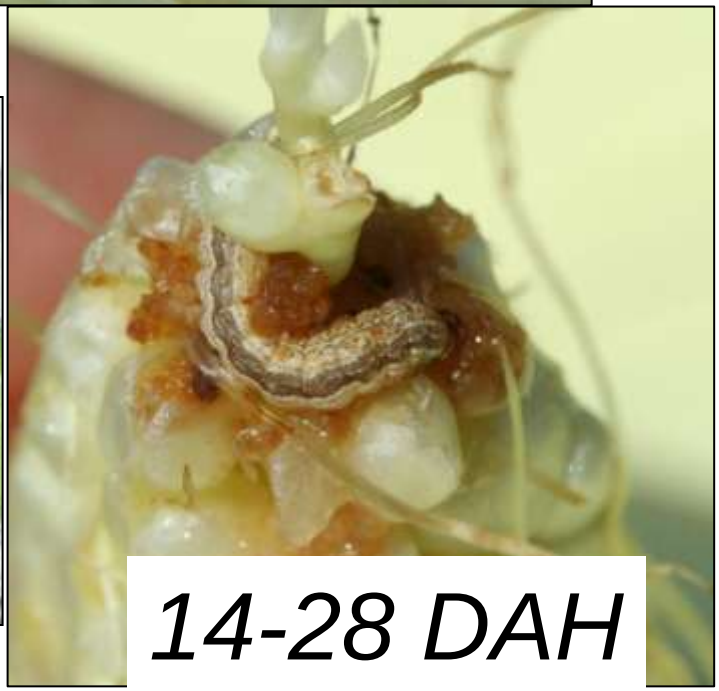
# Distribution of WBC on plants

| Location | 1 DAH | 5 DAH | 10 DAH | 14 DAH | 21 DAH | 28 DAH |
|---|---|---|---|---|---|---|
| tassel/ leaf | 57% | 47% | 1% | - | - | - |
| leaf axils | 26% | 41% | 19% | - | - | - |
| silks | 17% | 12% | 73% | 34% | - | - |
| betwn ear/stalk | - | - | 7% | 33% | 33% | - |
| ear~tip | - | - | - | 33% | 67% | 54% |
| ear~side | - | - | - | - | - | 46% |


1-10 DAH


1-14 DAH


10-21 DAH


14-28 DAH

# Survival on whorl stage vs pretassel corn

*No larvae recovered after 1 DAH from whorl stage plants*

# WBC Host Range Testing

*Poor*

*Good*

corn

dry beans

garden peas

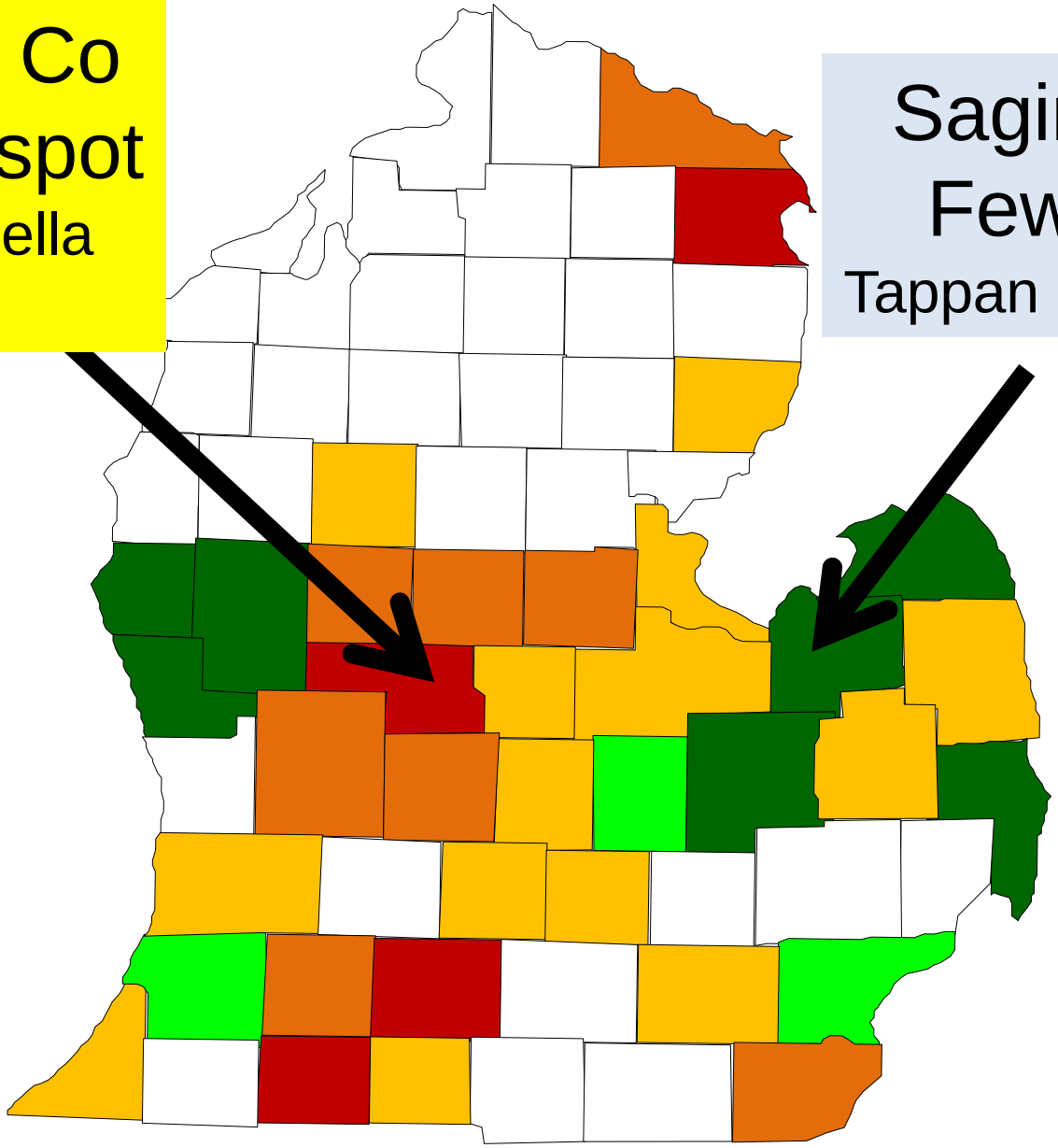
squash





# Overwintering depth x soil type

Montcalm Co
WBC hot spot
McBride/Isabella
sandy loam



Saginaw Co
Few WBC
Tappan Londo loam

2010

2011

# Pre-pupal stage in soil chamber November 2010

| 2010 | 2010 | Inch | 2011 | 2011 |
|---|---|---|---|---|
| x | - | 1 | - | - |
| - | - | 2 | - | - |
| x | - | 3 | - | - |
| x | - | 4 | - | - |
| x | x | 5 | x | - |
| x | - | 6 | x | - |
| x | - | 7 | x | - |
| x | x | 8 | - | - |
| x | x | 9 | x | - |
| x | dead | 10 | - | - |
| | | 11 | - | - |
| | | 12 | x | - |
| | | 13 | x | - |
| | | 14 | - | x |
| | | 15 | - | - |
| | | 16 | - | - |
| | | 17 | - | - |
| | | 18 | - | - |
| | | 19 | - | - |

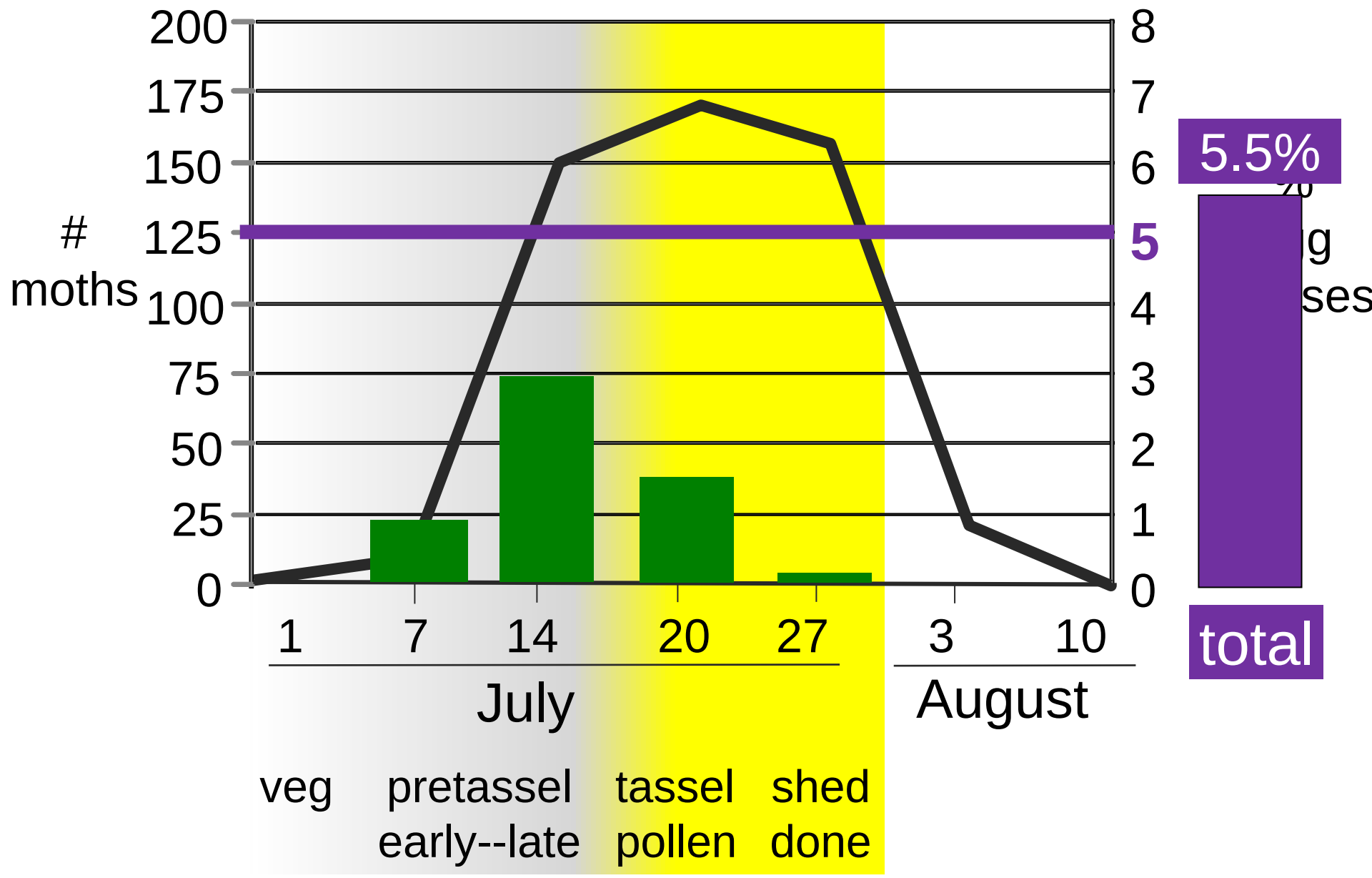
Saginaw

Montcalm

# WBC Management with Bt corn

| Trade Name | Type of Bt | WBC Protection |
|---|---|---|
| Non-Bt | none | none |
| VT3P | Cry1A.105<br>Cry2Ab2 | none |
| Herculex | Cry 1F | moderate |
| SmartStax | Cry 1F<br>Cry1A.105<br>Cry2Ab2 | moderate |
| Viptera | Vip3A | good/excell. |

# 2010 efficacy trial, Montcalm Co



# WBC damage w/ 5.5% infestation

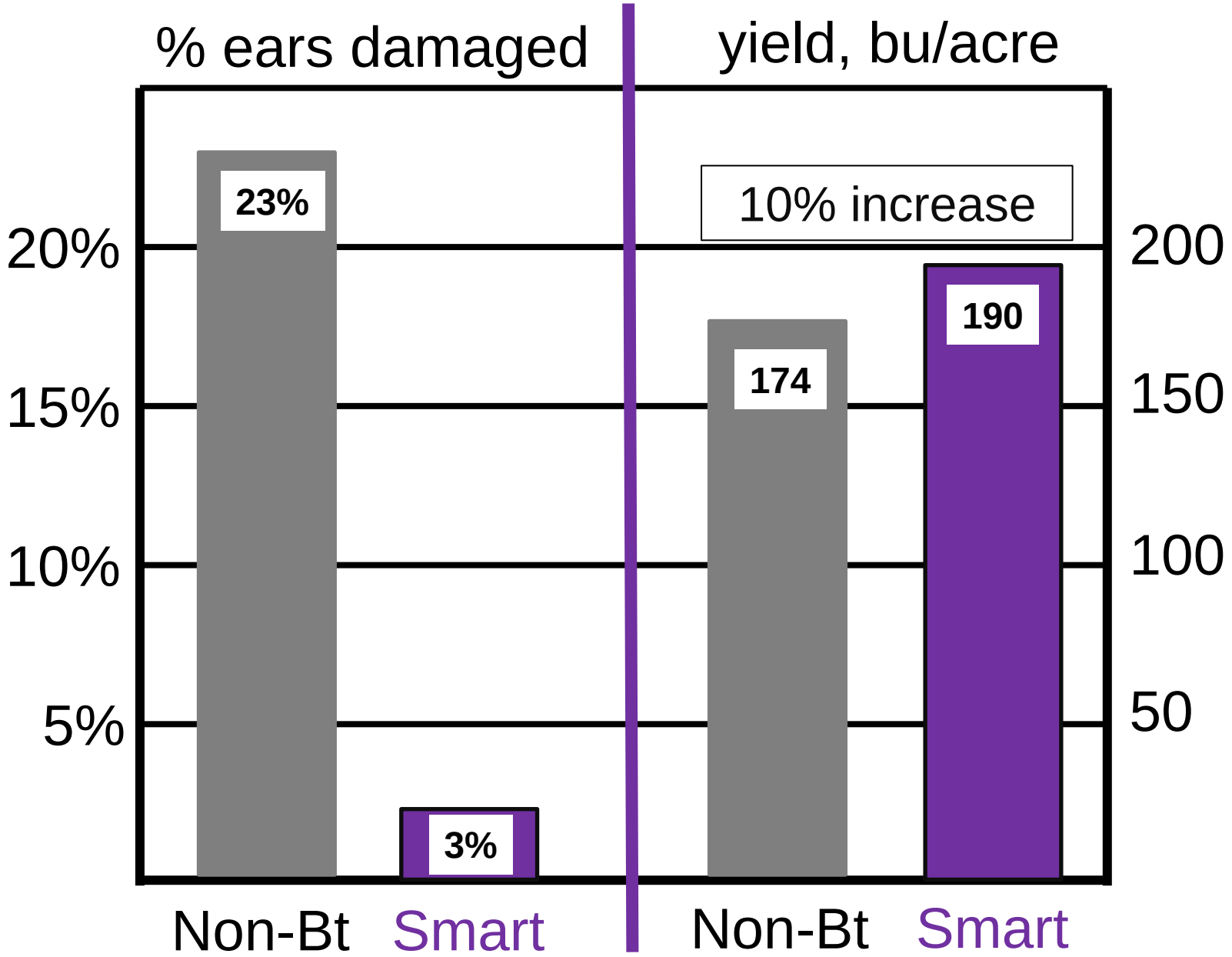
| Bt | %plants ECB | %ears WBC | %ear fungus |
|---|---|---|---|
| Non | 13 | 82 | 74 |
| VT3P | **0** | 67 | 61 |
| Smart | **0** | **34** | **22** |

## Difference in bu/acre

| | |
|---|---|
| Non | -17 |
| VT3P | -11 |

# 2011 efficacy trial, Montcalm Co

8% infestation



## For more information:

Michel, Krupke, Baute & DiFonzo
2010

# Ecology and management of the western bean cutworm in corn and dry beans

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