Scouting and Making Treatment Decisions for Western Bean Cutworm

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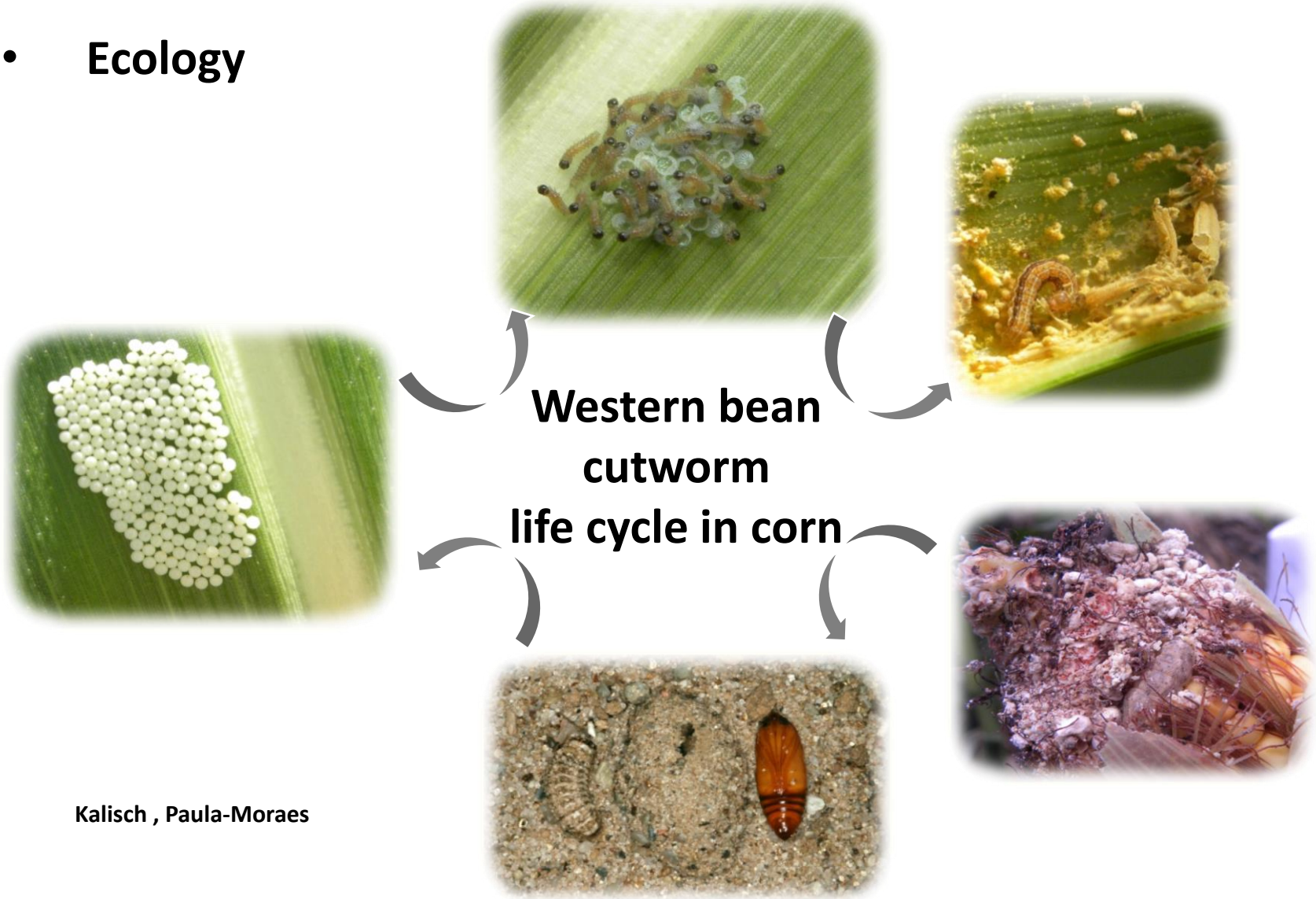
Integrated Pest Management IPM

Major components

- **Ecology**



Kalisch , Paula-Moraes

Major IPM Components

- **Management decision**

  EIL/ET

Some level of pest is tolerable by the plant

How much pest injury is tolerable?

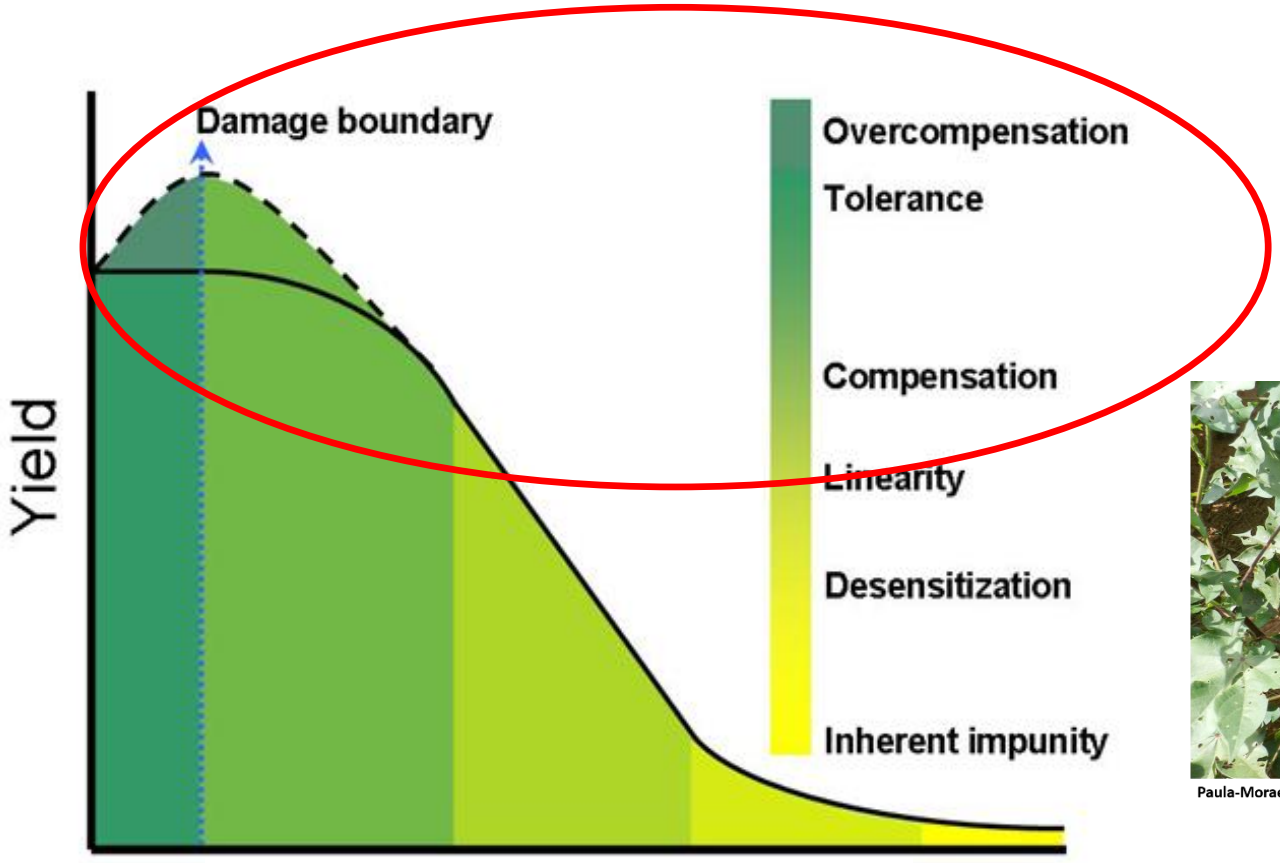
Economic Injury Level - EIL

Major IPM Components

- **Management decision**

  EIL/ET

  Some level of pest (injury) is tolerable by the plant



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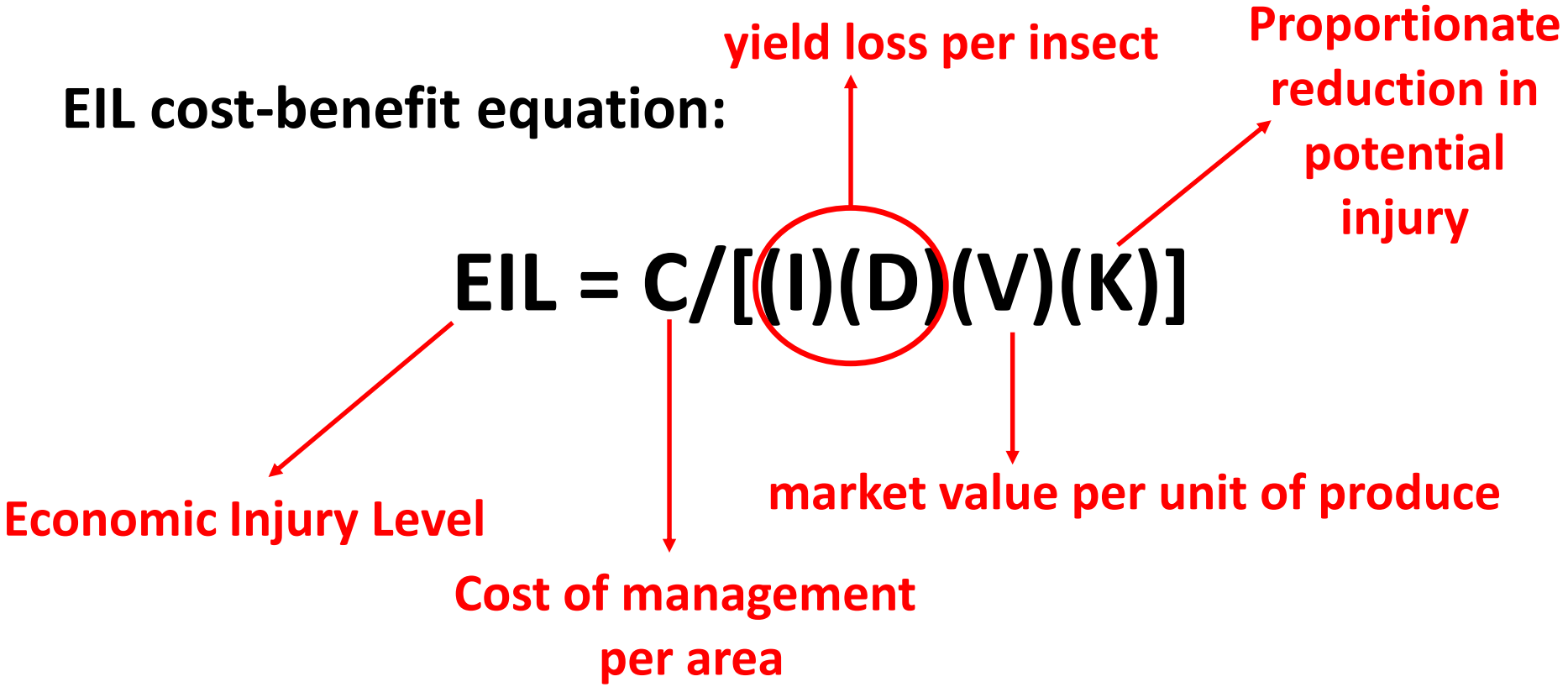
Major IPM Components

- **Management decision**

EIL

EIL cost-benefit equation:



Major IPM Components

- **Management decision**

  EIL

  Some level of pest is tolerable by the plant – EIL

  When is the best time to management the pest?

  Economic Threshold - ET

Major IPM Components

- **Management decision**

  ET

  Moment the pest population requires control

  Typically set below the EIL

  Often expressed in another pest stage

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Major IPM Components

- **Management decision**

  Sampling plans

  Estimate pest population density – below or above ET

  Probabilistic foundation

  Replace scheduled insecticide application

  Increase curative control - “right time”

Major IPM Components

- **Management decision**

  Sampling plans

  Target pest

  Correct timing

  Techniques

  Sampling patterns

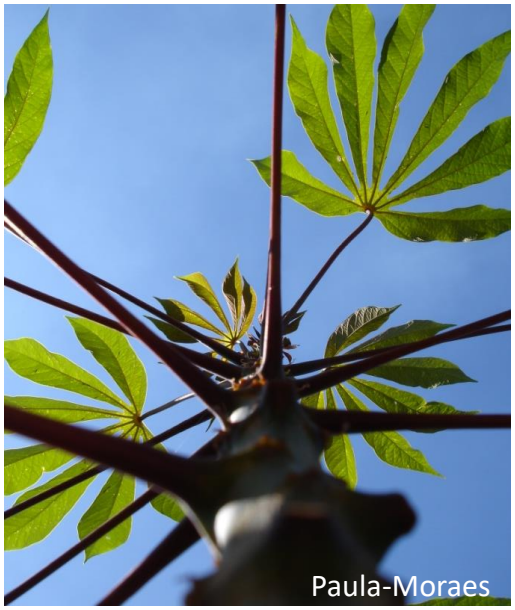
  Number of samples

Major IPM Components

- **Management decision**

  Sampling plans

  Target pest – stage
  habitat
  occurrence

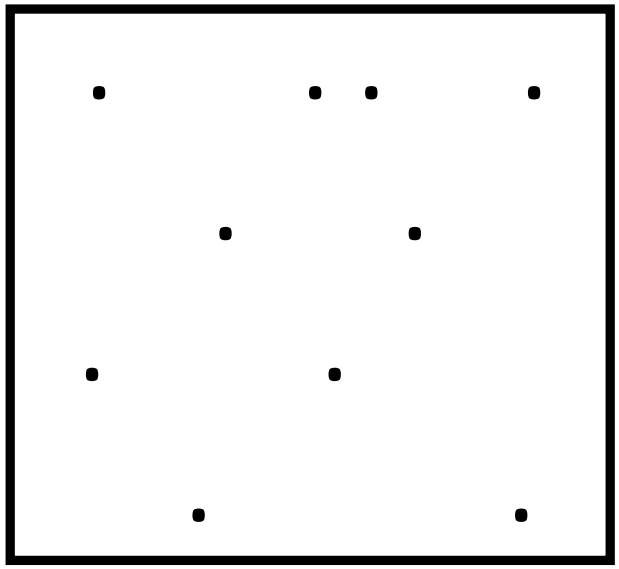


Major IPM Components

- **Management decision**

  Sampling plans

  Pattern of sampling – sampling route



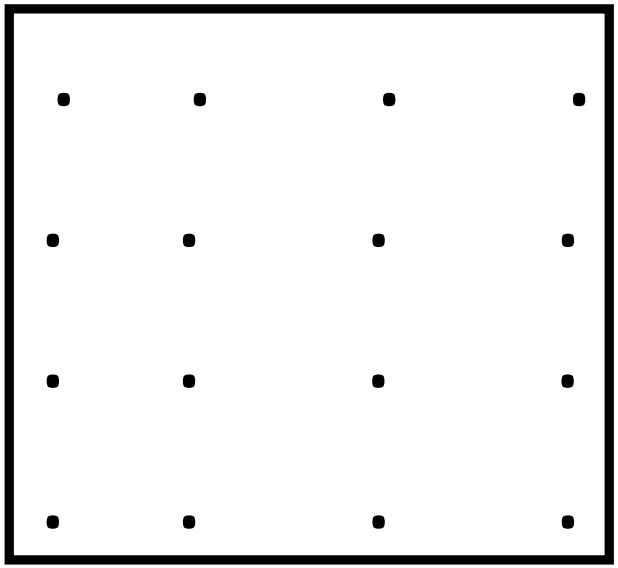
Random

Major IPM Components

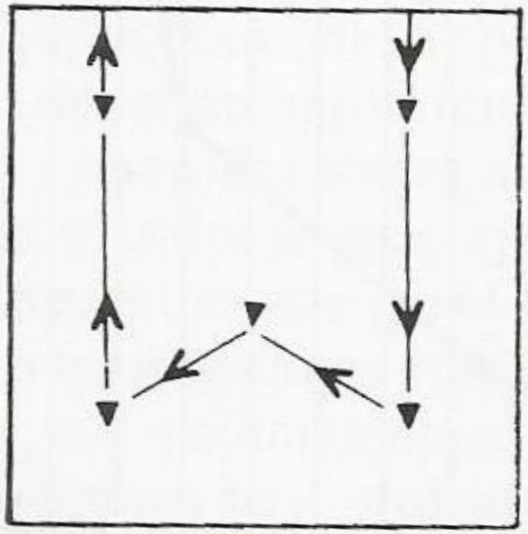
- **Management decision**

  Sampling plans

Pattern of sampling – sampling route



Regular



Predetermined route

Major IPM Components

- **Management decision**

  Sampling plans

Number of the samples

Probabilistic foundation

Balance between precision and sampling cost

Fixed sample size

Sequential sampling

Major IPM Components

- **Management decision**

  Sampling plans

  Number of the samples

  Sequential sampling

  Pest population density classification

  Above or below ET

  Management decision - fewer samples

Major IPM Components

- **Management decision**

  EIL/ET
  Sampling plans

Exercise

WBC speed scout App

WBC speed scout App

Major IPM Components

- **Management decision**

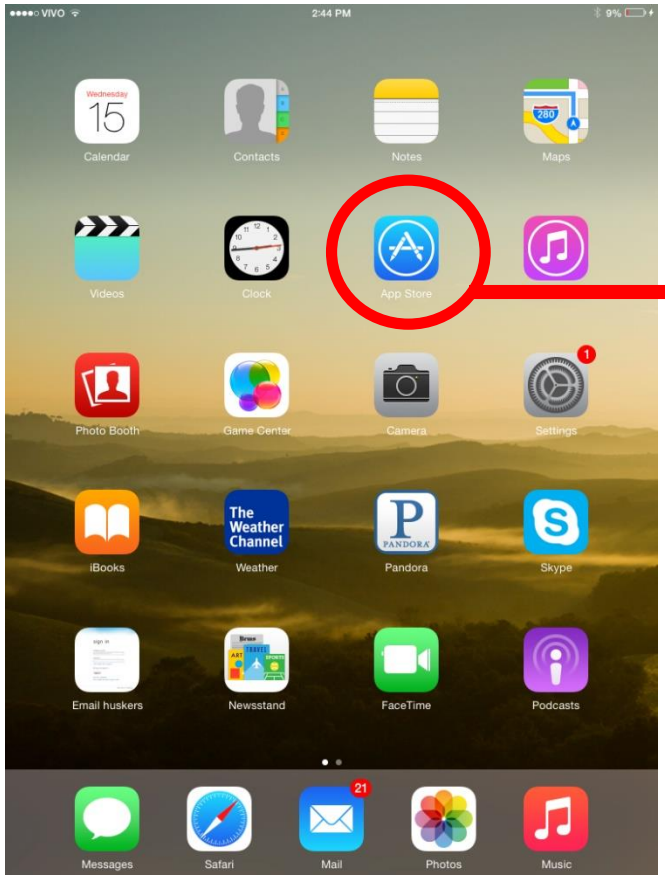
  EIL/ET

  Sampling plans

Western bean cutworm egg mass sampling

WBC speed scout App

WBC speed scout App



Google play

WBC speed scout App - WBCSS

Western Bean Cutworm Speed Sc… 4+

University of Nebraska - Lincoln >

OPEN

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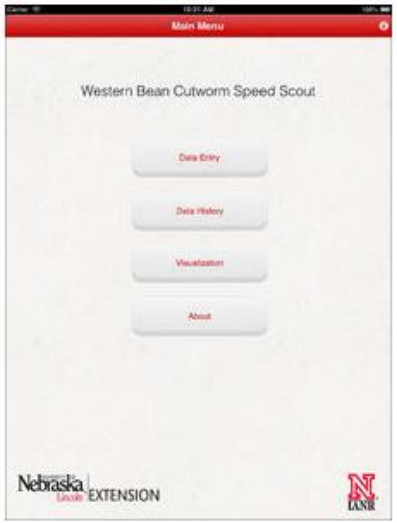


Description

Major IPM Components

- **Management decision**

  EIL/ET

  Sampling plans

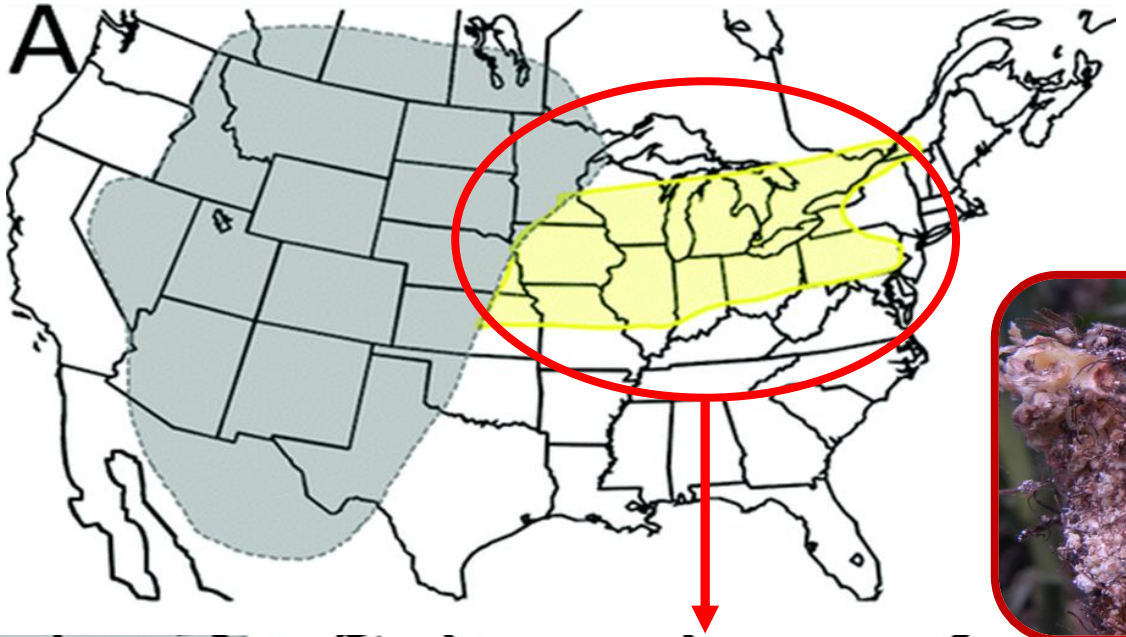
Exercise

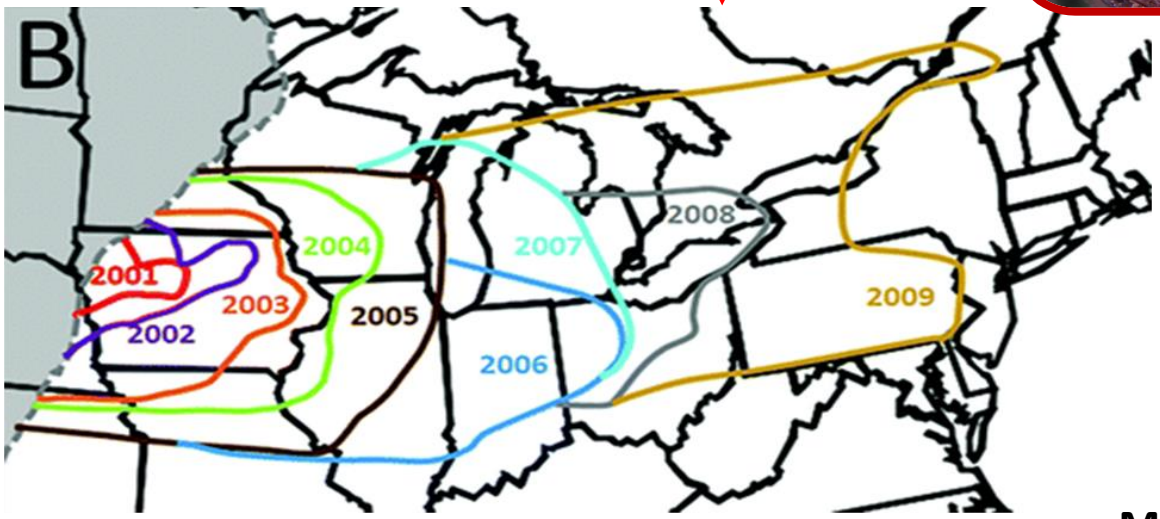
- **You are newly hired as a farm manager by a corn farmer in the Corn Belt**
- **One of the responsibilities is to coordinate the farm IPM program**
- **There were several reports of yield loss caused by western bean cutworm in the region last year**
- **State survey database informs a WBC moth flight has begun**
- **The corn is a Cry 1Ab (YieldGard) just prior to the tassel emergence**
- **Price of the corn above U$3.50/bushel**

Important information

- Western bean cutworm in corn
- WBC management
- WBC speed scout App – how to sample the pest in the field

Where WBC occurs?





Michel et al. 2010

How to manage WBC?

Bt corn hybrids

YieldGard (Cry 1Ab) - not effective

Herculex (Cry 1F) - adequate protection but not immune

some resistance reported – NE and Canada

Some pyramided – Cry1A.105/Cry2Ab2/Cry1F/VIP3A -

better control (two or more BT toxins)

How to manage WBC?

Sampling of western bean cutworm

- Egg mass sampling – early detection
- Foliar insecticide - narrow window
- Before ear colonization

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When to sample WBC?

- **Time to sample**

Corn stage – pre-tassel

Corn Belt

Early to mid-July

How to sample WBC?

Sequential binomial sampling plans for WBC egg masses (Paula-Moraes et al. 2011)

Sequential sampling – variable number of samples

average of 40 plants per field

Binomial sampling – presence/absence

plant classified as infested

by presence of at least one egg mass


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How to sample WBC?

WBC egg masses randomly distributed

- Transect across the field
- Diagonal path
- Random plant selection
- Egg mass of top surface of leaf
- On leaves above the ear
- Next plant selection -30 rows apart

When is time to manage WBC?

- **Action thresholds**

4% - sweet corn or field corn price at or above $3.50/bushel

8% - field corn price below $3.50/bushel

20% - mid-silk corn stage

WBC speed scout App

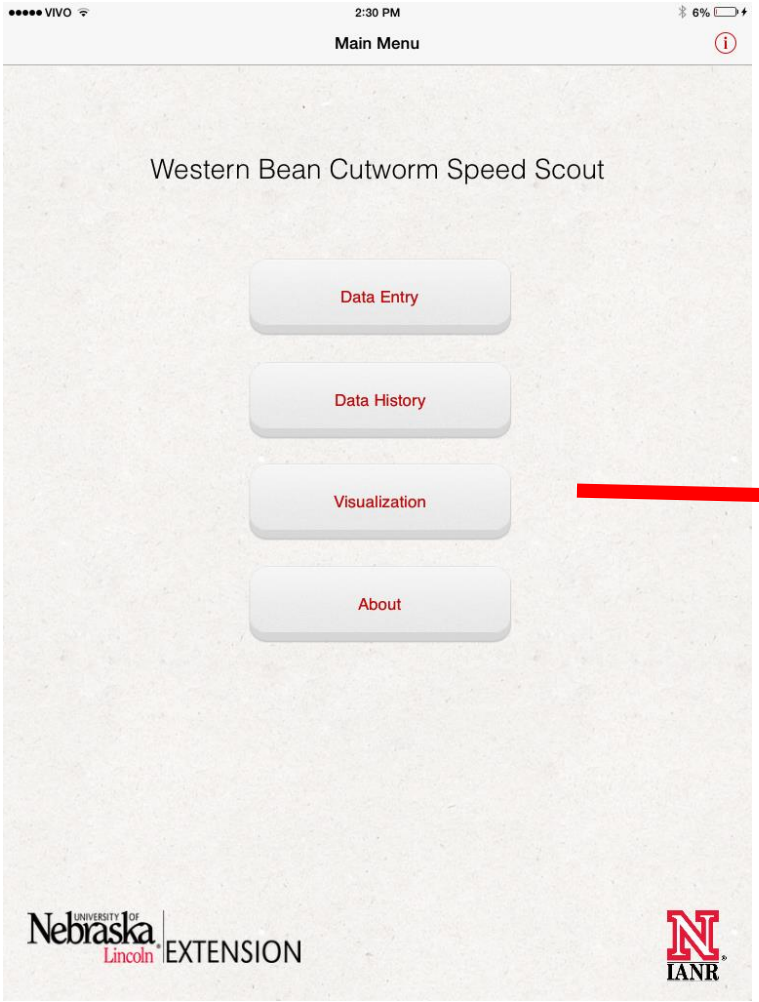
(Paula-Moraes et al. 2012)

Smartphones, tablets or excel spreadsheet
Immediate management decision

Result options:

- **Resample in 2-3 days**
- **Sample 10 more plants**
- **Treat**

WBC speed scout App

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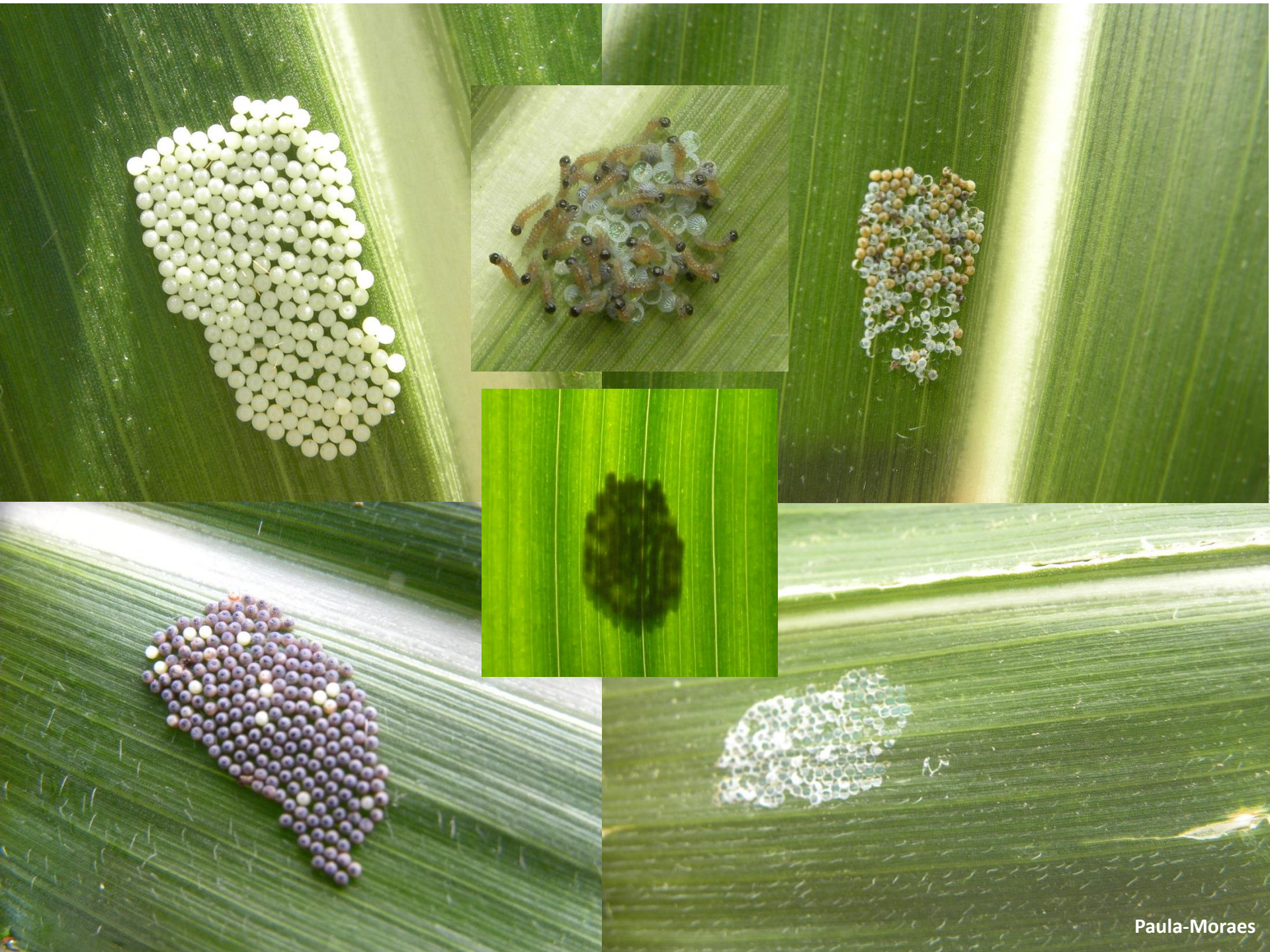
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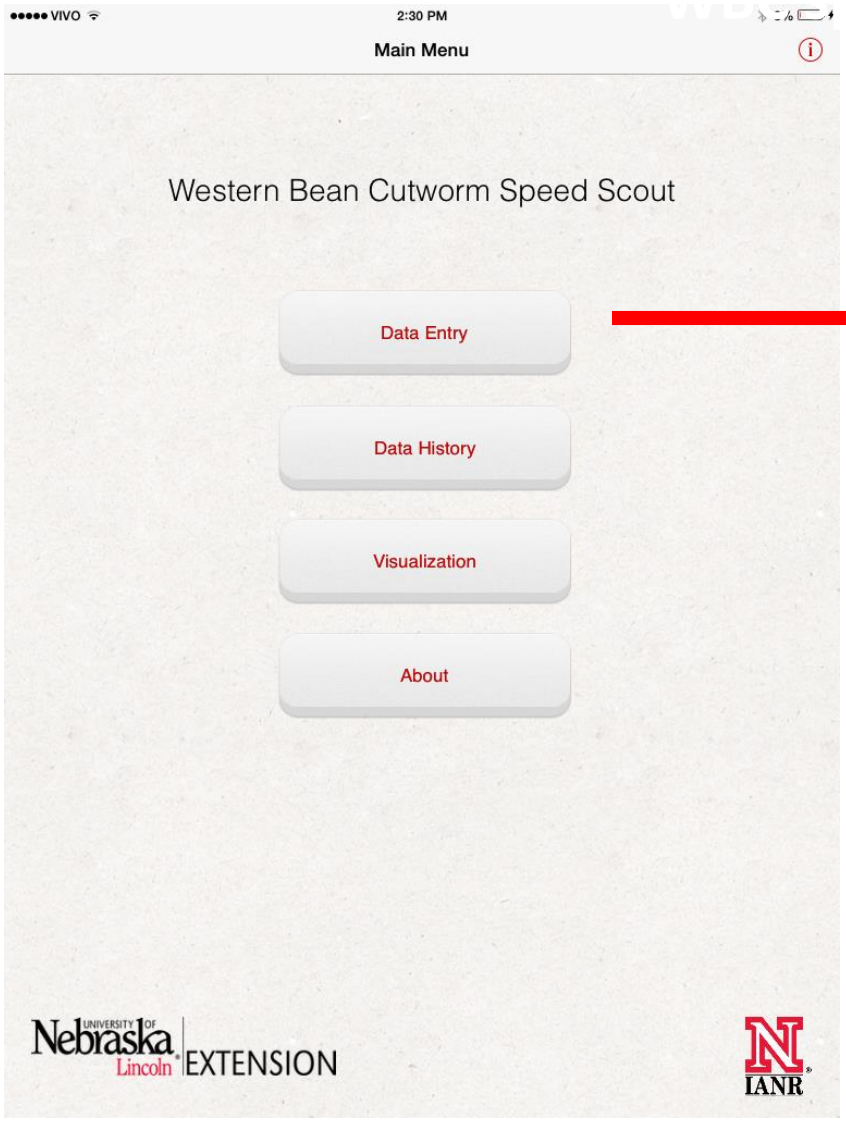
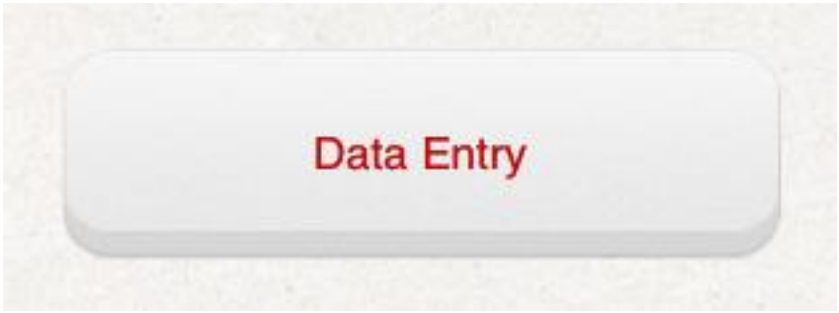
WBC speed scout App





WBC speed scout App

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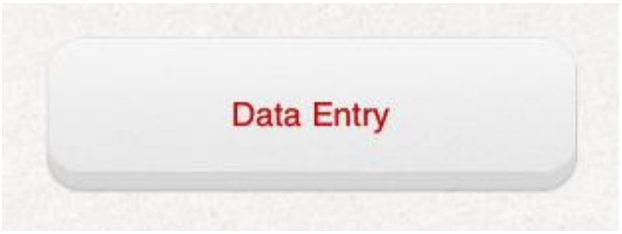
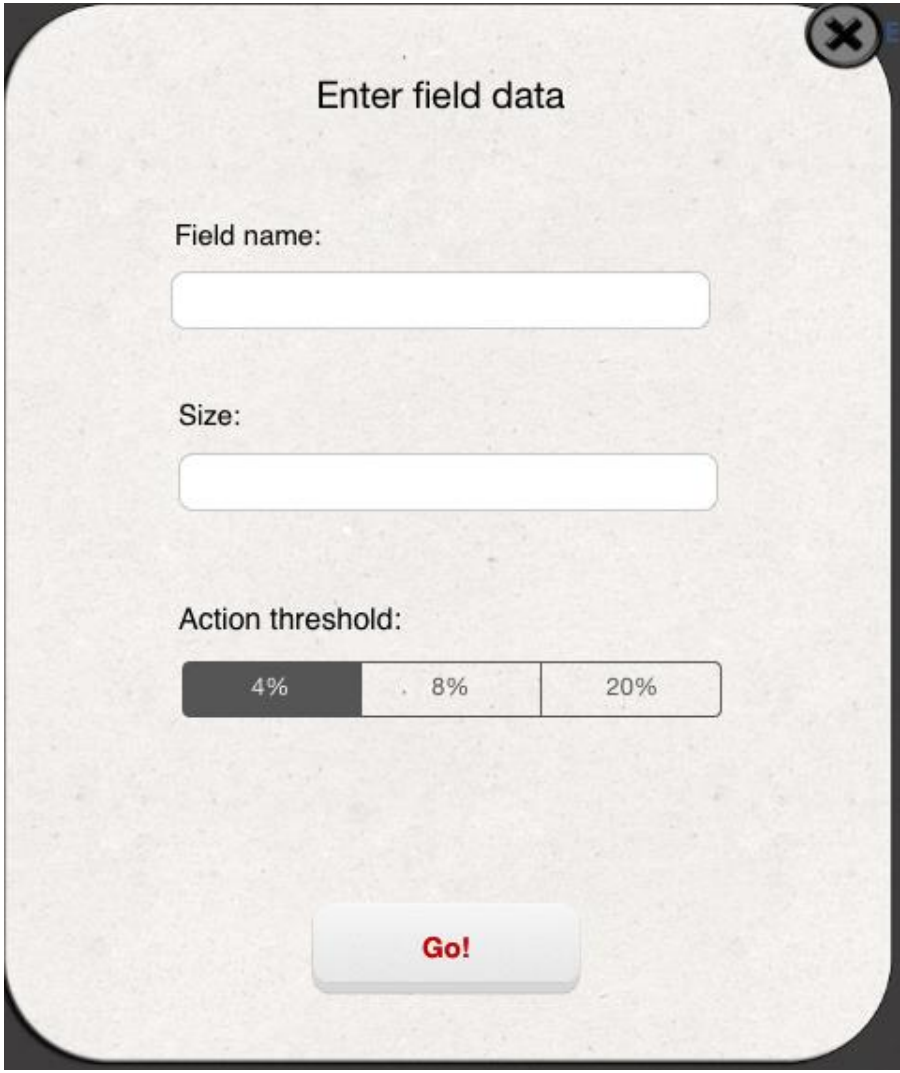
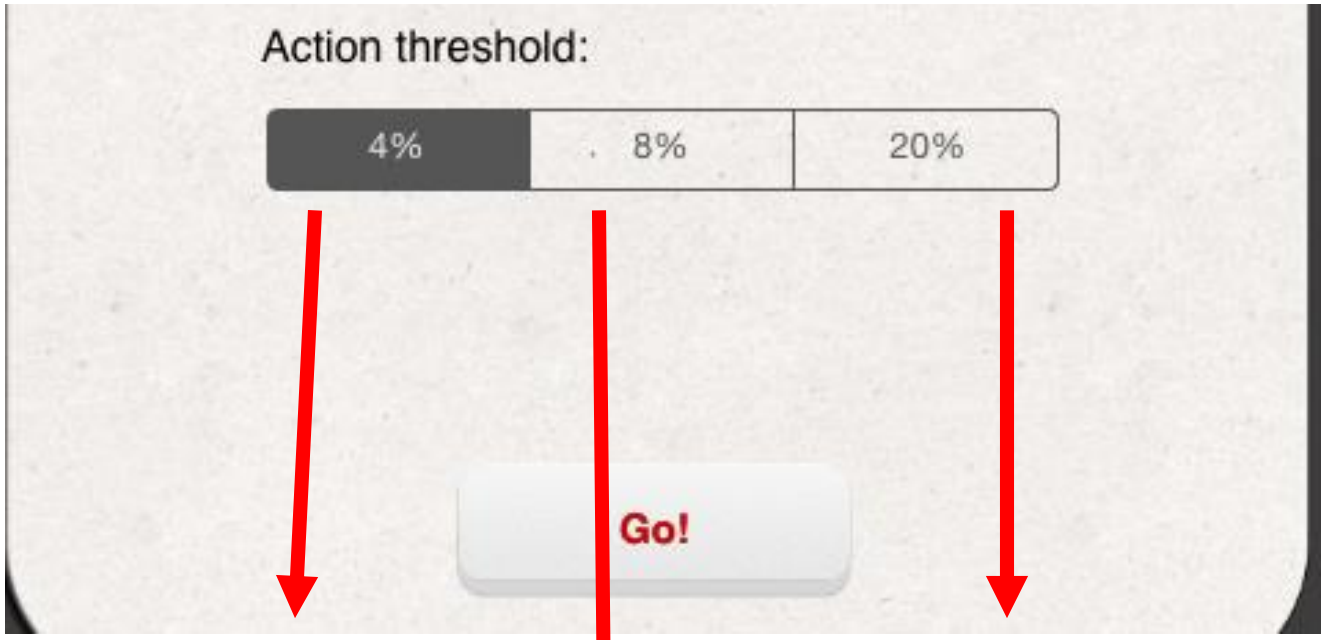




WBC speed scout App

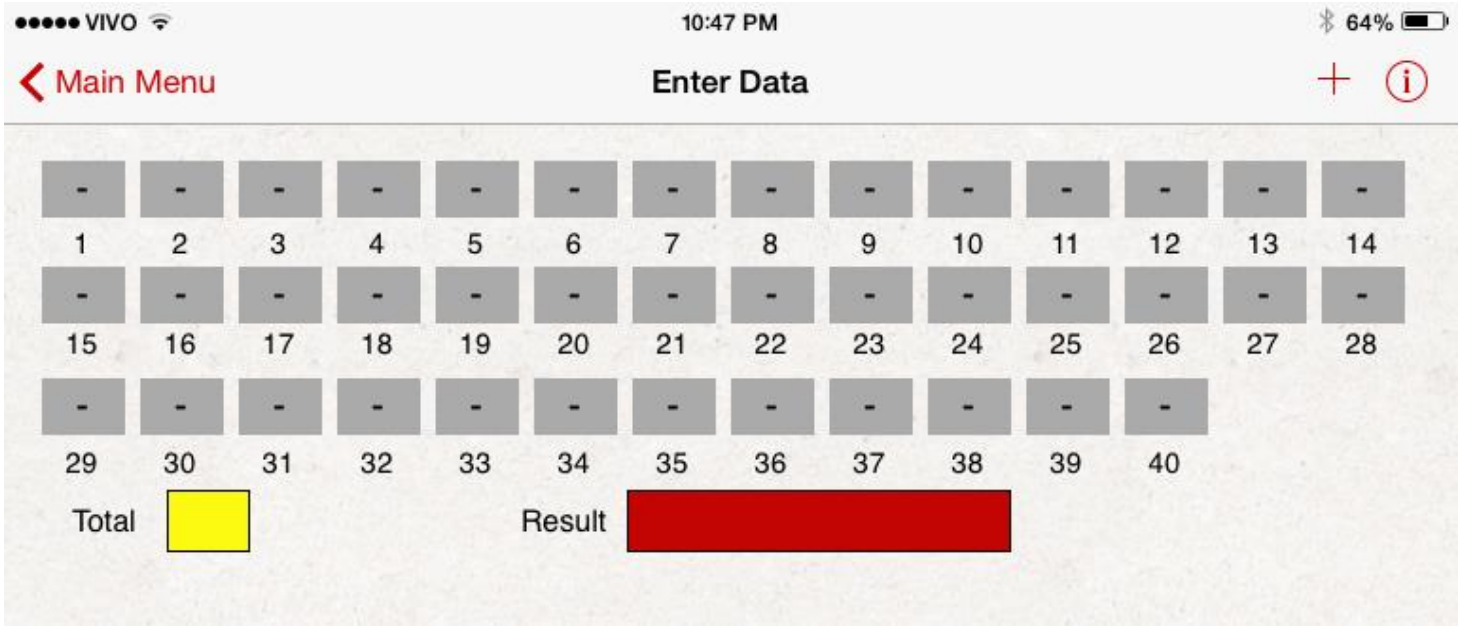


4% - sweet or field corn, price above $3.50/bushel

8% - field corn, price below $3.50/bushel

20% - field corn, Mid-silk stage (R3)

WBC speed scout App



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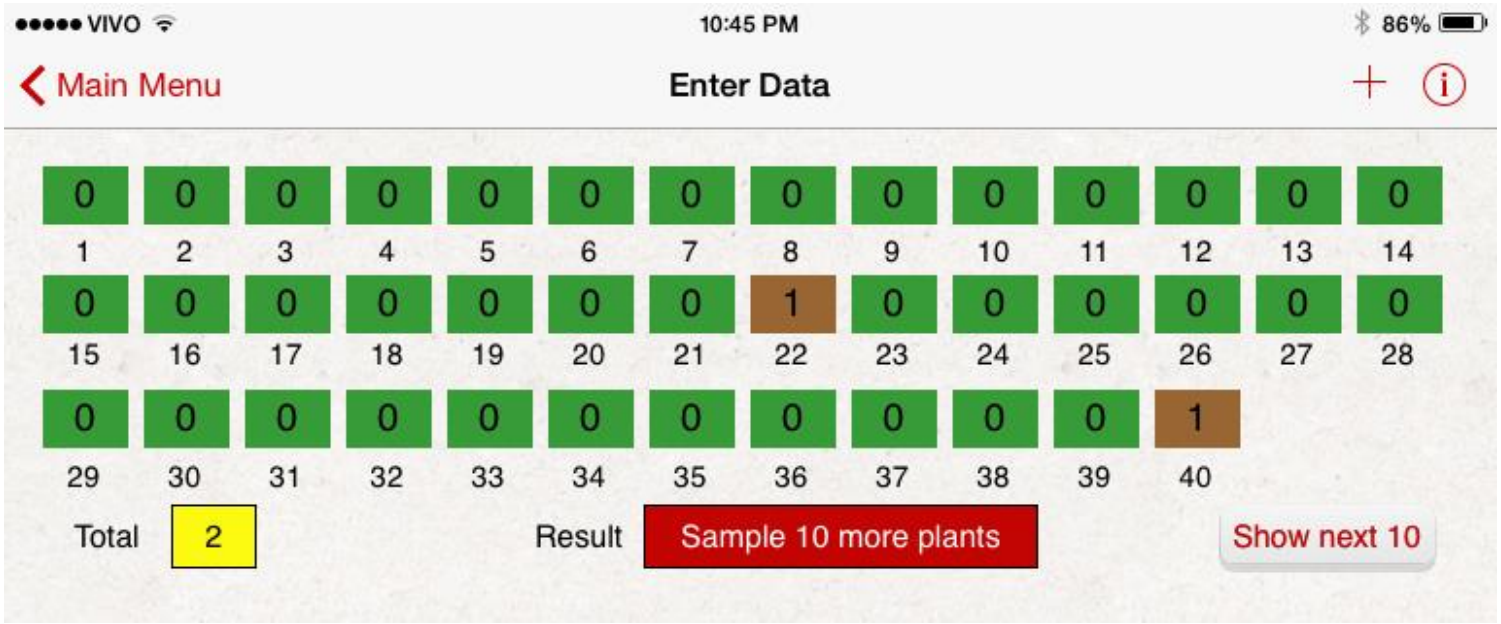

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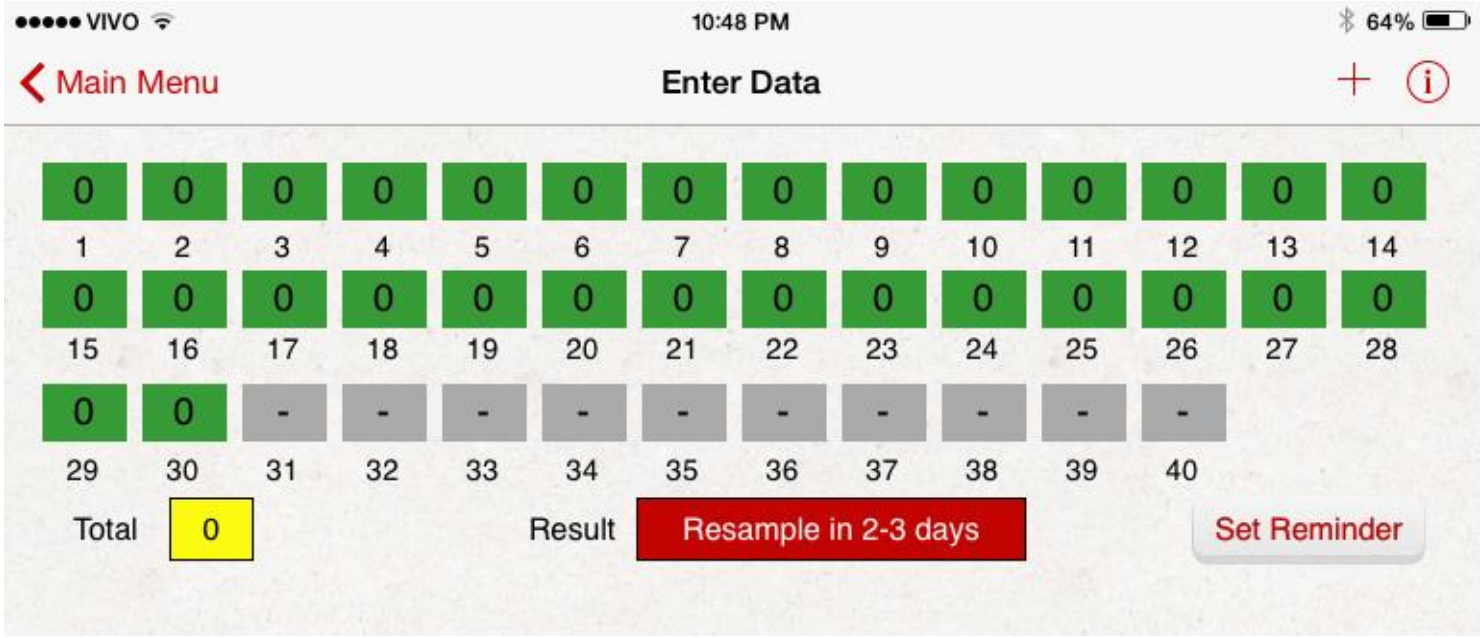

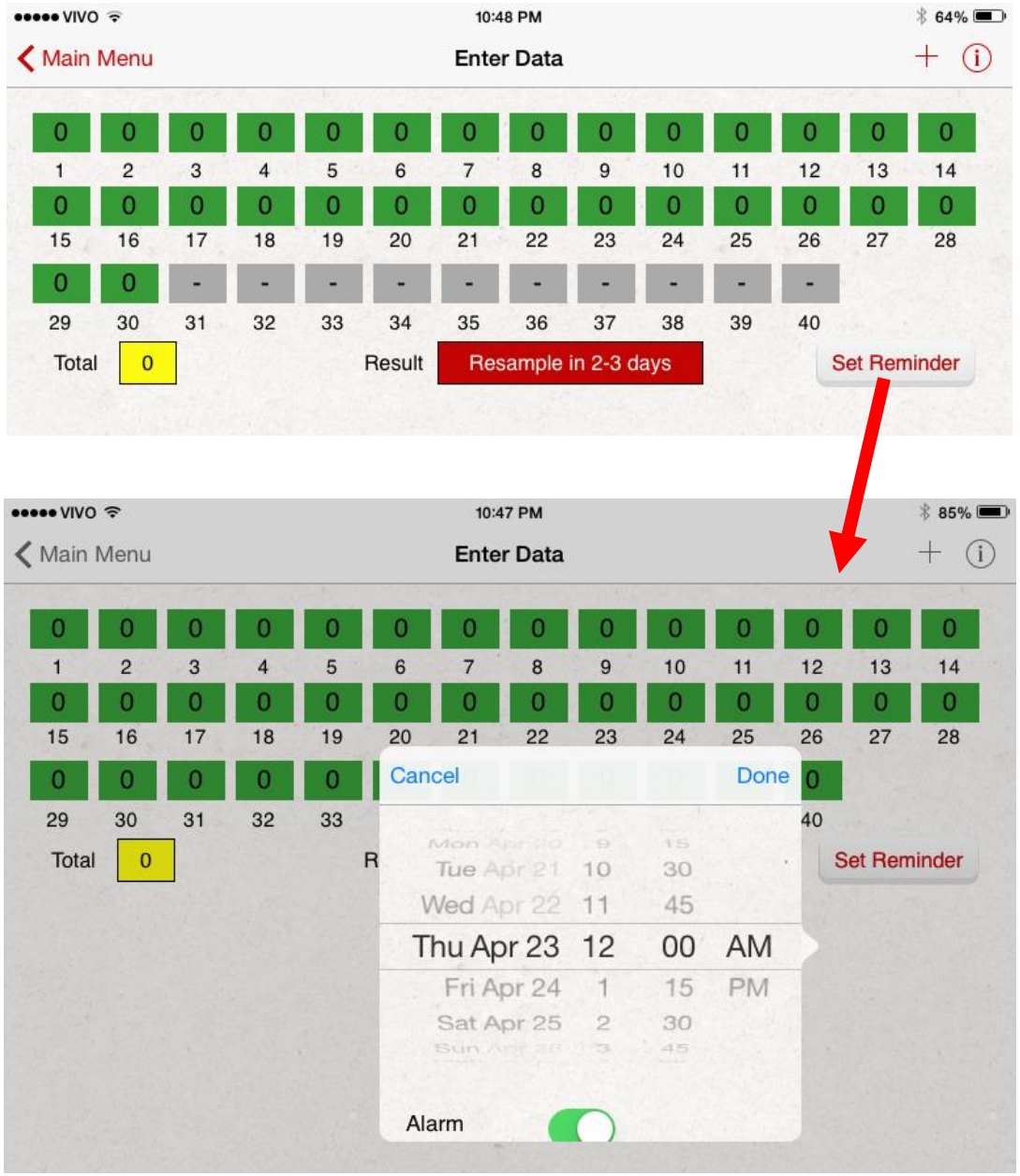
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Exercise

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- **The corn is a Cry 1Ab (YieldGard) just prior to the tassel emergence**
- **Price of the corn above U$3.50/bushel**

Exercise

- **Is it necessary to sample this corn field for WBC? Why or why not?**
- **Considering the corn price today and the corn stage, which action threshold would you use?**

- **Simulate sampling WBC in field corn in the following situations, using the sampling app and report your results:**

    1. **First five plants infested**
    2. **No plants infested**
    3. **One plant infested in the 22 position**

Questions?