Economic decision levels for pest populations

PMA 4570/6228

Six Steps to Successful Pest Management

1. Correct Identification
2. Understanding of pest and crop dynamics
3. Monitoring
4. Economic thresholds
5. Choice of optimum pest control options
6. Evaluation

R. Foster, Purdue 2002

Some important concepts

- Injury: effect of the pest on the plant

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- Damage: effect of the pest on my pocket
- EIL: Economic Injury Level
    - Starts when Injury produces damage

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- ED: Economic Damage:
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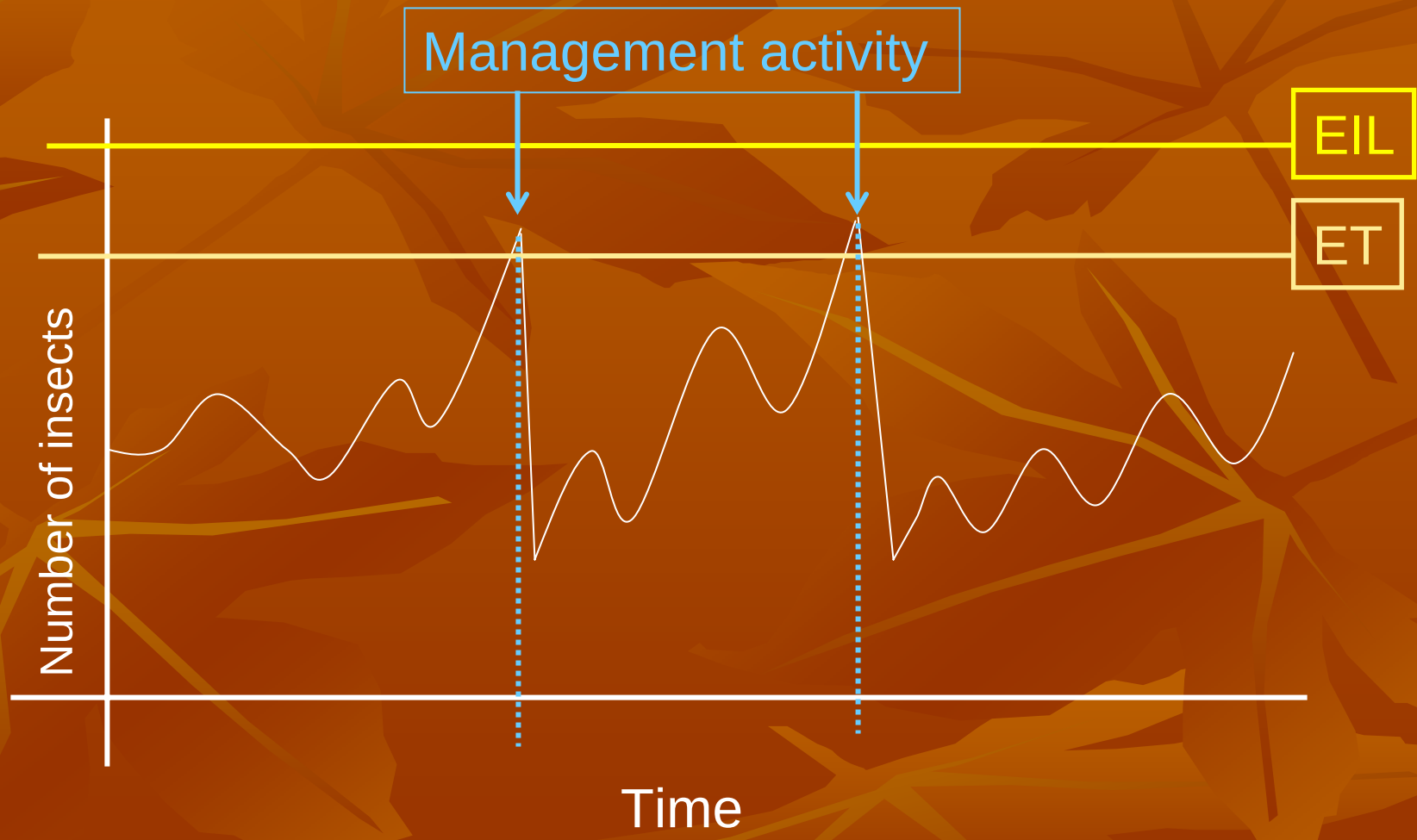
Economic Threshold (ET) and Economic Injury Level (EIL)



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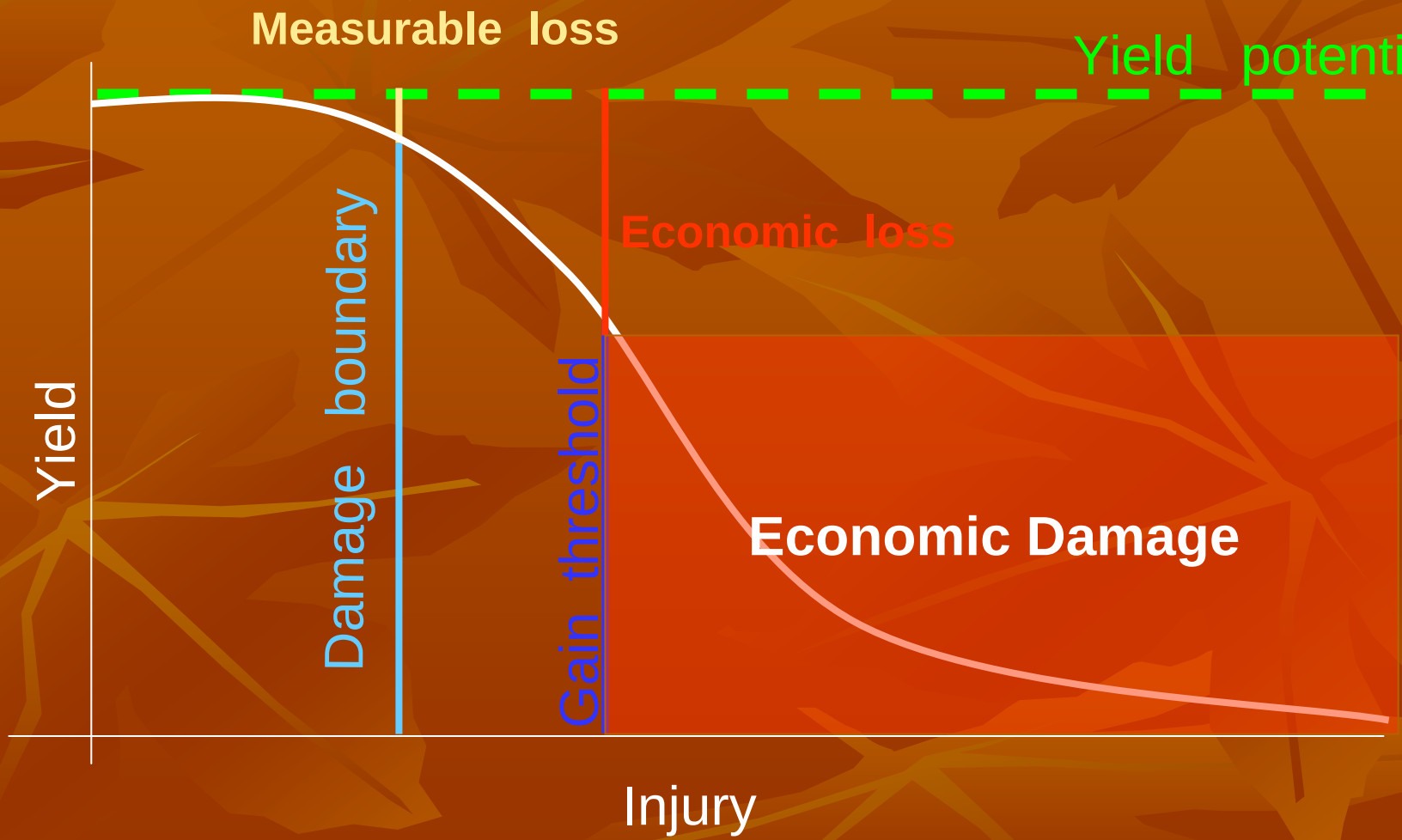
- EIL: Economic Injury Level
- ED: Economic Damage:
    - cost of control = potential lost caused by the pest
- Damage boundary: lowest injury level measurable
- Gain Threshold: beginning of economic damage

$$GT: \frac{\text{Management cost (\$/ha)}}{\text{Market value (\$/Kg)}} = Kg/ha$$

Summary


Measurable loss
Yield potential
Economic loss
Yield
Damage boundary
Gain threshold
Economic Damage
Injury

EIL equation

$$EIL = P = \frac{C}{V \times I \times D \times K}$$

P: Density of insect population — insects/area

C: Cost of management/area — $/area

V: Market value/ unit of product — $/weight

I: Injury/Insect/area — chewed leaves/insect/area*

D: Damage/area/injured unit — weight lost/area/chewed leaf*

K: (1-proportion of unavoidable injury)

*I x D is often combined into D' which is weight lost per insect

The real thing

Variables needed to calculate the EIL flower-thrips in blueberries.

- C: 640 $/ha (spray of Malathion/ha)
- V: 6000 $/Ton (market price for Bb)
- D': 3.024×10^{-9} Tons caused by 1 thrips (Alejandro's data)
- K: 0.4 (Despite the application 60 % of the flowers do not become fruits)

$$GT: \frac{\text{Management cost (\$/ha)}}{\text{Market value (\$/Kg)}} = \frac{C}{V} = 0.107 Ton/ha$$

$$\text{EIL} = \frac{\text{C}}{\text{V} \times \text{D'} \times \text{K}} = \frac{640}{6000 \times (3.024 \times 10^{-9}) \times 0.4} =$$

$$54{,}269{,}942 \text{ thrips/ha} \approx 5.4 \text{ insect/flower}$$