

Satellite-Driven Pest Forecasting Seeing Infestations from Space

Detect Early | Act Smart | Protect Crops



Presented by:
PlanetEye Farm AI Ltd

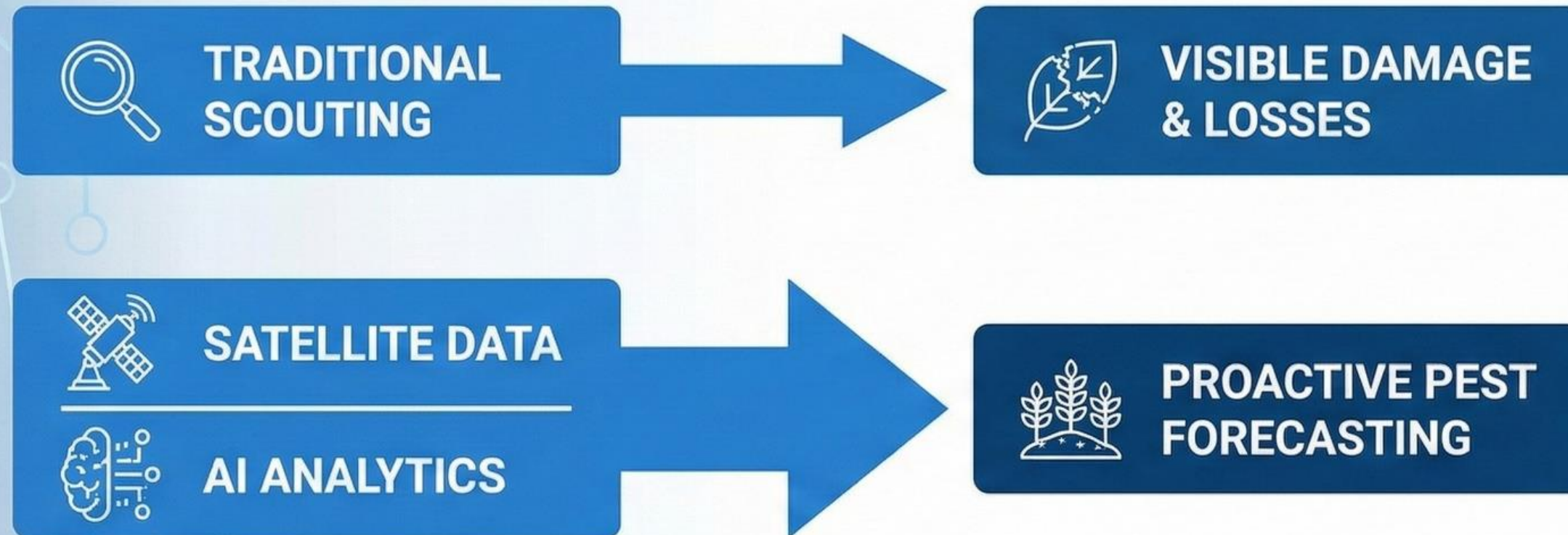
Introduction

1 Increasing Pest Pressure

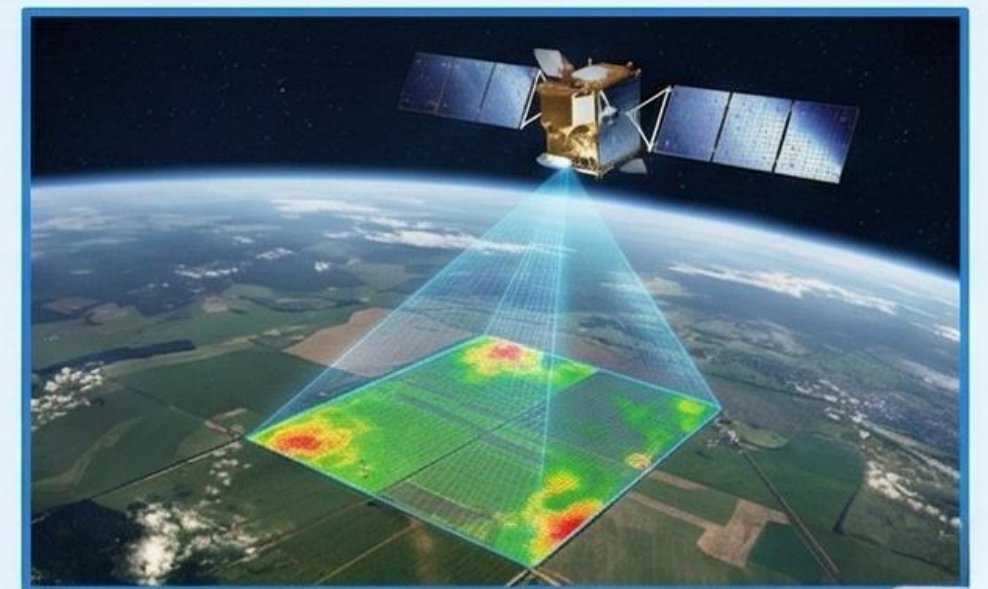
- Climate variability.
- Monocropping.
- Changing pest behavior.

2 Traditional Scouting Limitations

- Reactive.
- Labor-intensive.
- Limited to visible damage.




Satellite + AI enables proactive pest forecasting before major losses occur.



What Are Crop Pests

1 Pest Types & Examples

 Insects (borers, aphids, whiteflies, armyworms).



 Mites and nematodes.



 Disease vectors.



2 Attack Targets

 Leaves.



 Stems.




 Roots.



 Fruits.




3 Impacts & Consequences

 Reduced photosynthesis.



 Stunted growth.



 Yield and quality loss.



Why Pest Detection Is Critical

1) Global Pest Loss Fact



2) Consequences of Late Detection

-  Excessive pesticide use.
-  Higher costs.
-  Environmental damage.



3) Benefits of Early Detection

-  Reduce chemical usage.
-  Improve yield.
-  Enable precision spraying.



Traditional Pest Detection: Limitations



- Manual field scouting.



- Visual symptom-based identification.



- Time-consuming and subjective.



- Cannot scale to large areas.



- Detects pests after visible damage.




➔ **Need for early, scalable, objective detection.**

Role of Satellites in Pest Detection

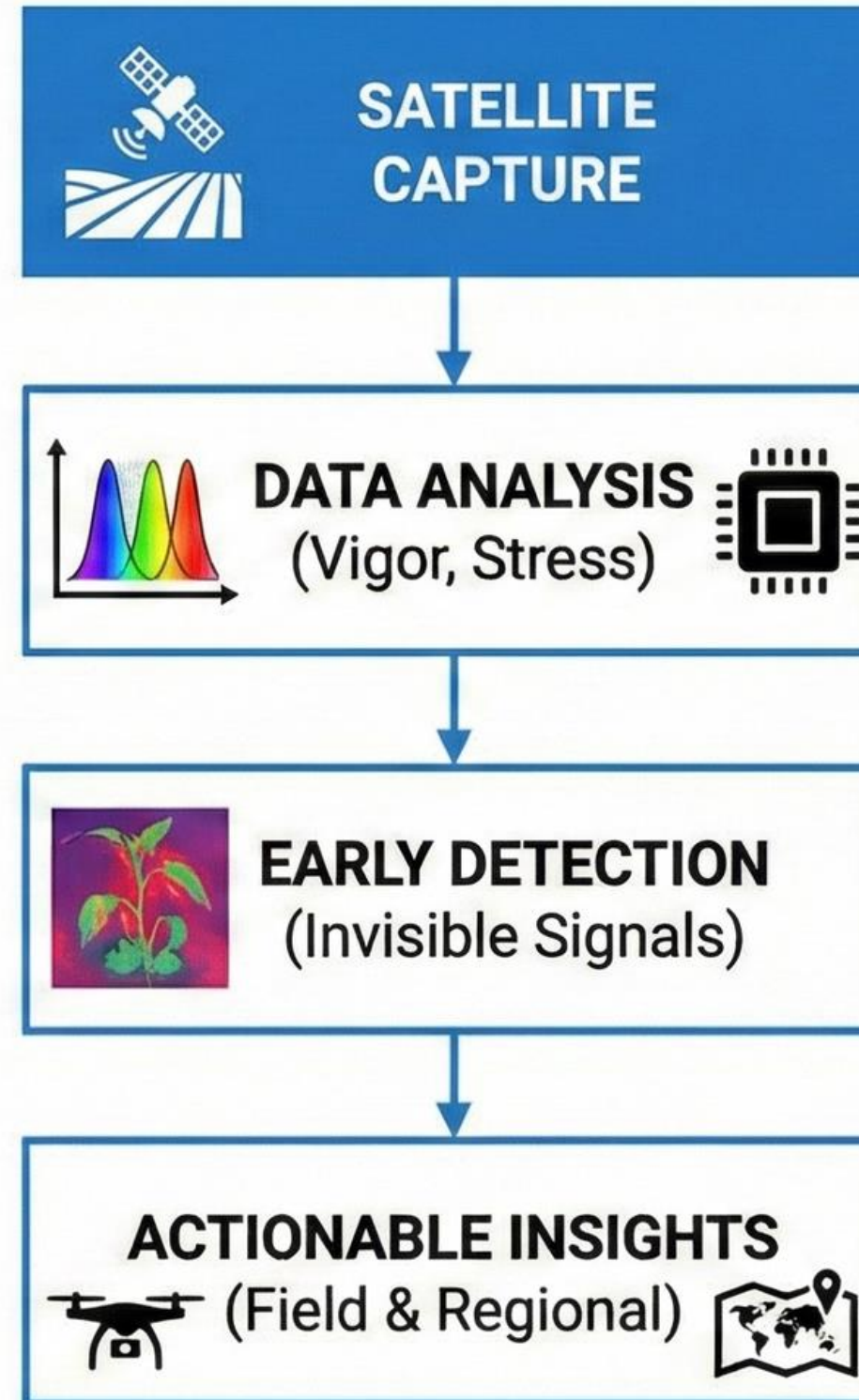
- 1. **Satellites continuously observe crops from space.** 

- 2. **Capture:** 

- ✓ Plant vigor.
- ✓ Canopy condition.
- ✓ Moisture & thermal stress.

- 3. **Detect subtle stress signals** invisible to the human eye. 

- 4. Enable **field-level** and **regional monitoring.** 




Satellite Image Acquisition



Data Acquisition

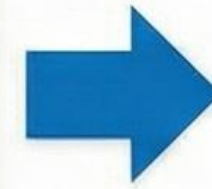
 Optical + Radar (SAR) Imagery

 Multi-temporal Data






Processing & Analysis

AI/ML Algorithms









Monitoring & Insights

-  Large area coverage
-  Regular revisit cycles
-  Historical trend analysis

Vegetation Indices for Pest Detection

Key Indices Used & Their Role in Early Pest Identification

<p>NDVI (Normalized Difference Vegetation Index) </p> <ul style="list-style-type: none"> Measures plant greenness and vigor 	<p>EVI (Enhanced Vegetation Index) </p> <ul style="list-style-type: none"> Better sensitivity in dense crops 	<p>SAVI (Soil Adjusted Vegetation Index) </p> <ul style="list-style-type: none"> Useful in early crop stages 
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 Sudden drops often indicate biotic stress like pest attack. 



Chlorophyll & Canopy Changes

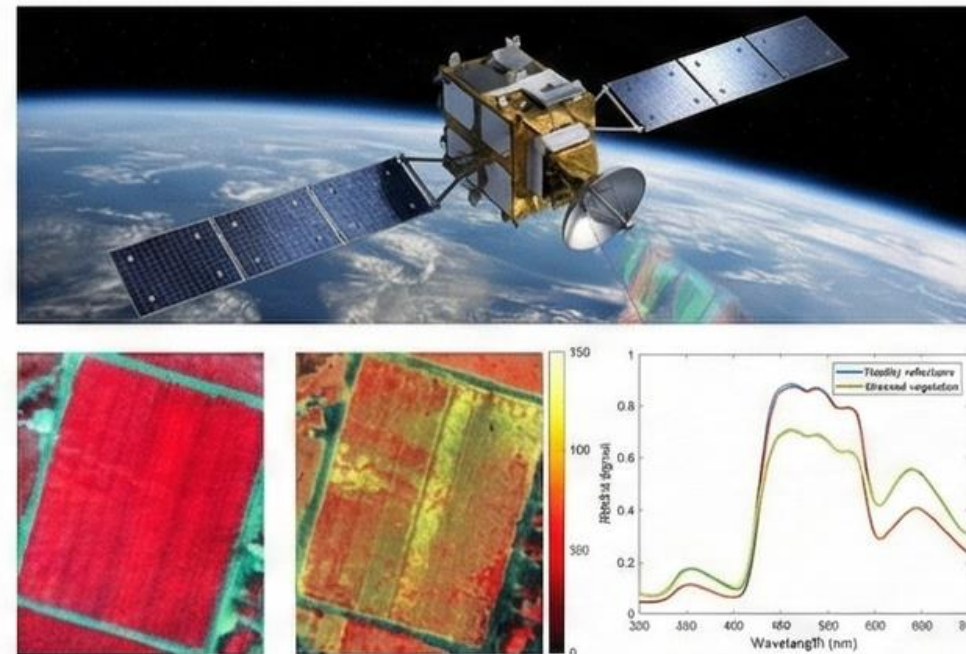
1) Pests Reduce Plant Health

- Chlorophyll content.
- Leaf area.
- Canopy density.



2) Satellites Detect Subtle Changes

- Reduced reflectance in NIR bands.
- Structural canopy degradation.



3) Enables Early Stress Recognition

- Before significant yield loss.



 PEST ATTACK

CAUSES

 CHLOROPHYLL & CANOPY LOSS

DETECTED BY



 SATELLITE NIR SENSORS

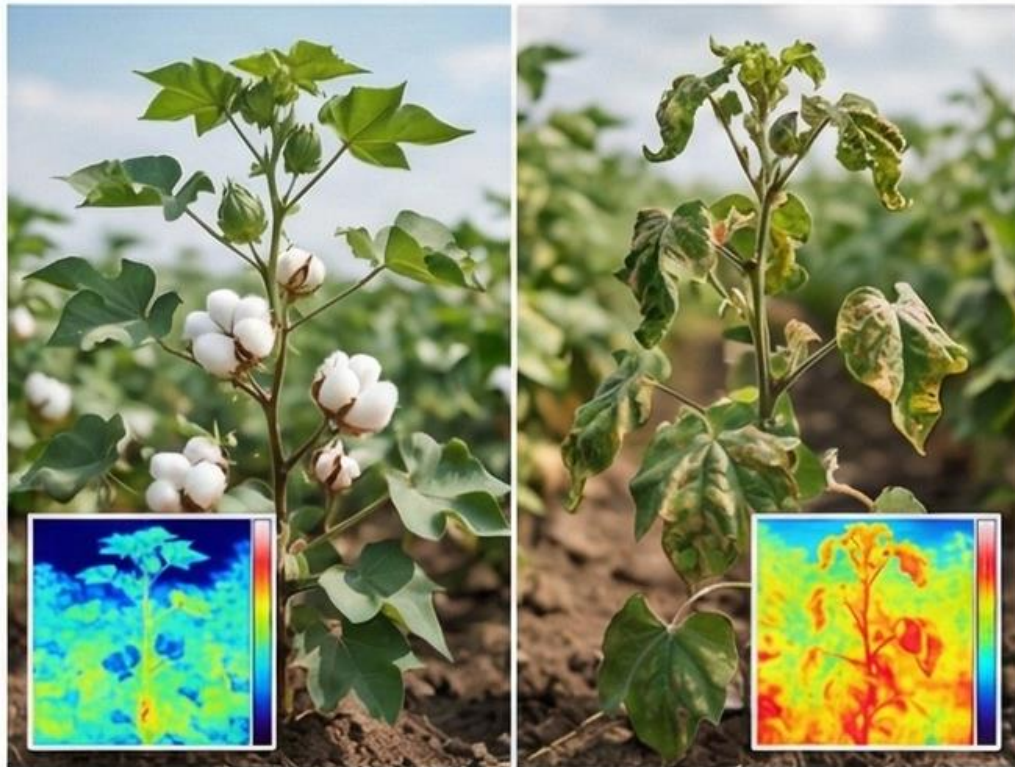
ENABLES

 EARLY WARNING & ACTION

Thermal Stress Indicators

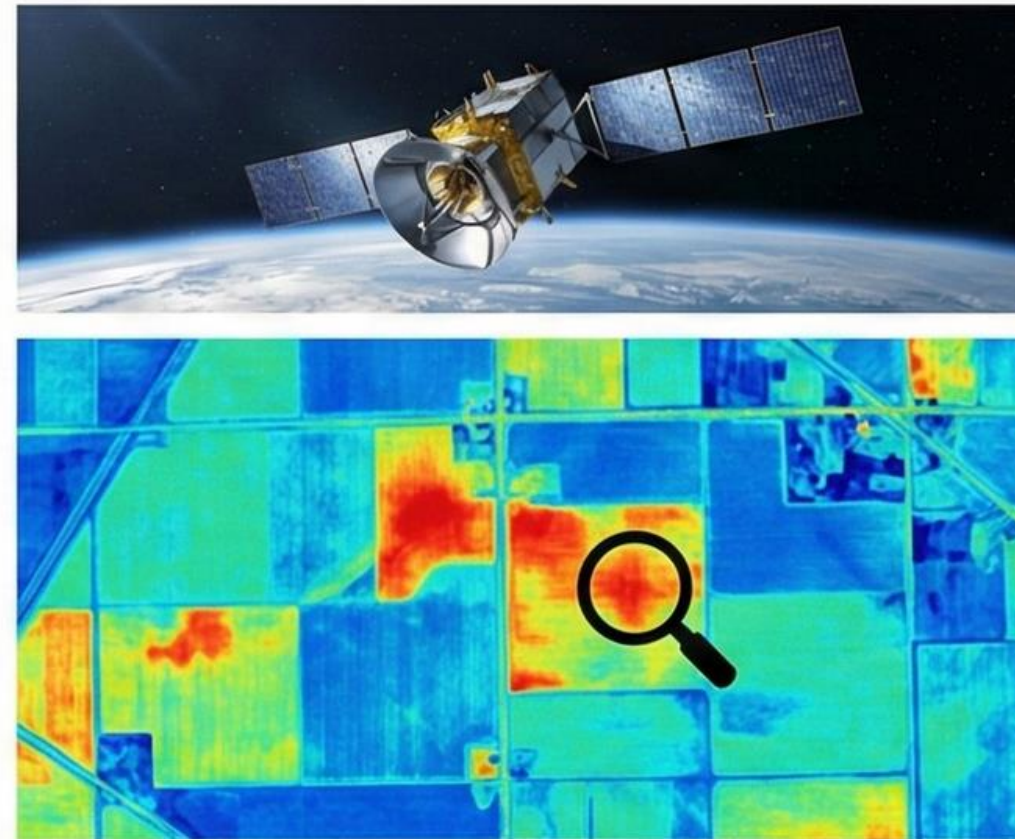
1) Pest-Affected Plants

- Transpire less ( ↓).
- Show higher canopy temperature ( ↑).



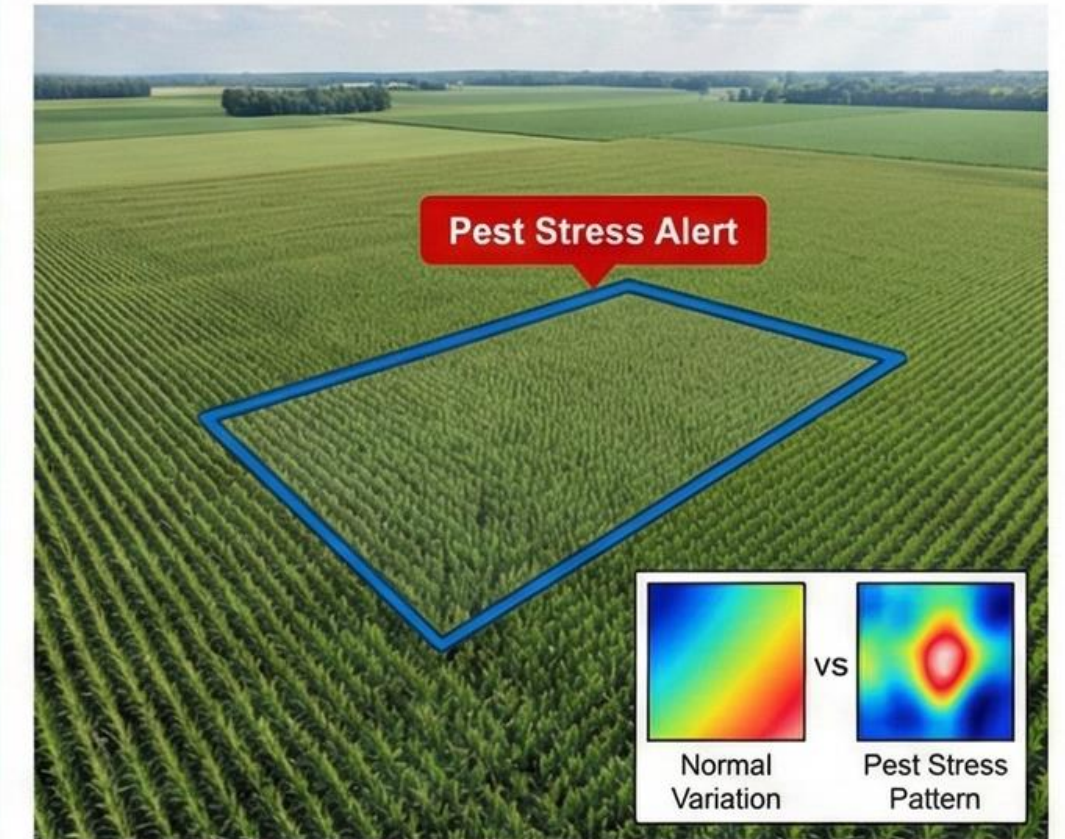
2) Thermal Satellite Data Helps Identify

- Abnormal heat patterns.
- Stress zones within fields.



3) Distinguishes Stress

- Distinguishes pest stress from normal crop conditions.



 PEST IMPACT

CAUSES

 REDUCED
TRANSPIRATION
& HIGHER TEMP

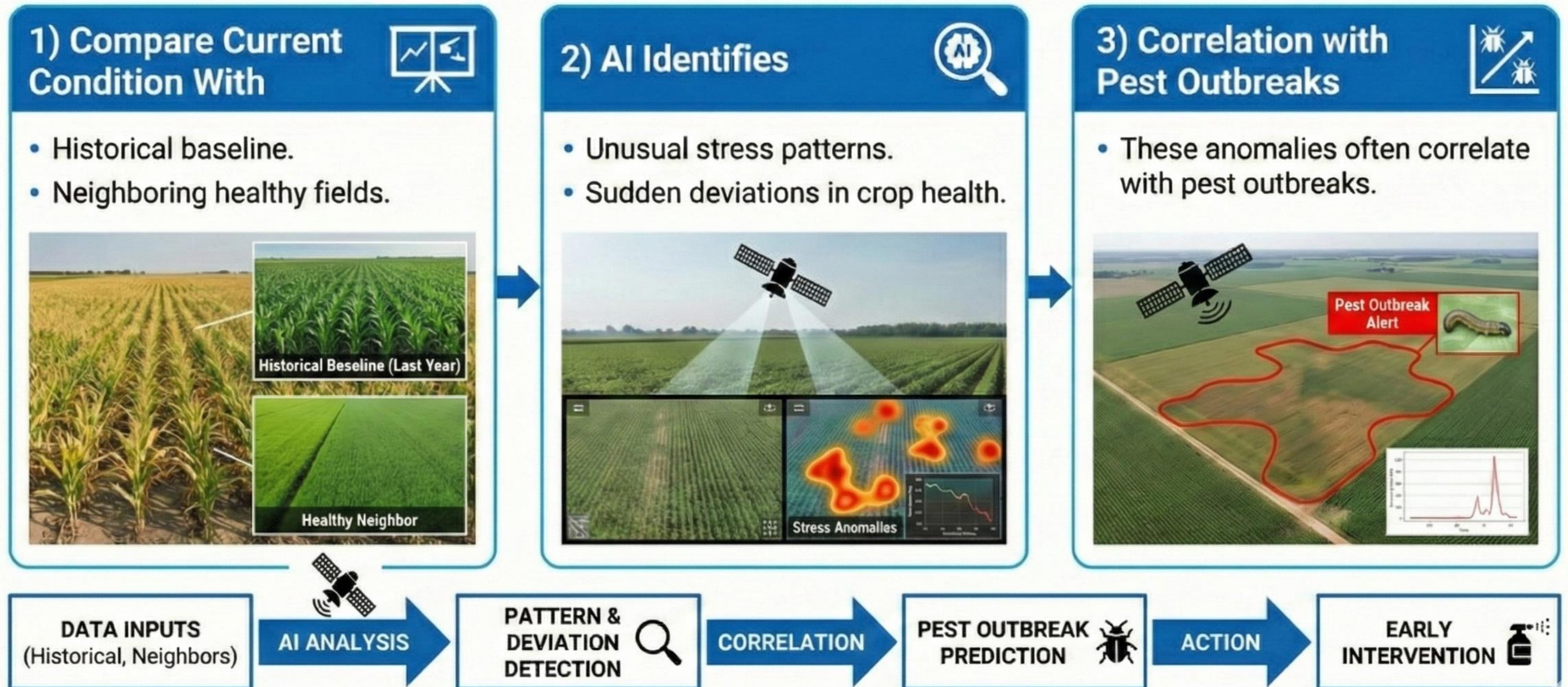
DETECTED BY

 THERMAL
SATELLITE
SENSORS

ENABLES

 PRECISE STRESS
DIFFERENTIATION

Stress Anomaly Detection



AI-Based Pest Probability Scoring



AI Model Inputs & Process

- Vegetation Indices (e.g., NDVI)
- Thermal Stress
- Weather Data (Temp, Humidity, Rain)
- Crop Growth Stage

Enables predictive, not reactive pest management.



Outputs & Early Warnings

- Pest Risk Probability Score
- Early Warning Alerts (SMS/Email)



DATA INPUTS




AI MODEL
(Machine Learning)

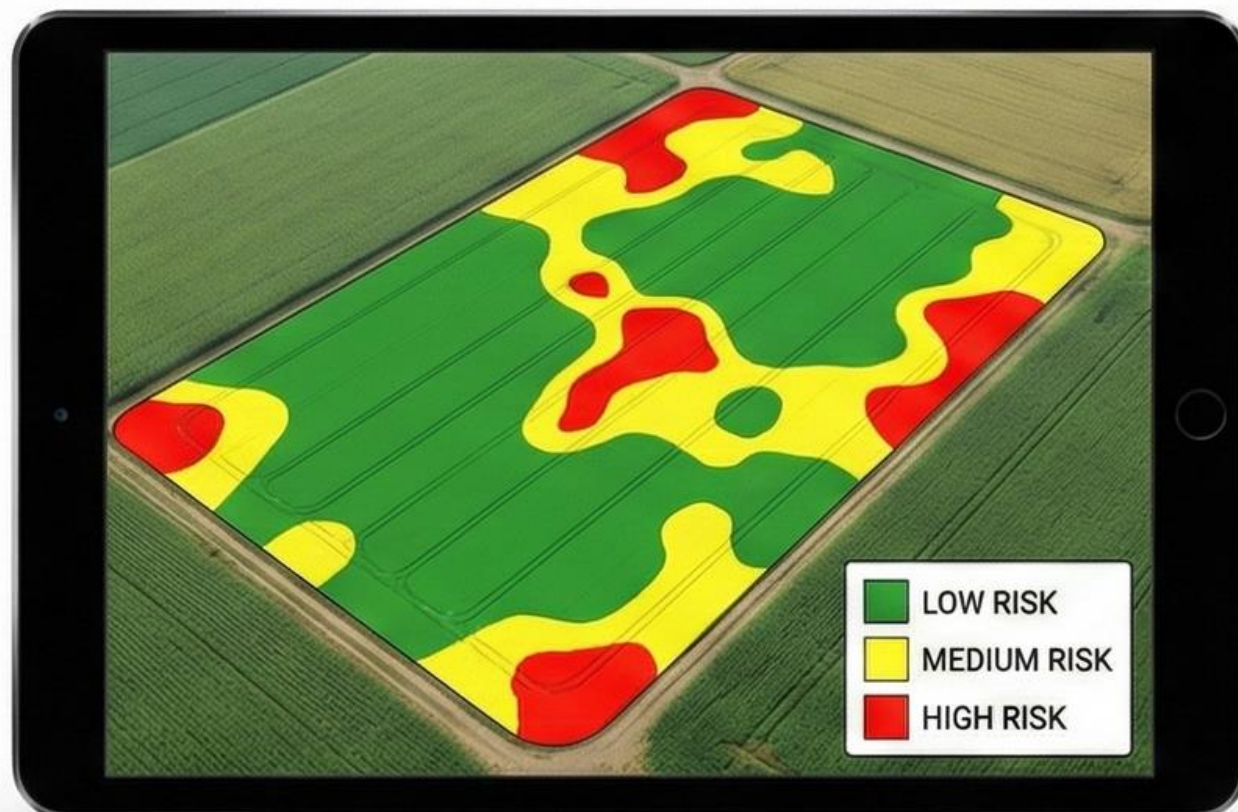
RISK SCORING & ALERTS

PREDICTIVE MANAGEMENT ACTION




Field-Level Pest Risk Maps

AI Analysis & Risk Map Generation

-  • AI converts analysis into...
-  • Color-coded risk maps.
-  • Low / Medium / High pest risk zones.



Benefits & Actionable Intelligence

-  • Field-specific insights.
-  • No blanket spraying.
-  • Actionable intelligence for farmers.



Advisory Generation



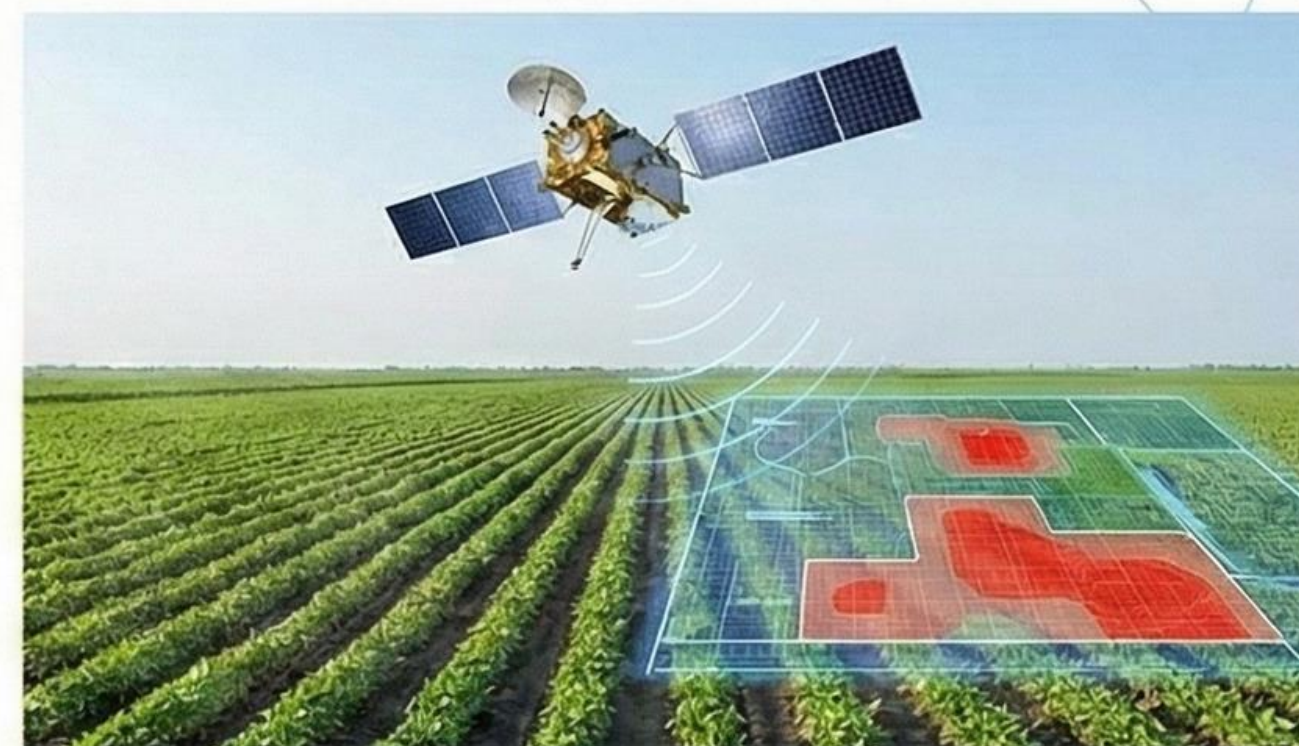
Actionable Advisories Answer:

- ✓ When to spray?
- ✓ Where to spray?
- ✓ What to spray?
- ✓ Whether spraying is required at all?



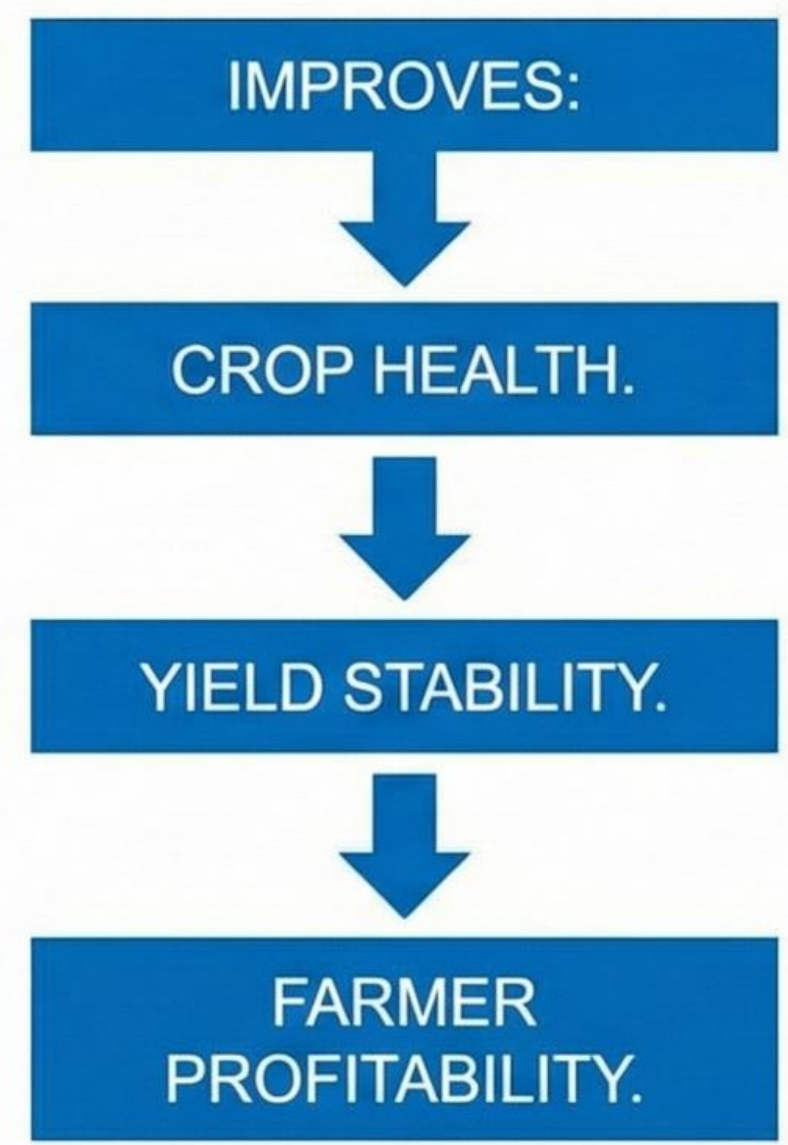
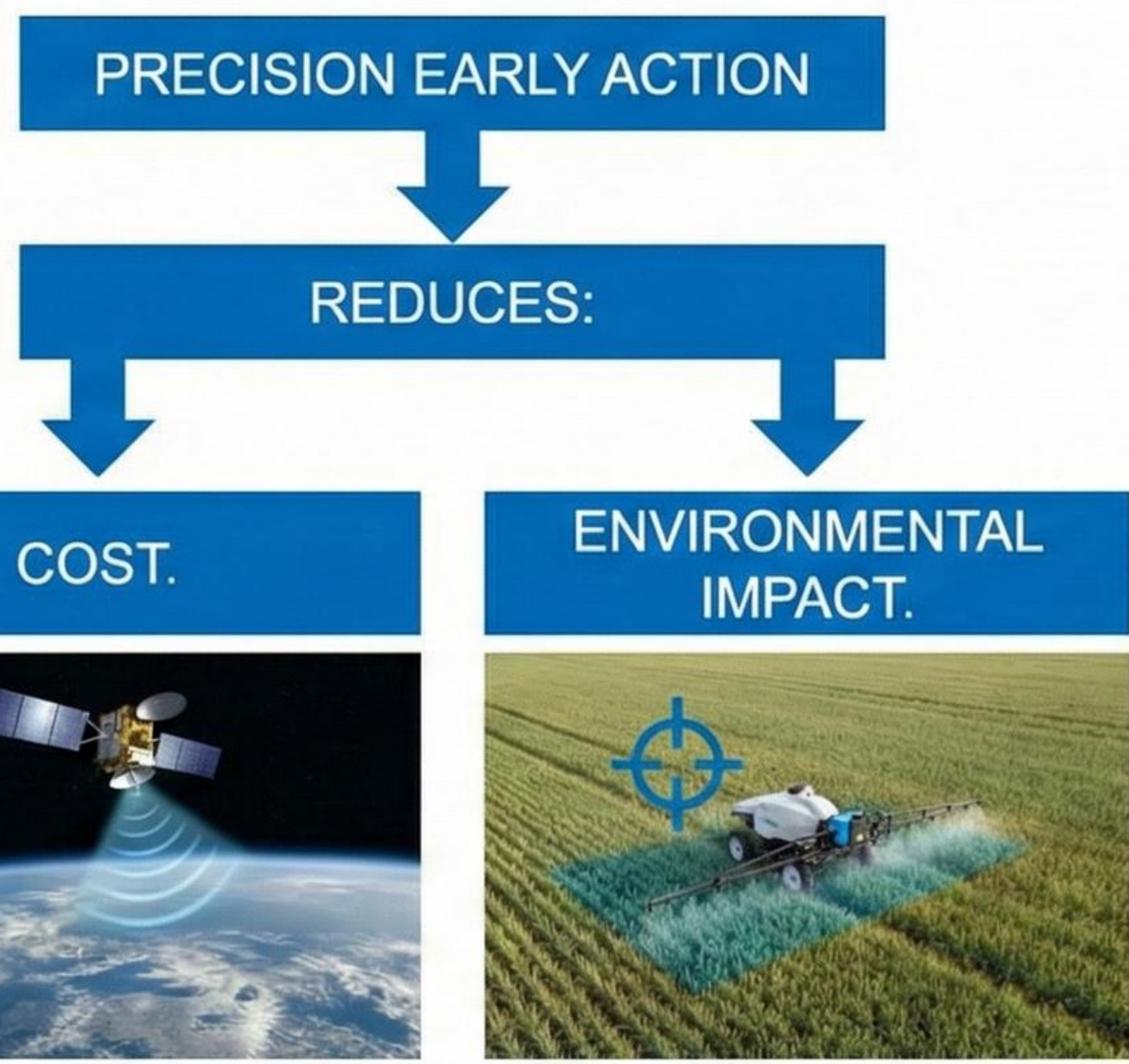
Includes:

- Optimal timing.
- Targeted zones.
- Reduced chemical dosage recommendations.



Effective Pest Management Using Satellites

Early detection = early control



Sustainable & Climate-Smart Practices

Environmental Benefits



Strategic Alignment

- Supports: 
 -  - Integrated Pest Management (IPM).
 -  - Sustainable agriculture goals.
- Aligns with: 
 -  - ESG & climate resilience strategies.



PlanetEye FarmAI Advantage



AI-Driven Core Technology



- AI-driven satellite analytics.



- Field-level pest forecasting.



Scalable for:



- Individual farmers.



- Corporates.



- Government programs.



- Crop insurance.



From Data to Decisions



SATELLITE
DATA

AI
ANALYTICS



DECISION
INTELLIGENCE

Turning satellite data into
decision intelligence.

Thank You

for your participation

Empowering Precision Agriculture with
AI & Satellites

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