

# Botrybel

## As a service

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BIOCONTROL



# The Current Challenge

*Botrytis cinerea* and other fungal pathogens cause significant **yield losses**.

Traditional crop protection is under **growing environmental and regulatory pressure**, while crop management practices still **lack local adaptation**.

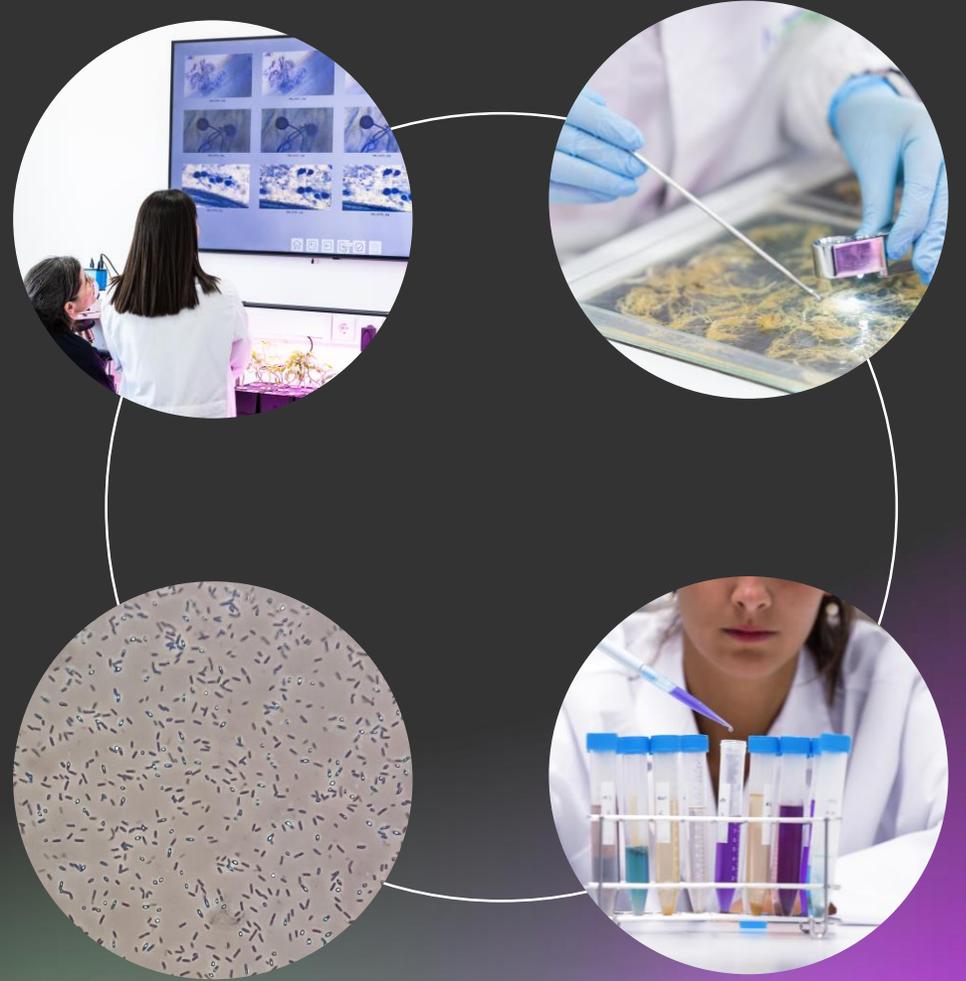
Farmers need **green & efficient alternatives** to ensure continued production.

Agriculture needs both **precision & sustainability**.



# About Probelte

- Leader in **biological crop** protection with proven expertise in biocontrol.
- Developer and registrant of **Botrybel®** (*Bacillus amyloliquefaciens* AH2).



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- Member of **AGRONOVA BIOTECH**, leading agricultural biotech platform that provides greater value, resources, and technology across all its companies.
- Through **AGRONOVA BIOTECH**, **Probelte** strengthens its innovation capacity – integrating digitalization into its product DNA to enhance performance, precision, and sustainability.



# Botrybel

## SCIENCE BEHIND THE BIOCONTROL



### ACTIVE INGREDIENT:

- *Bacillus amyloliquefaciens* strain AH2.
- Isolated in Spain in **tomato *Solanum lycopersicum*** cultivated soil 2002.
- **Deposited in 2007** in the Spanish collection of type cultures
- Classified as a **low-risk active substance** in 2020 by the UE



### FORMULATION:

- Concentrated suspension (SC)  
10<sup>8</sup> Cfu/ml



### APPLICATION METHOD:

- Foliar spray

# Botrybel

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ACTION MODE



# Botrybel

ACTION MODE



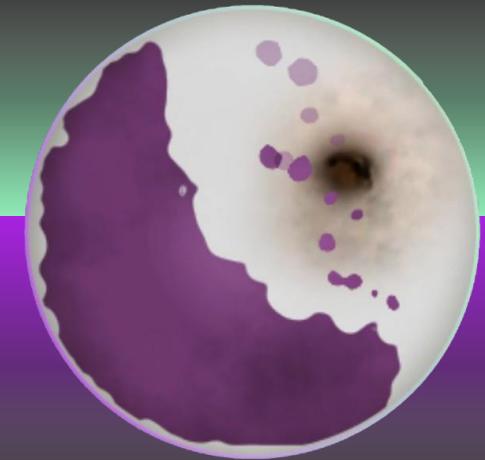
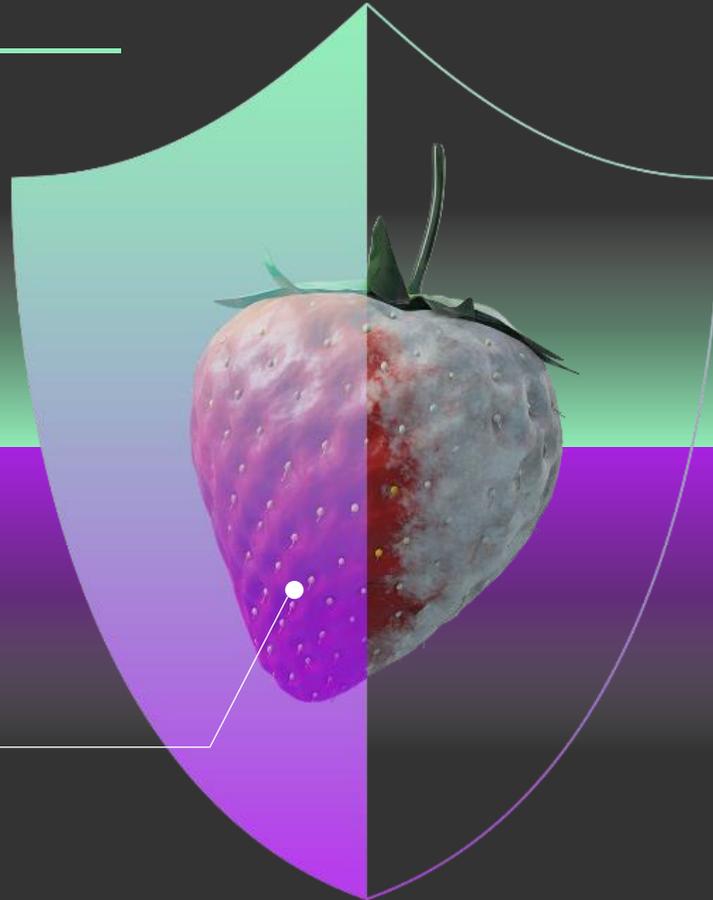
Botrytis

# Botrybel

ACTION MODE

01

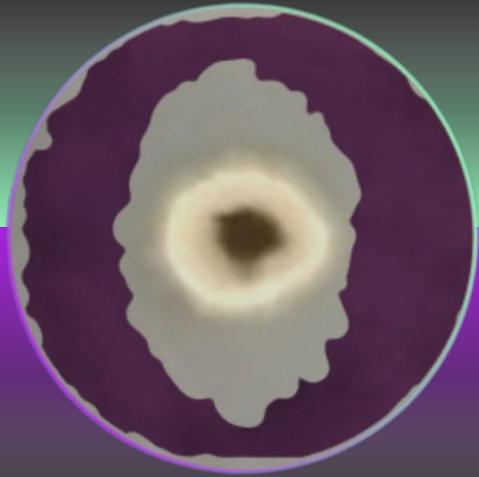
DIRECT ACTION  
Enzymes  
Metabolites  
VOCs



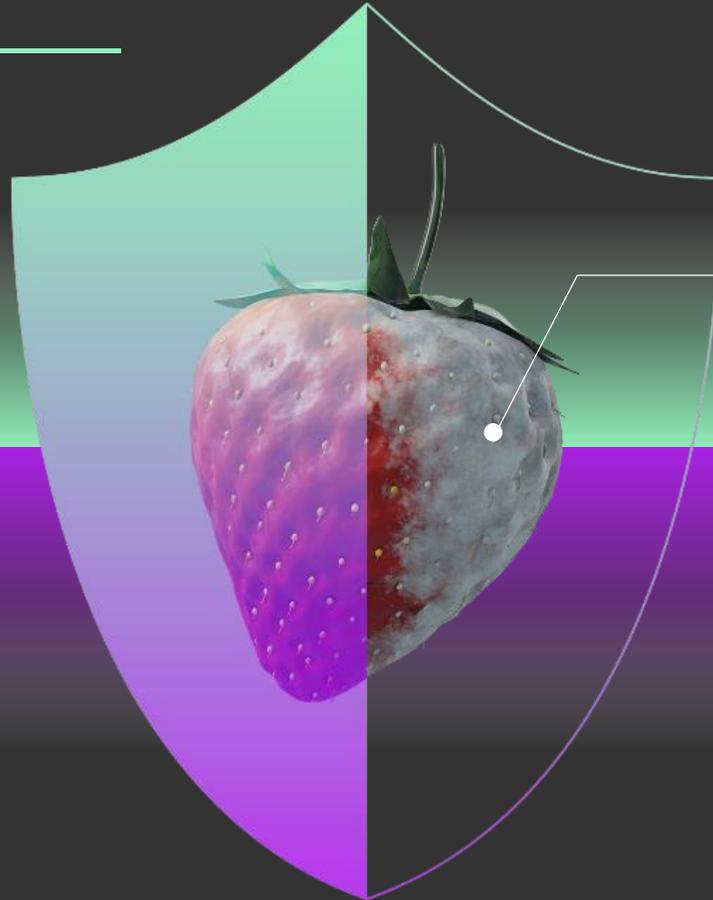
INHIBITING PATHIGENIC  
DEVELOPMENT

# Botrybel

## ACTION MODE



REDUCING THE PATHOGEN'S  
ROOM FOR GROWTH

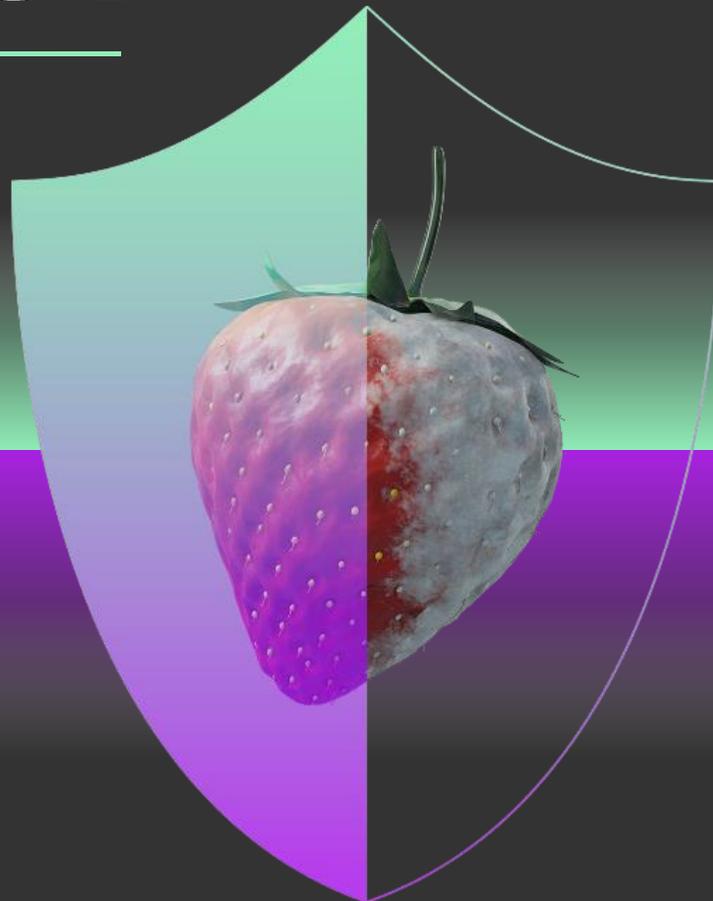


02

Competes  
for resources

# Botrybel

ACTION MODE



# Botrybel

ACTION MODE

03

INDIRECT ACTION  
Botrybel interacts  
with the plant's  
immune system



# Botrybel As a service

## THE DIGITAL LAYER

- **Biologicals thrive when tailored to field conditions.**  
Digital tools help transform their natural variability into consistent performance.
- Growers need **actionable, data-driven** guidance to optimize use, predict and adapt, ensuring maximum impact.
- Biologicals must go beyond good characterized strain and formulation  
→ Digitalization **turns biologicals from variable to reliable.**

Strain



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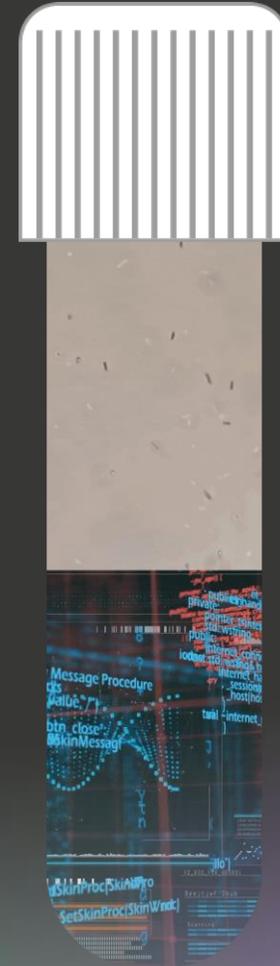
Formulation

Digital layer



# Probelte's vision:

- Integrate **digitalization into the DNA of our biological products**, turning **Botrybel®** into a **smart biocontrol service** with personalized recommendations for each field and crop.



# Combining living science with intelligent data

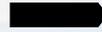
Creation of a data-driven decision support system :

- **Real-time field data** – weather conditions, humidity, crop phenology, collected by our own towers and public stations.
- **Deep biological knowledge** of AH2 – its growth, activity, and interactions with pathogens.
- **AI-driven models** – predictive algorithms that forecast Botrytis risk and prescriptive tools that recommend when and how to apply Botrybel® for maximum impact.  
We've also developed **molecular detection tools** – specific TaqMan probes – to monitor AH2 presence in the field, helping us validate and refine our recommendations.”



**PREDICTIVE TOOLS:**

- 12 Applications (A)
- 14 Visual Evaluation of Disease symptoms (Ev)
- Meteorological data



**AH2 DETECTION/QUANTIFICATION:**

- 7 Leaves sampling times (green)
- 4 Fruit sampling times (red)

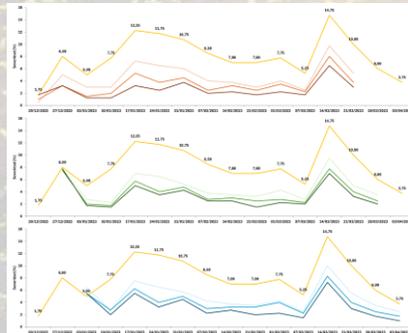
**Conducted field trials** with different crop protection strategies to evaluate effectiveness against pests and diseases.

Applied Botrybel with environmental monitoring through **sensors** to capture **relevant data**.

**Studied bacteria-fungus-plant interactions**, quantified *Botrytis cinerea*, and analyzed plant defense gene expression.

Collected key data to develop **AI models** evaluating organism interactions and plant defense mechanisms.

**Performed biological validation** of the model to optimize timing and dosage of product applications.



**BLOCK A**

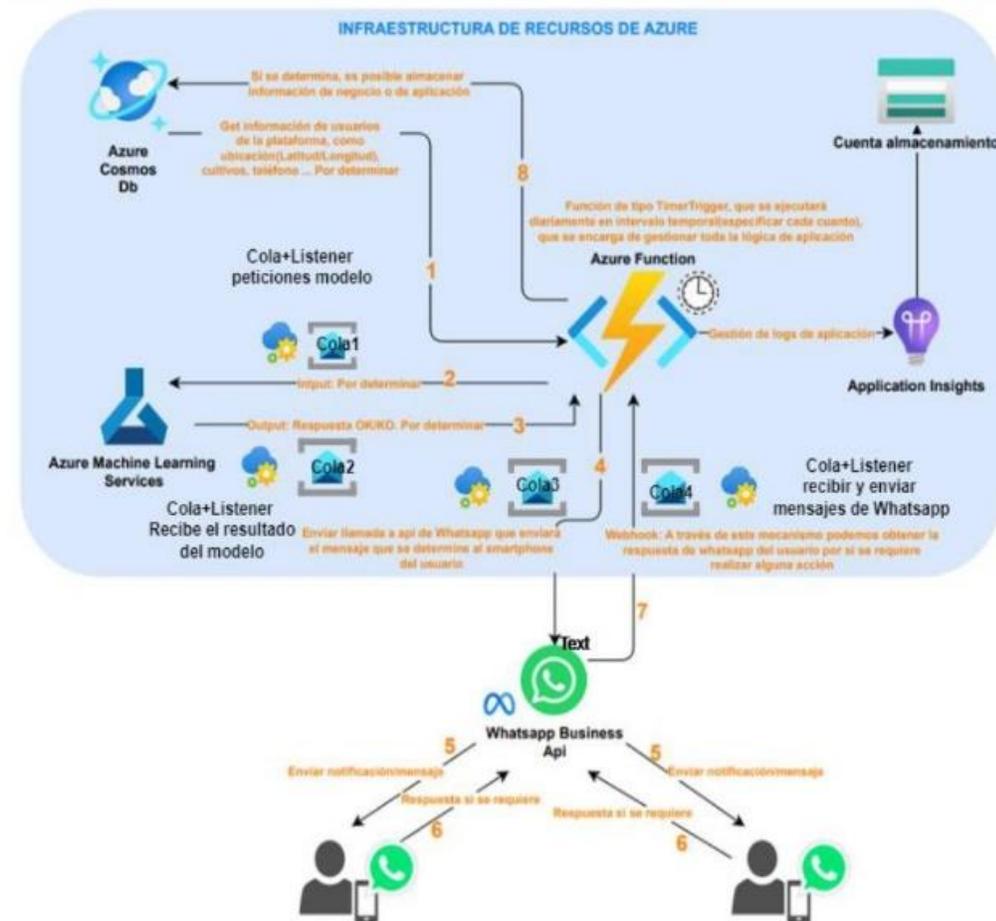
**BLOCK B  
+ 7 DAYS**

**BLOCK C  
+ 14 DAYS**

T1	Untreated	103, 208, 304, 409
T2	Low dose	107, 204, 305, 407
T3	Medium dose	105, 209, 308, 402
T4	High dose	109, 202, 302, 410
T5	Low dose +7	102, 207, 310, 405
T6	Medium dose +7	106, 203, 309, 401
T7	High dose +7	101, 206, 303, 408
T8	Low dose +14	104, 210, 301, 406
T9	Medium dose +14	108, 201, 306, 404
T10	High dose +14	110, 205, 307, 403

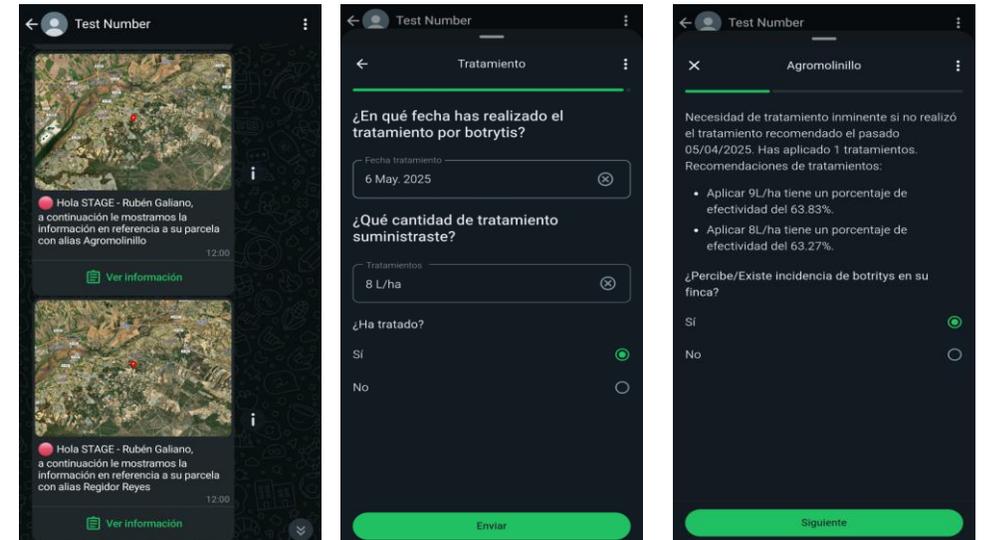
# Machine Learning Model Design and Development

- **Built a cloud-based platform** to enable generation of field recommendations.
- **Developed and trained machine learning models** using collected agronomic and environmental data.
- **Defined and implemented data structures and technologies** for efficient data capture and storage.
- **Generated, deployed, and monitored predictive models** to continuously improve recommendations.



# Design and Development of a Personalized Recommendation Application for Biopesticide Use

- **Created a digital tool** that sends personalized alerts to farmers and provides tailored recommendations for optimal biopesticide use.
- **Defined key requirements** to ensure the best user experience and developed an initial prototype.
- Selected **WhatsApp Business API** as the notification channel, requiring a **Meta Developer account** to enable seamless communication with farmers.



# Closing the Loop

## Training the Models to Reach Full Efficiency

- The **next step** focuses on training and optimization with larger, more **diverse datasets**.
- This stage will make the system **more accurate, adaptive, and reliable** under real field conditions.
- We are now very close to achieving our goal: transforming **Botrybel®** into a fully operational, intelligent recommendation service for sustainable biocontrol.



**FARMER  
SUCCESS**

**THANKS FOR YOUR  
ATTENTION!**



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**Probelte**



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DE MADRID



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