



Progress beyond

Formulation Makes the Difference:

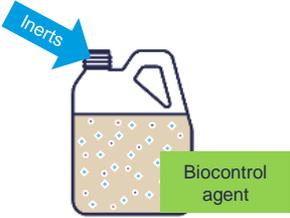
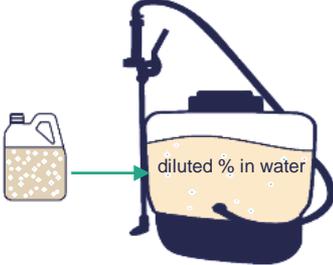
Optimized biological formulation strategies with Solvay's co-formulant toolbox

C. Orizet - Solvay



Formulation is key for biological efficacy of microbial pesticides



FORMULATION <i>Liquid Concentrate (SC / OD)</i> <i>Solid Concentrate (WP, WDG)</i>	DILUTION <i>in the Spray Tank</i>	APPLICATION <i>on target pest / disease</i>
		
SHELF LIFE <ul style="list-style-type: none">• Microorganism viability (compatibility inerts)• No premature spores germination• Homogeneous Dispersion, no aggregation	HANDLING <ul style="list-style-type: none">• Homogeneous dispersion quality upon dilution• Prevention of agglomeration and nozzles clogging	ON TARGET <ul style="list-style-type: none">• Spreading & Retention• Rainfastness• UV protection• Activation (Boosting of microorganism growth, production of 2ndary metabolites)

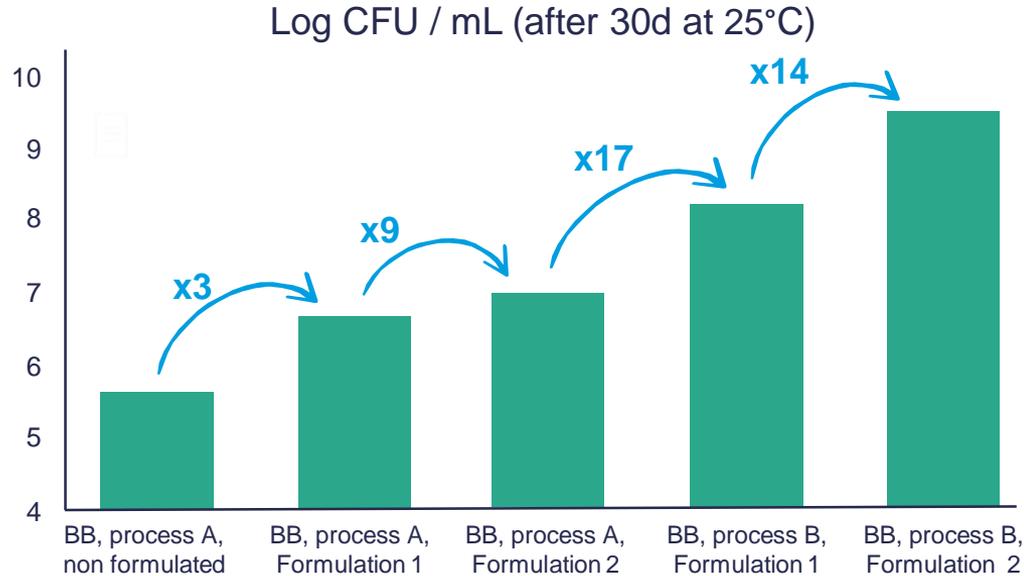
Optimized formulation strategies and adapted toolbox to overcome biologicals specific challenges

Formulation Makes the Difference



Formulation of an agrochemical:

“put one or several active ingredients into a **usable form**”



The same strain of *Beauveria bassiana* was prepared using 2 different solid fermentation processes and 2 different liquid carriers to prepare a final OD formulation.

The right process combined with the right formulation can have a huge impact!!

From Solid to Liquid for Easier Handling

Oil Dispersion design for fungi



CHALLENGE:

- Shift from solid WP to Liquid OD
- More complex preparation
- Biological & physical stability (no sedimentation)

OUR SOLUTION:

AgRHEA™ OD-EASY, OD made easy
All-in-one, ready-to-use, Oil Dispersion basis, suitable for fungi formulation (eg *Beauveria Bassiana*)

FORMULATION EXAMPLE

Composition	OD (Wt%)
Beauveria bassiana	20.0
AgRHEA™ OD-EASY	45.0
Soybean or Canola Oil	Up to 100

Characteristics	
Appearance	Dark green viscous liquid
Density	0.98
pH (5%)	6.0
Brookfield Viscosity (20°C, 20RPM, mPa.s)	1250
Storage at 0°C for 7 days	stable
Dilution stability (CIPAC D, 30°C, 2h)	OK



1. Blend AgRHEA™ OD-EASY and Oil



2. Add the biopesticide active



3. Stir, Homogenize and Pack

Improving Shelf Life and Storage



CHALLENGE:

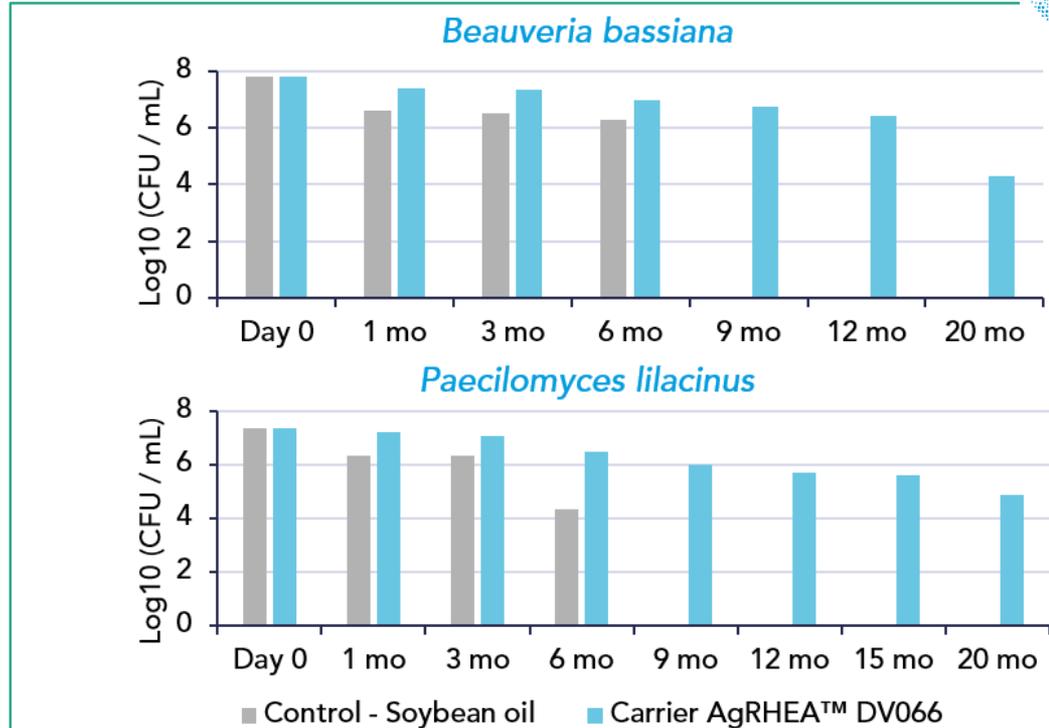
- Short shelf life affects efficacy and logistics
- Low Water activity (aw) for liquid formulations

OUR SOLUTION:

AgRHEA™ DV 066

Liquid carrier addressing an enlarged scope of fungal biopesticides with an even higher shelf-life enhancement target, at/above room temperature

aw of AgRHEA™ DV066: 0.045 @25°



Incubation temperature: 25°C, 95% carrier/5% biological
Tests still running

Easier handling of the product for final users.
Better Shelf Life & Storage. Better biological efficacy.

Improving Shelf Life and Storage



CHALLENGE:

- Short shelf life affects efficacy and logistics
- Low Water activity (aw) for liquid formulations

OUR SOLUTION:

AgRHEA™ DV 100

A ready-to-use, efficient Non aqueous Dispersion basis, suitable for microorganisms formulation

DV AgRHEA™ 100 with 5% of *Trichoderma harzianum*



Initial Viscosity:
550cP



35°C: small
synereisis
300cP



Dispersion test
in CIPAC D
water after 24h

Easier handling of the product for final users.
Better Shelf Life & Storage. Better biological efficacy.

Rainfastness Adjuvant for Delivery & Efficacy



CHALLENGE:

- Retention & Protection on target surface

OUR SOLUTION:

AgRHEA™ STICGUARD

Sticker adjuvant:

- wash-off prevention
 - increased retention time
- better overall spray efficacy
→ possible active dose reduction

OMRI eligible.

100% biobased & biodegradable

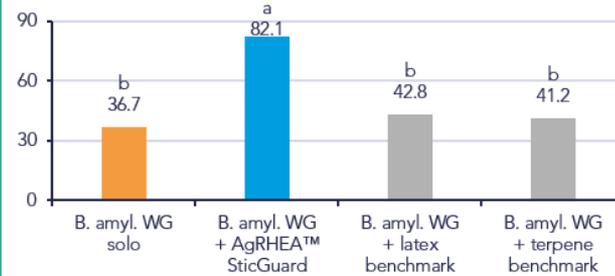
Broad compatibility

(microorganisms, minerals)

Performance - Field Trials 2022

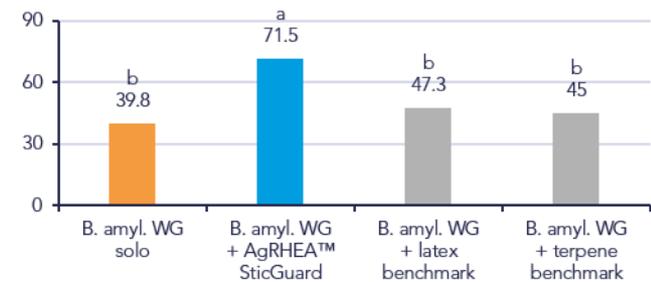
Reduction in pest severity

% vs. untreated control

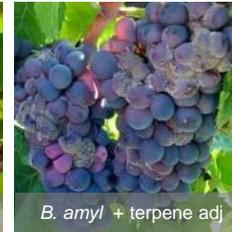


Reduction in pest incidence

% vs. untreated control



Nota: Moderate Botrytis pressure during the season → relatively low % pest severity for untreated control (~8%)
Rain: 37.2mm precipitation during the week after last application → differentiating conditions for rainfastness



Improved Delivery. Improved & Consistent Biological Efficacy.

Solvay's Biologicals Offer



ANSWERING BIOLOGICALS FORMULATION & APPLICATION CHALLENGES

FOLIAR

solid & liquid



Formulation Toolbox
Range of wetting agents,
dispersant & emulsifiers
for all type of biological
products



AgRHEA™ SticGuard
Retention & Rainfastness
adjuvant

solid

liquid



AgRHEA™ OD-EASY
Oil Dispersion basis
for conidia microbial
biopesticides



AgRHO® S-Boost IFA
Adjuvant to improve the
viability and performance
of biologicals applied in-
furrow

**IN
FURROW**

liquid



DV AgRHEA™ 100
Structured liquid carriers
for next generation of
concentrated formulations
of fungi with extended
shelf life



Peridiam® Active 319
Seed Coating for
improved microorganism
survival on seed

**ON
SEED**

Solvay Capabilities for Biologicals Formulations Design



- SC, SE, OD, EC, SL, EW, WP, WDG agro formulations, process, characterizations
- Database of more than **19000 agro formulations**
- **High throughput** formulation capabilities & modelling tools
- **State of the art capabilities:**
Droplet size distributions, contact angle, surface tension, microscopy, granulometry, Zeta potential, foliar retention, rainfastness

1

Solid analytical capabilities Network

(structural, separation, elementary analysis, powder morphology)

2

Phys-chem expertise

- Rheology
- Colloidal science
- Surface modification

3

Technology platforms

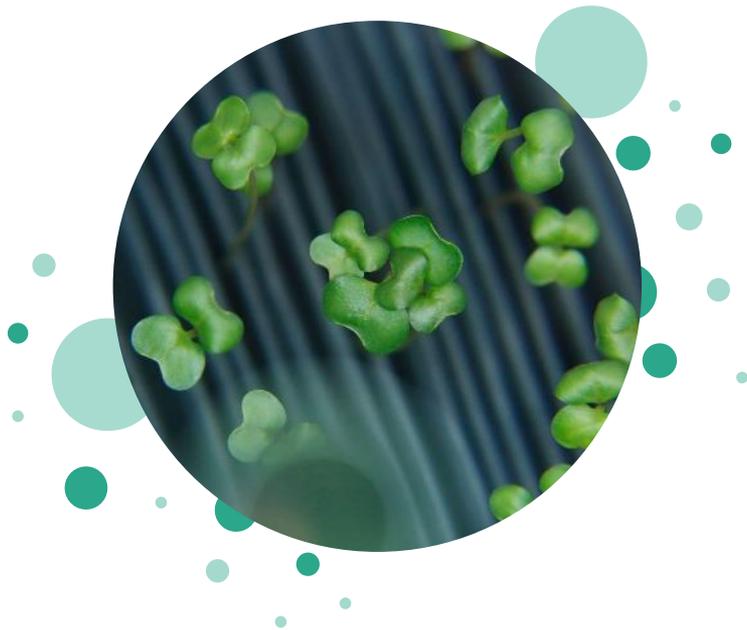
- Polymers incl. from natural source
- Mild Surfactants
- Green Solvents
- Renewable materials & Biotechnology

4

Microbiology advanced labs in France, Brazil, United States

More than 40 years of Agro formulations expertise worldwide

Thank you!



Progress beyond

Contact our agricultural specialties experts