

Croda Crop Protection

Reducing development
time of microbial
formulations using
chassis systems

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Specialist*



Our company



Our Purpose

Smart science to improve lives™

Our 2030 Commitment

We are committed to being the **world's most sustainable supplier of innovative ingredients.**

We will create, make and sell solutions to tackle some of the **biggest challenges** the world is facing. The United Nations Sustainable Development Goals (UN SDGs) are the foundation of our approach.

Our priority SDGs



Croda Crop Care



Life Sciences



Croda Pharma



Crop Care



Consumer Care

CRODA

Crop Protection

Sustainable delivery systems for agrochemical active ingredients both chemical and biological based



incotec

Seed enhancement

Enhance seeds to reach their maximum potential

plantimpact

Biostimulants

Biostimulant chemistry to stimulate natural plant responses, helping them direct more of their resources to improving crop quality and creating yield



Selecting the right formulation type



- Selection of the right formulation is key – know your microbe!
- Formulation aids such as dispersants and emulsifiers can compromise the viability of some biological actives

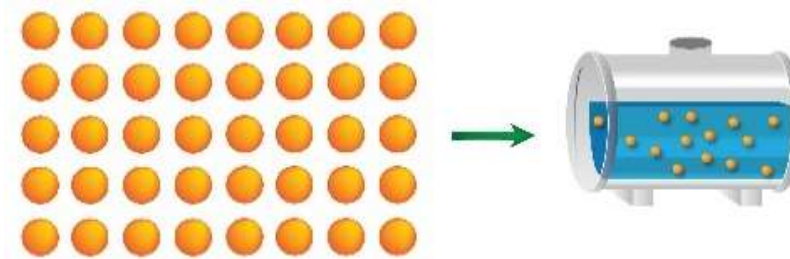
Typical formulation types for formulating microbes

Oil based:



Oil dispersion (OD)

Solid based:



Wettable powder (WP)

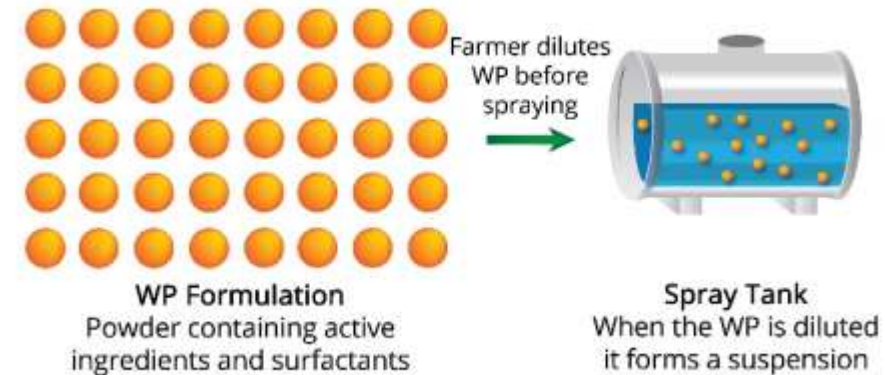




Formulating microbes as WPs

General WP formulation recipe

Component	% w/w
Microbe (active ingredient)	10 - 90
Wetting agent	2 - 12
Dispersant	2 - 12
Other excipients	2 - 10
Inert filler	To 100



Benefits of WPs

- Water-free systems
- Provide a uniform distribution of active ingredients
- Simple and easy to be formulated
- No storage sedimentation issues
- High loading of active ingredient is possible

Challenges of microbes and WPs



- Difficult to maintain formulation quality
- Poor water dispersibility
- Low wettability
- Slow blooming in the tank mix
- Stability issues of the microbe
- Developmental time and formulation knowledge
 - Ratios and amounts of the different components required optimisation to provide the required performance



The solution



Atlox™ BS-50

A complete delivery system (chassis) for WP microbial formulation



Atlox BS-50 introduction

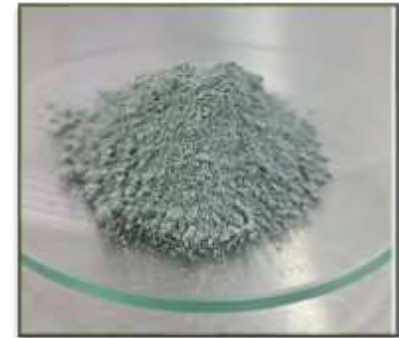
- A ready-to-use powder system
- Simply add a microbe to create a completed WP formulation
- Optimised composition to deliver performance
 - Fast wetting upon dilution in water - even with microbes with high hydrophobicity
 - Good suspensibility upon dilution
 - Maintains viability of spores with common microbes

Benefits to the user:

- No formulation knowledge required
- Reduced developmental time
 - Optimisation of the components already done



Pure sample of Atlox
BS-50



Atlox BS-50 (70%) +
*Trichoderma
asperellum* (30%)

Component	Function	% (w/w)
Microorganism	Active ingredient	15 - 30
Atlox™ BS-50	Delivery system	70 - 85

Initial performance data



Atlox BS-50



Microorganism

- a) *Trichoderma asperellum*
- b) *Beauveria bassiana*
- c) *Metarhizium anisopliae*

Component	Content (% w/w)
Atlox BS-50	70%
Microorganism	30%

Evaluations

Wettability

Time needed for 5 g of the powder mixture to wet into 100 g of water

Suspensibility

% of solids that are kept suspended in water after 30 minutes at 30°C



Wettability



Time needed for 5 g of the powder mixture to wet into 100 g of water

**Example of poor wettability of a
microbe powder**



**Example of good wettability of a
microbe powder**



Wettability with microbes



Beauveria bassiana and Atlox BS-50



Very good wettability



5 min

10 min

15 min

5 min

10 min

15 min

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Suspensibility with Atlox BS-50



% of solids that are kept suspended in water after 30 minutes at 30°C



The success criteria is above or equal to 60% of solids in suspension

Samples	Suspensibility (%)
<i>Trichoderma asperellum</i> (30%) + Atlox BS-50 (70%)	78
<i>Beauveria bassiana</i> (30%) + Atlox BS-50 (70%)	70
<i>Metarhizium anisopliae</i> (30%) + Atlox BS-50 (70%)	67



Atlox™ BS-50



Viability
results

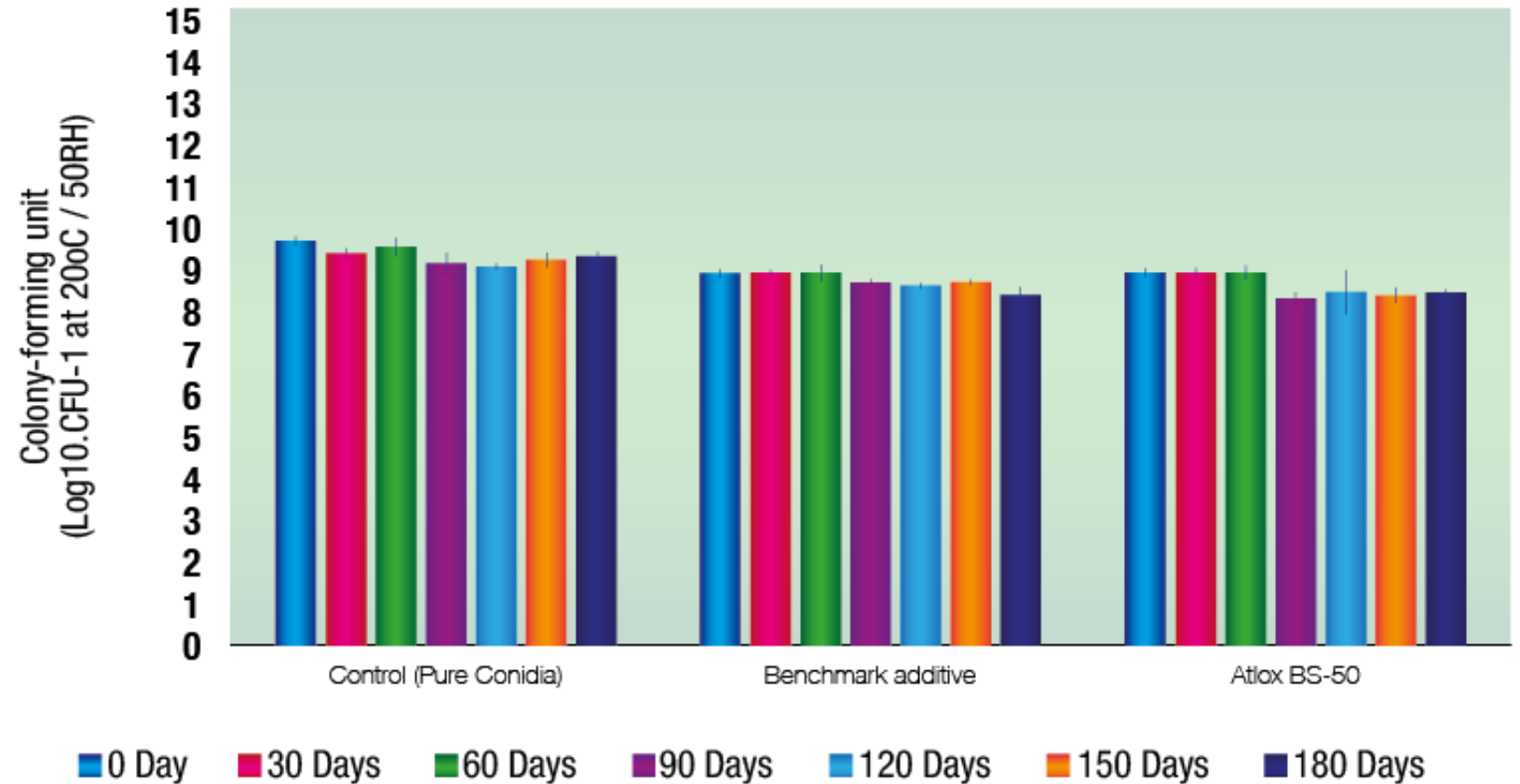
Colony-forming unit



Atlox BS-50 did not affect the number of colony units when compared with the other samples over the time



Atlox BS-50 is non harmful to the *Trichoderma sp.*



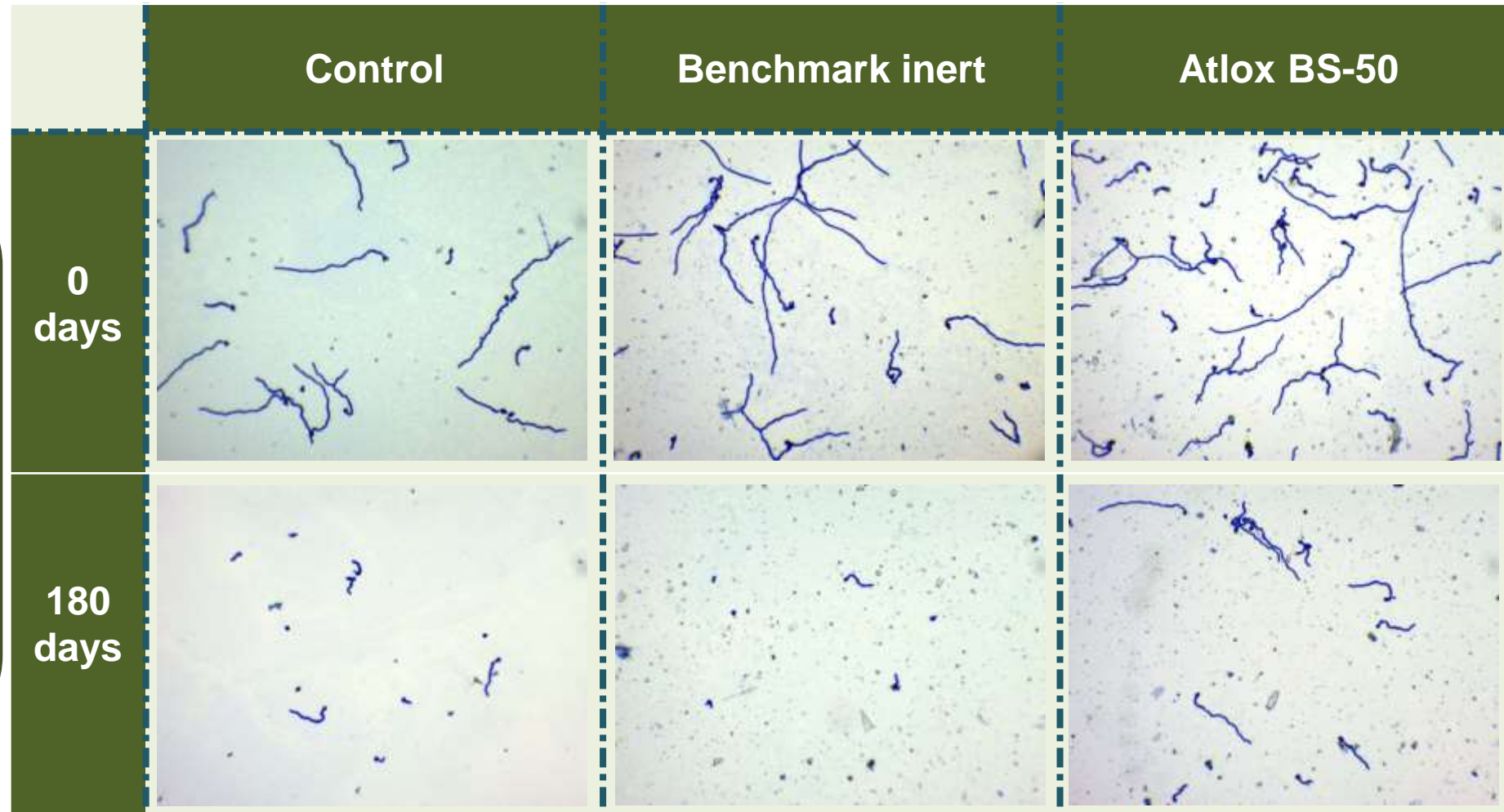
CFU results of samples with *Trichoderma asperellum* alone, *Trichoderma asperellum* plus benchmark additive and *Trichoderma asperellum* plus Atlox BS-50

Conidia viability - conidia germination method



Atlox BS-50 can offer an improvement in conidia germination over the time due the mitigation in natural viability drop

Also, after 180 days, it's possible to observe that the length of the germinative tubes of the conidia are longer than the other samples, indicating an improvement in conidia vigour

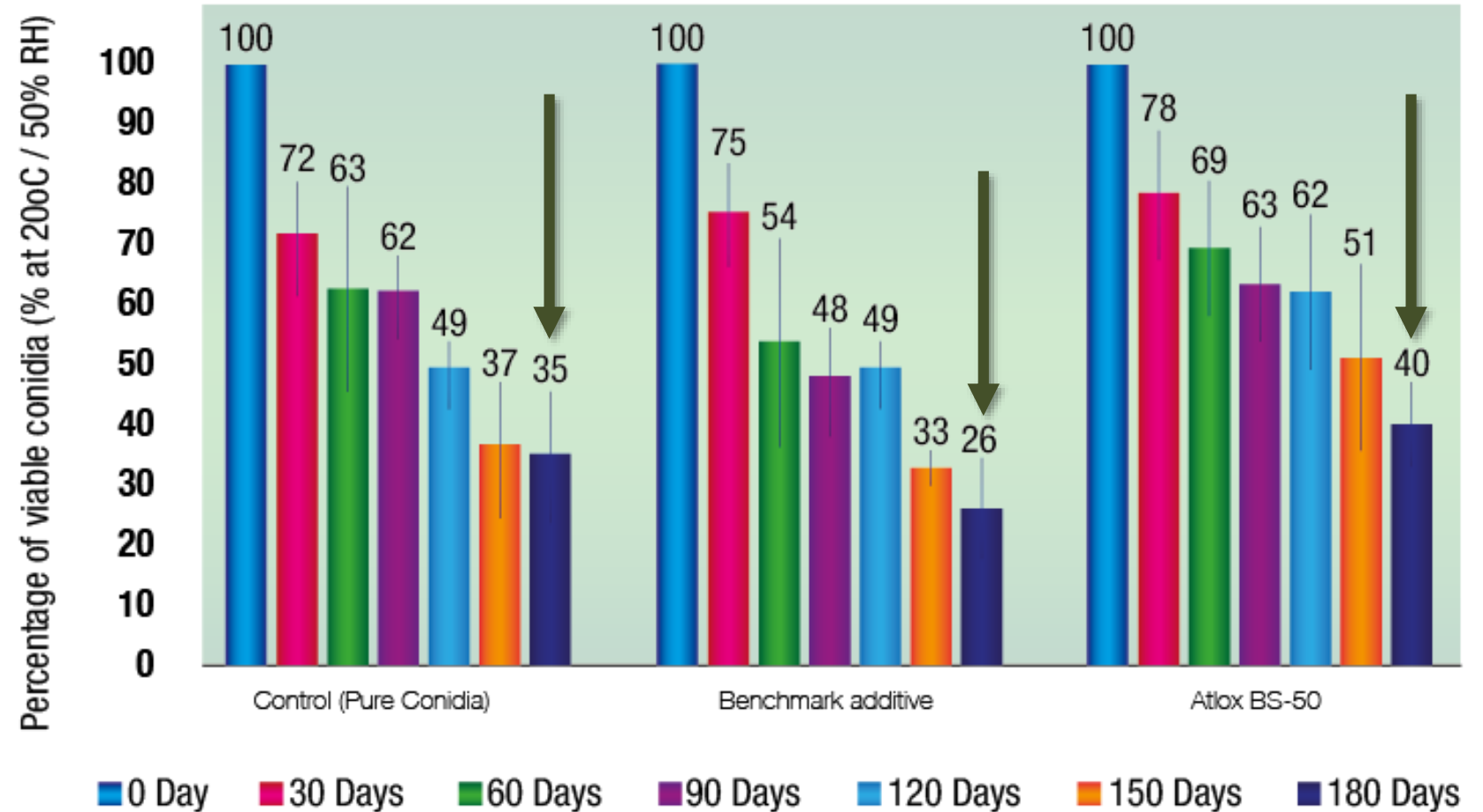


Visual evaluation in microscopy of conidia after 180 days.

Conidia germination method with Atlox BS-50



- A natural drop of conidia viability is expected
- **Atlox BS-50** can mitigate this natural viability drop compared with the other samples
- This improvement is important to maintain the viability during storage and improve the efficacy of the microbe in the field

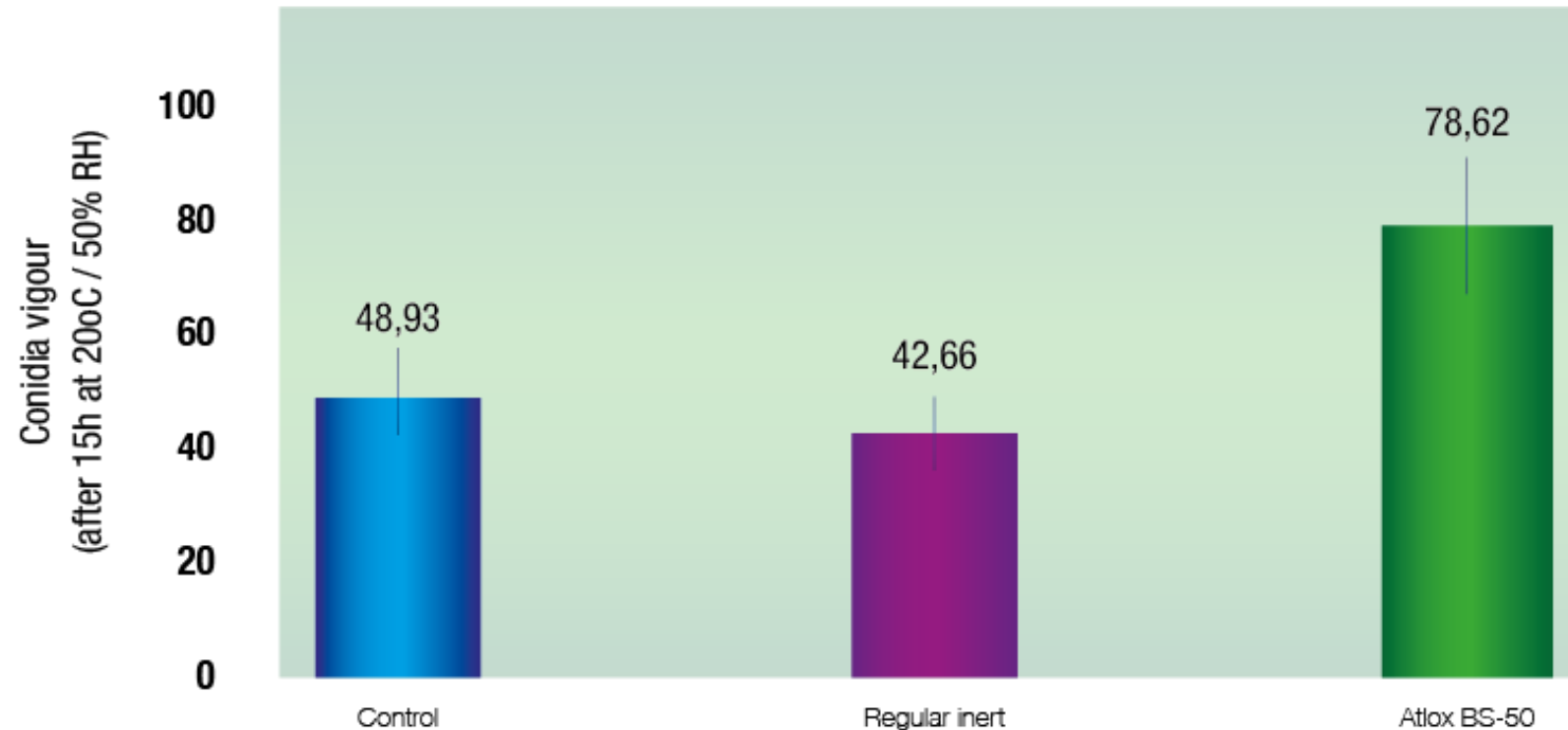


Conidia germination results of samples with *Trichoderma asperellum* alone, *Trichoderma asperellum* plus benchmark additive and *Trichoderma asperellum* plus Atlox BS-50,

Conidia vigour



- An internal software was developed to measure the conidia vigour → PrecisionBio
- This methodology measures the conidia germination speed
- Higher vigour → Less time will be necessary for the microbe to become established in the field
- **Atlox BS-50** improves the conidia vigour compared with the other samples

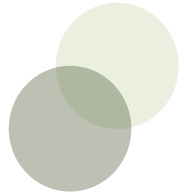
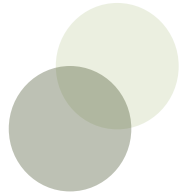


Conidia vigour results of samples with *Trichoderma asperellum* alone, *Trichoderma asperellum* plus benchmark additive and *Trichoderma asperellum* plus Atlox BS-50,

Summary




- WP formulations are a good system for microbes
 - Water-free systems
 - No storage sedimentation issues
 - High loading of active ingredient is possible
- Formulating WPs made easy using Atlox BS-50
 - A ready-to-use powder system
 - Simply add a microbe to create a completed WP formulation
 - Optimised composition to deliver performance
 - Good wettability and suspensibility
 - Maintains viability of spores with common microbes
 - No formulation knowledge required
 - Reduced developmental time
 - Optimisation of the components already done



How Croda can help you



 Scan me to download literature and order samples

Croda Crop Protection



Scan order a sample of
Atlox BS-50

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