



# INNOVATIVE APPROACHES TO RESILIENT GROWING

DCM

# RESILIENCE

1

Theme: Resilient Growing  
Microbiology and organic fertilisers

2

Resilience: Microbiology  
Effect on soil life, growth and production

3

Trial results  
Juniper and cyclamen



# 1 RESILIENCE:

## *MICROBIOLOGY AND ORGANIC FERTILISERS*

# RESILIENCE

## Microbiology and fertilisation

- Plant resilience: the ability of a plant to defend itself.
  - Improving plant vigour
- Soil resilience: the ability of a soil to adapt to and recover from disturbances
  - Soil resilience affects plant resilience

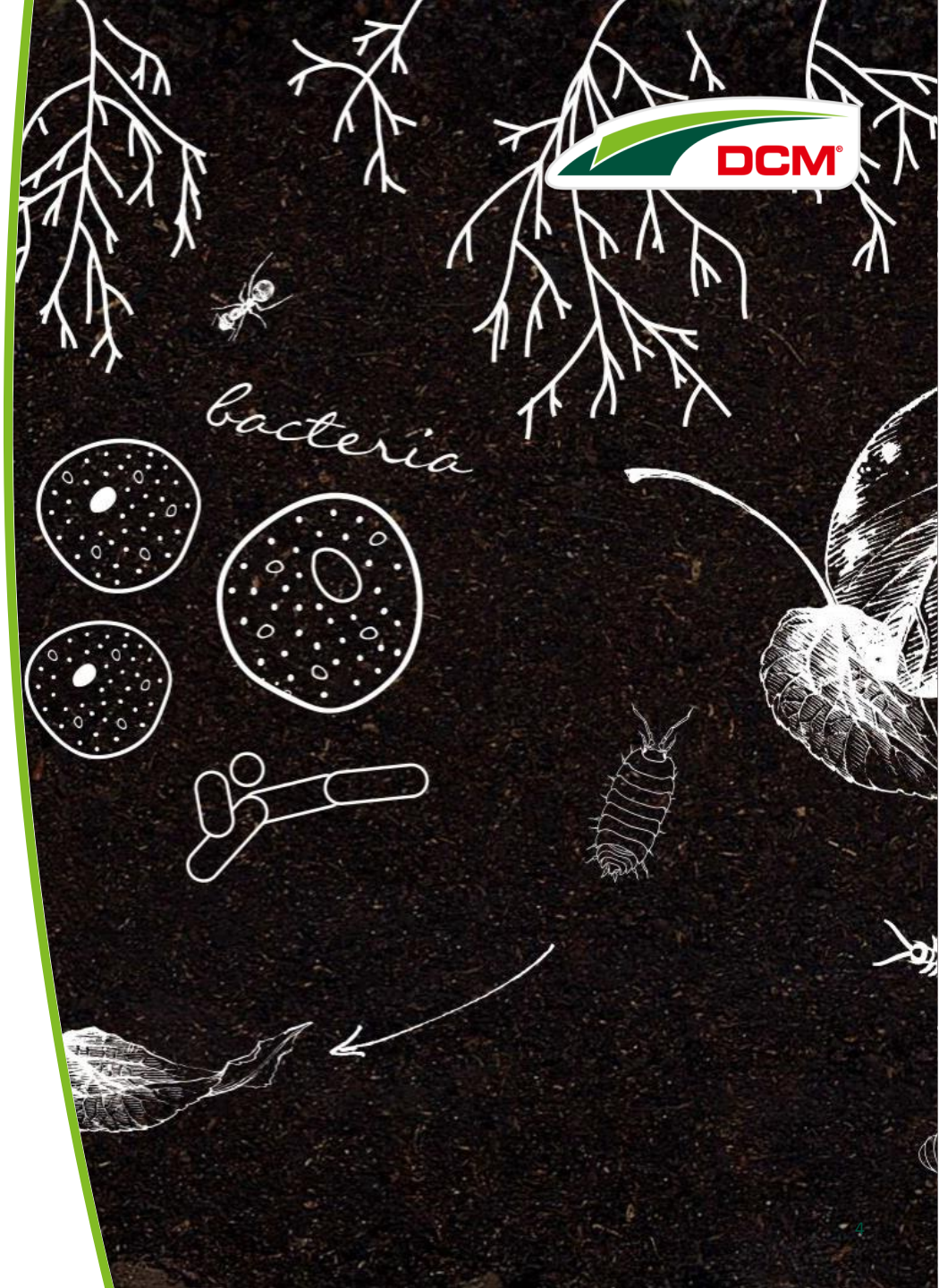
### Physical



### Chemical



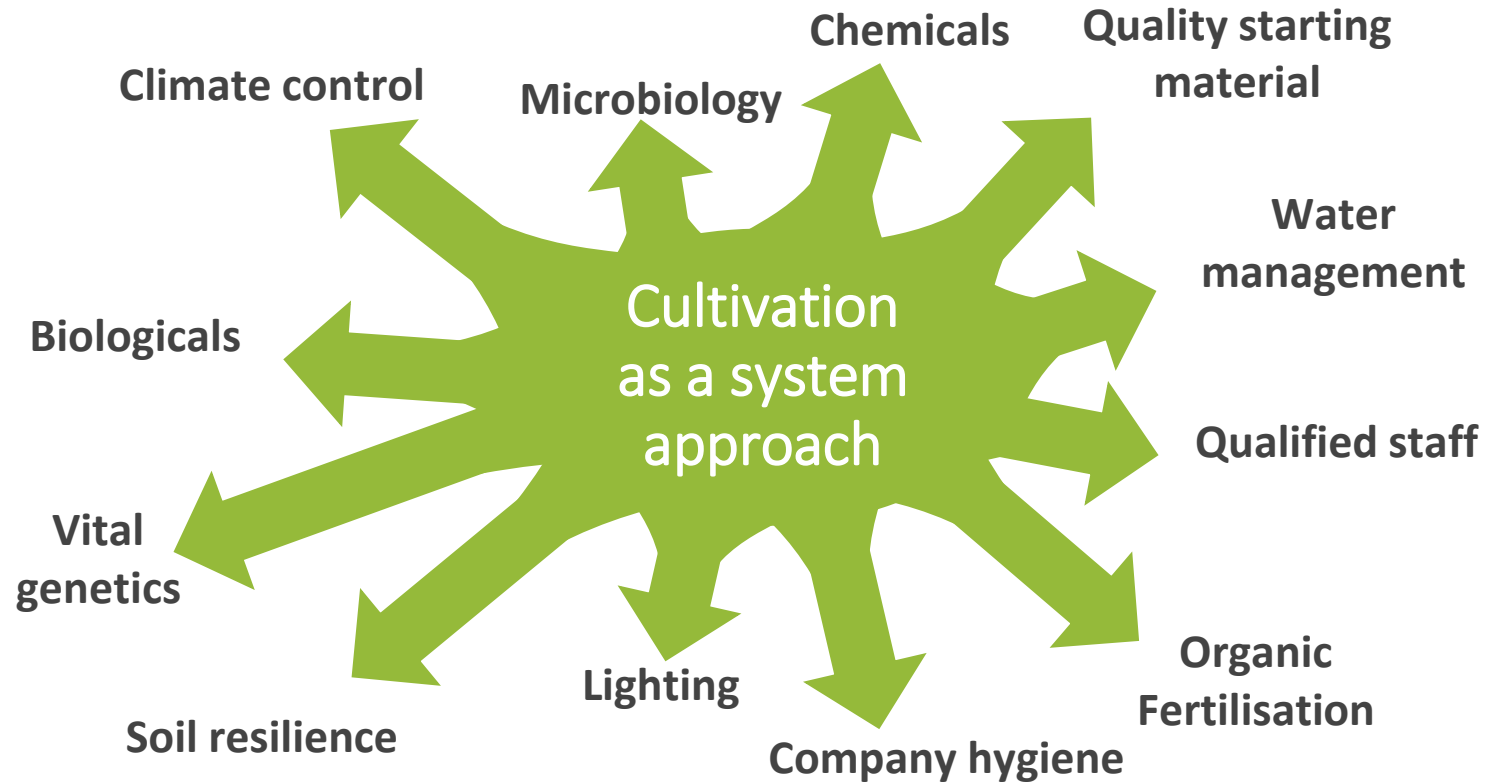
### Biological



# RESILIENCE



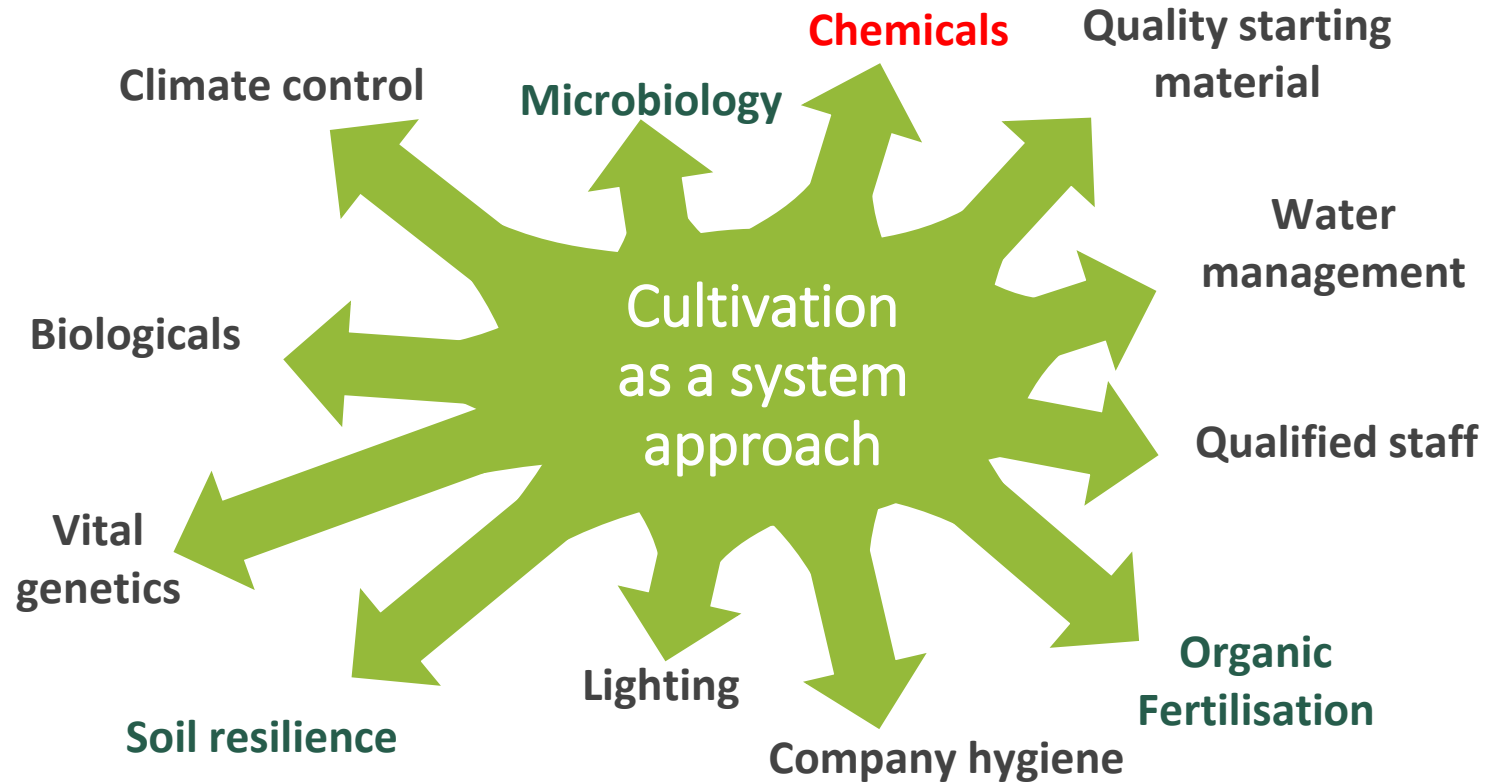
## Microbiology and fertilisation



# RESILIENCE



## Microbiology and fertilisation



# RESILIENCE



## Microbiology and fertilisation: stability in an ecosystem

### Biodiversity



### Stability



### Resilience

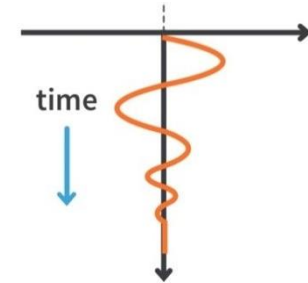
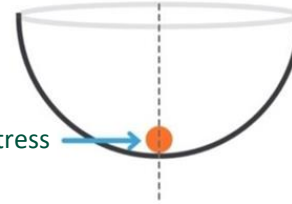
1



high biodiversity → rain forest



Stable system



2

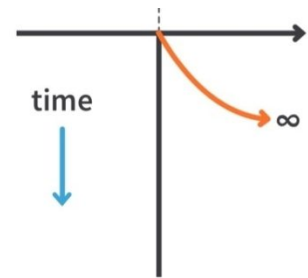
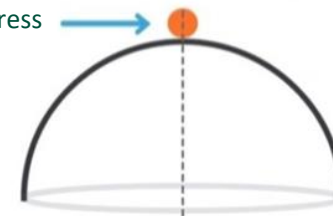


low biodiversity → monoculture



Instable system

External stress



# RESILIENCE



## Microbiology and fertilisation: stability of soil and its ecosystem

1

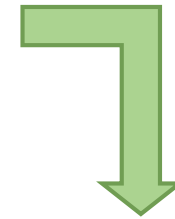
### Microbiology

Soil improvers  
Biostimulants



#### Direct boost of soil life

- Active application of biostimulants
- Adding 'positive' soil life



Soil  
diversity



Soil  
resilience



Soil  
stability

2

### Organic Fertilisation



#### Indirect boost of soil life

- Organic components feed soil life
- Increase existing soil life



Soil  
diversity



Soil  
resilience



Soil  
stability

# RESILIENCE

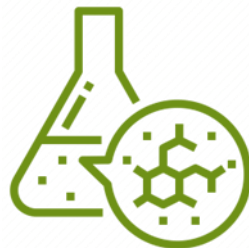
## Microbiology and fertilisation

- DCM organic fertilisers, soil conditioners and biostimulants contribute to soil resilience.
- Soil resilience is the foundation.

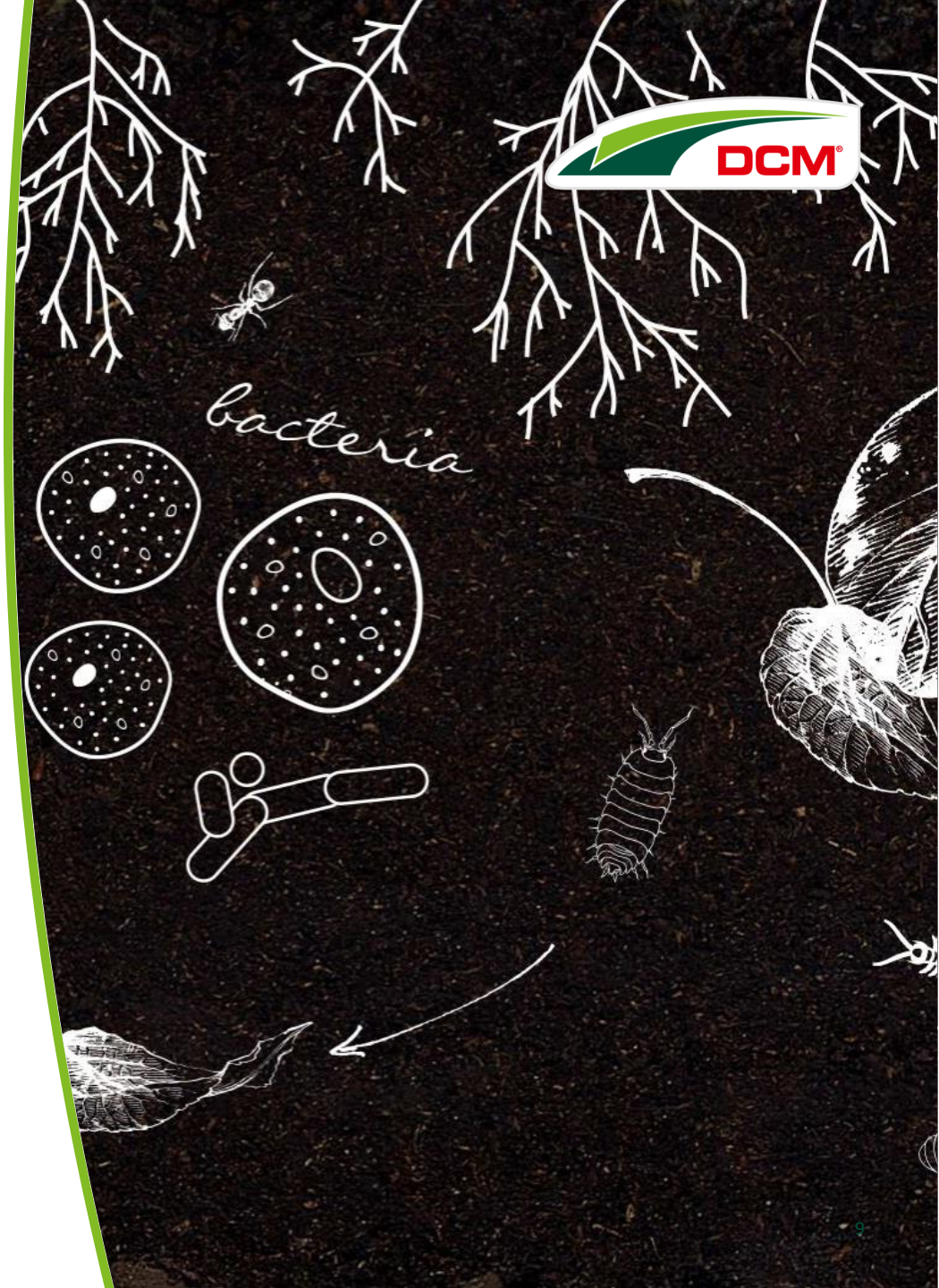
Physical



Chemical



Biological





## 2 RESILIENCE: *ORGANIC FERTILISERS*

Effect on soil life, growth and production



## Which raw materials?

Biodiverse composition.

- More than **30** different raw materials
- Both of plant and animal origin
- By-product flows from the food industry
- Also possible to select raw materials suitable for BIO (organic agriculture) cf. EU 2018/848





## Each raw material has its own nutritional value

- Main elements:



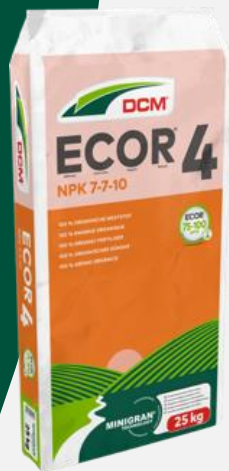
- Naturally occurring secondary elements and trace elements
- In addition, each raw material contains organic matter





## ECOR® = efficient controlled organic release

- Each ingredient has its own release pattern
- Combination of different organic raw materials in one formula
- Continuous, controlled and more constant duration of action of 75 to 100 days
- For N-P-K
- Measured and proven in various laboratories and practical situations



Soy bean meal



Grape seed



Bone meal



Hair meal



Blood meal



Feather meal



Meat and bone meal



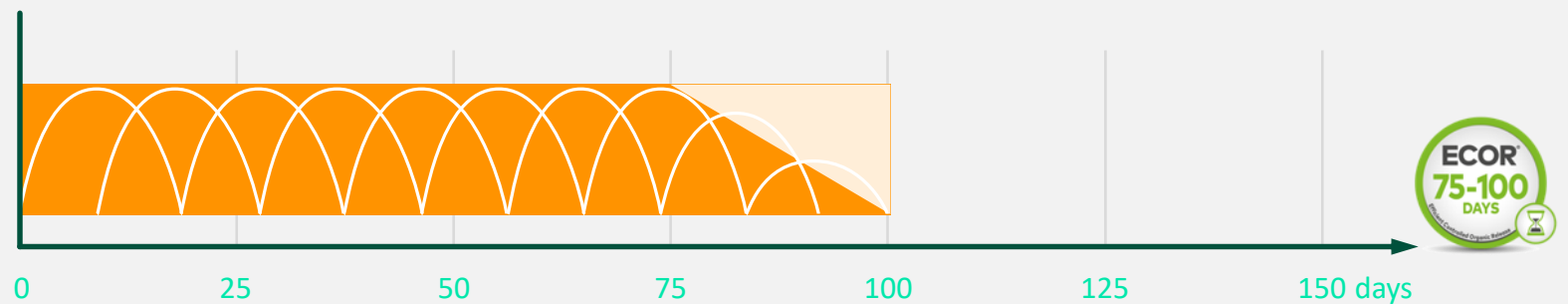
Cacao shells



Hoof meal



Vinasse extract



Release experiment Scientia Terrae, Sint-Katelijne-Waver, Belgium. Also measured by Altic, the Netherlands and RHP, Graverzande, the Netherlands



## Effect on soil life

Each type of soil life has

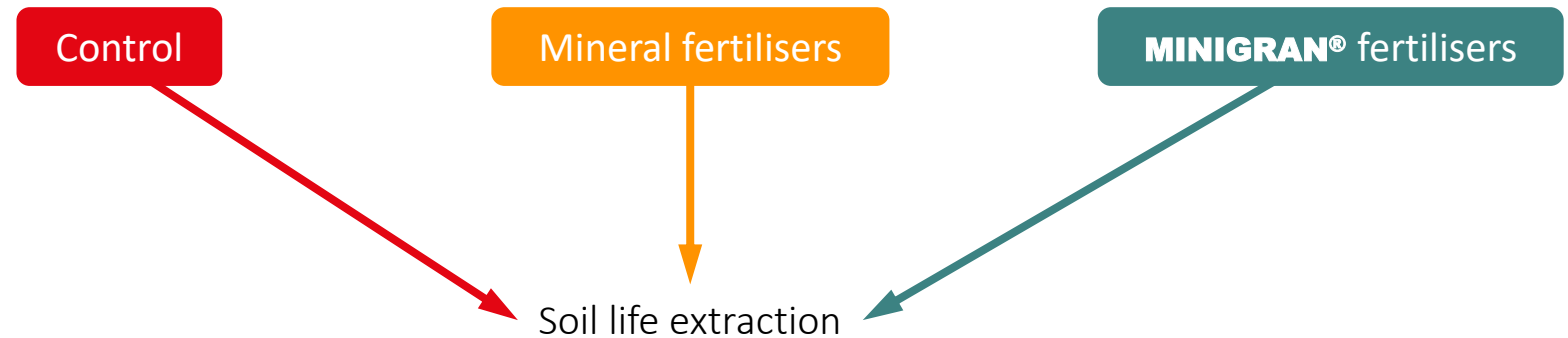
- A specific function
- A preference for certain C sources as nutrient source

Test: how are different C sources used as energy sources by adding products?

- Decomposition speed
- Decomposition rate



## EVERY CARBON SOURCE IS A NUTRIENT SOURCE FOR SOIL LIFE.



### Biolog Analysis:

Conversion of complex carbon sources

- Monitoring conversion of complex carbon sources over time
- 31 carbon sources ranging from **very rapidly degradable** to **more difficult to degrade** + 1 control
- The height of the graph represents the degree of conversion



## Effect on soil life

A diverse and active soil life is the best guarantee for a better soil balance and soil resilience

Roots will develop better

Plants will grow better



# EVERY CARBON SOURCE IS A NUTRIENT SOURCE FOR SOIL LIFE

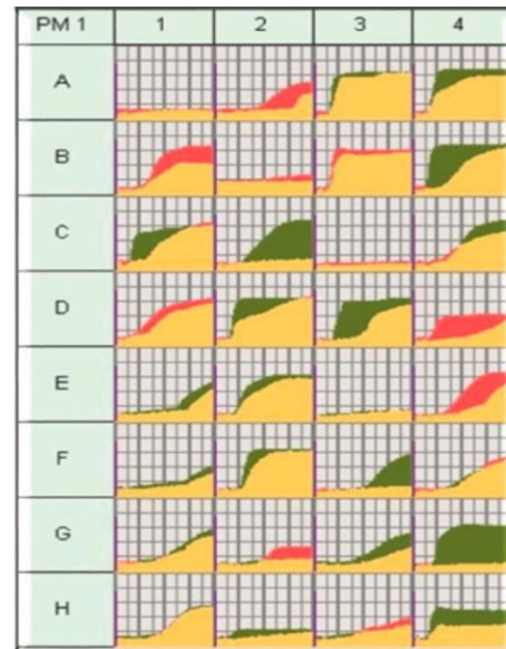
**Orange:** carbon source conversion in 'control' potting soil

**Red:** reduced carbon source conversion compared to 'control' potting soil

**Green:** improved carbon source conversion compared to 'control' potting soil

Soil life extraction

### Potting soil + Mineral Fertilisers

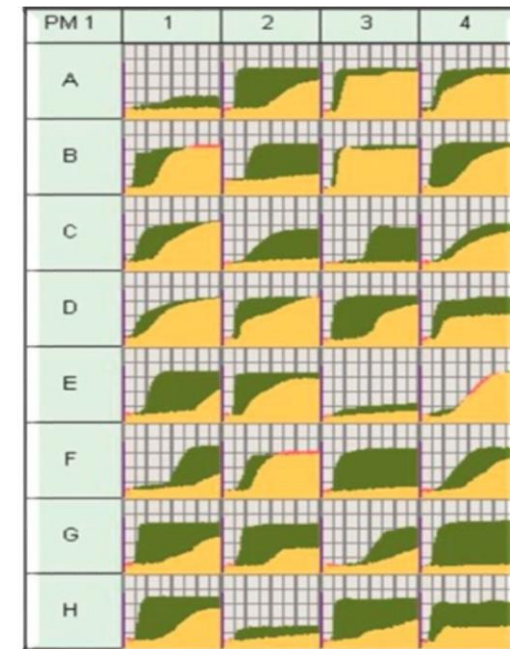


Mineral Fertilisers:

- Slow conversion
- Less efficient conversion
- Less active soil life

Soil life extraction

### Potting soil + MINIGRAN® Fertilisers



Minigran® Fertilisers:

- All tested C sources are converted
- Faster conversion
- More efficient conversion
- More active and more diverse soil life



# 3 TRIAL RESULTS

# RESILIENCE

## Microbiology and fertilisation



- Delphy Research centre for Tree Nurseries and Perennial Crops
- 14 June start of demo trial:
  - *In cooperation with Lensli Substrates*
  - Crop: *Juniperus stricta* → 70% peat reduced
    - Basic biomix
    - Structure bark
    - Rice husk
    - Peat moss
- Object 1: **Mineral fertilisation**
- Object 2: **Hybrid fertilisation**



# RESILIENCE

## Microbiology and fertilisation

- Delphy Research centre for Tree Nurseries and Perennial Crops

Mineral fertilisation	
Gram per m <sup>3</sup> substrate	Product
3250	Osmocote Exact® 5 (5-6 mnd)
500	PG mix
150	MICROMAX PREMIUM

Hybride fertilisation	
Gram per m <sup>3</sup> substrate	Product
6500	ECOR® 5 (4-5 month)
500	PG mix
150	MICRO MIX® YELLOW



# RESILIENCE

## Microbiology and fertilisation

- Delphy Research centre for Tree Nurseries and Perennial Crops
- Root development:

Mineral fertilisation



Hybrid fertilisation



# RESLIENCE

## Microbiology and fertilisation

- Delphy Research centre for Tree Nurseries and Perennial Crops
- Soil resilience and microbiology:
  - DNA multiscan → check for 56 plantpathogenenic fungi



	Mineral fertilisation	Hybrid fertilisation
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<b><i>Plant pathogenic fungi (July)</i></b>		
<i>Coniothyrium fuckelii</i>	2	1
<i>Penicillium spp.</i>	2	1

<b><i>Plant pathogenic fungi (August)</i></b>		
<i>Alternaria spp.</i>	0	0
<i>Botrytis spp.</i>	0	0
<i>Botrytis cinerea</i>	0	0
	0	0

# RESILIENCE

## Microbiology and fertilisation

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	Mineral fertilisation	Hybrid fertilisation
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### *Plant pathogenic fungi (July)*

<i>Coniothyrium fuckelii</i>	2	1
<i>Penicillium spp.</i>	2	1

### *Plant pathogenic fungi (August)*

<i>Fusarium spp.</i>	2	0
<i>Fusarium oxysporum</i>	2	0
<i>Fusarium solani</i>	2	0

# RESILIENCE

## Microbiology and fertilisation

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	Mineral fertilisation	Hybrid fertilisation
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<b><i>Plant pathogenic fungi (July)</i></b>		
<i>Coniothyrium fuckelii</i>	2	1
<i>Penicillium spp.</i>	2	1

<b><i>Plant pathogenic fungi (August)</i></b>		
<i>Penicillium spp.</i>	0	1
<i>Pythium spp.</i>	3	1
<i>Pythium dissotocum</i>	3	0

# RESILIENCE

## Microbiology and fertilisation

- Summary:
  - *Homogenous crop*
  - *Improved root development*
  - *Organic base in longer cultivation → added value to the crop*
- Resilient crop
  - *Resistance to biotic or abiotic stress factors*
  - *Increased resistance to plant pathogenic fungi!*



# CYCLAMEN



Trial set up	
Crop	Cyclamen
Substrate	40% peat reduced
Goal	Evaluate impact of incorporating DCM fertilisers on root mass, crop growth consistency, and nutrient efficiency
Objects	<ol style="list-style-type: none"><li>1. Mineral control with CRF and liquid feed</li><li>2. DCM strategy with CRF and ECOR 5</li></ol>
Dosage	ECOR 5: 2 kg/m <sup>3</sup>



# RESULTS



MINERAL CONTROL



DCM HYBRID FERTILISATION

