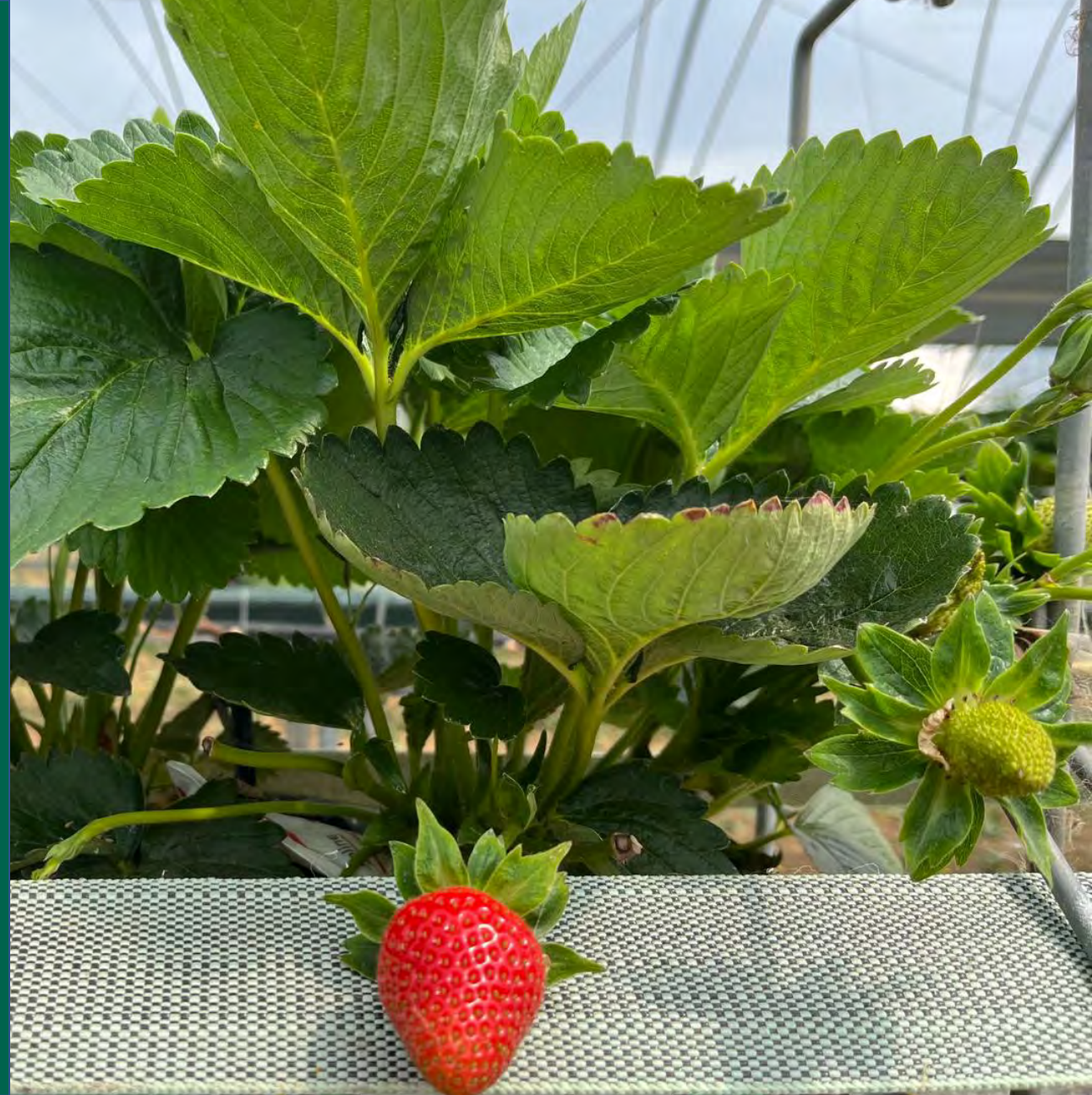


The Holistic Approach to Plant Disease Control



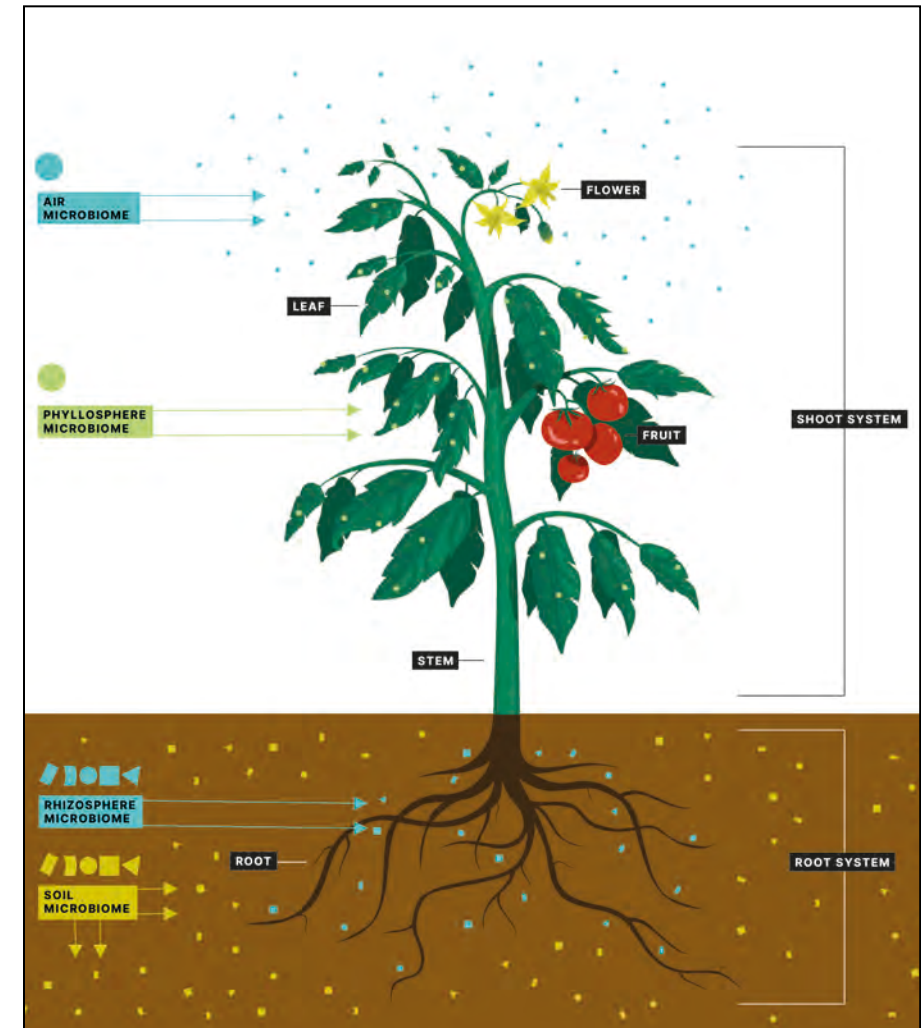
Plant Microbiomes

Plants are colonised by microbes and are in continual interaction with them.

If interactions are **correctly** managed, then pathogens are suppressed.

If interactions are **badly** managed, then pathogens will flourish.

Majority of plant diseases arise from mismanagement of these ecosystems

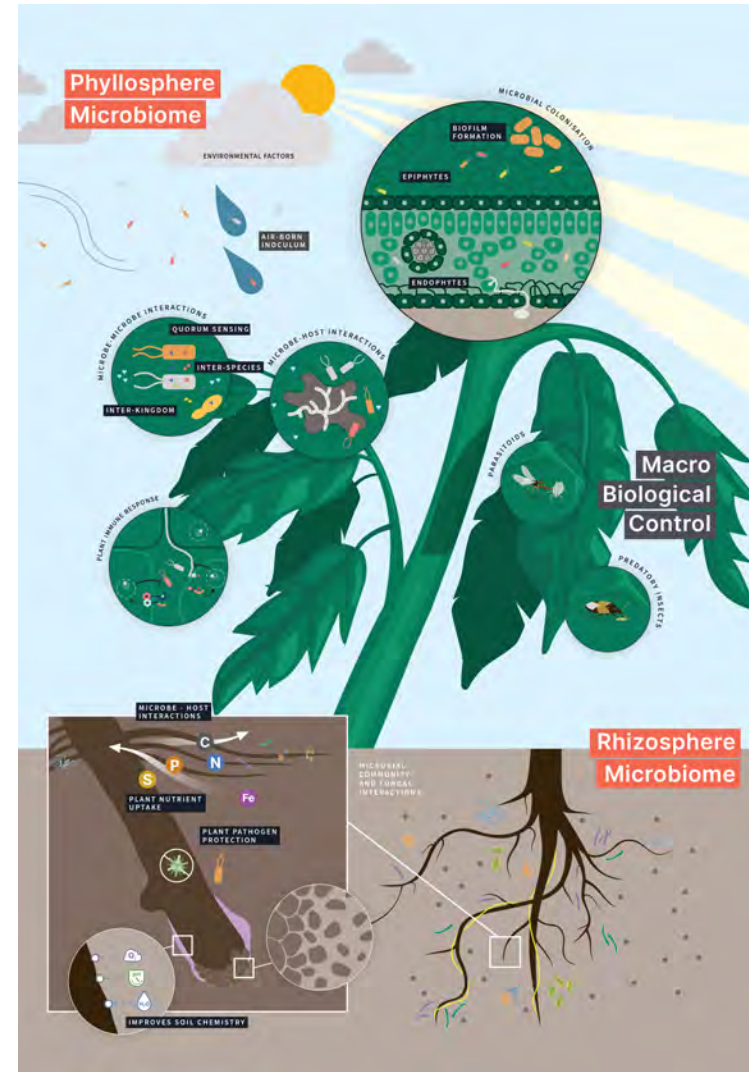


The Key Biomes

The Growing Facility
The wider growing area

The Phyllosphere
Above ground parts of the plant

The Rhizosphere
Below ground parts of the plant



How does disease develop?

Stage 1: Inoculum makes contact with plant

Stage 2: Plant environment is amenable for pathogen to initiate infection

Stage 3: The defences of the plant are overcome by the pathogen

Stage 4: Sufficient nutrition is available for it to establish



Stage 1

Inoculum makes contact with plant

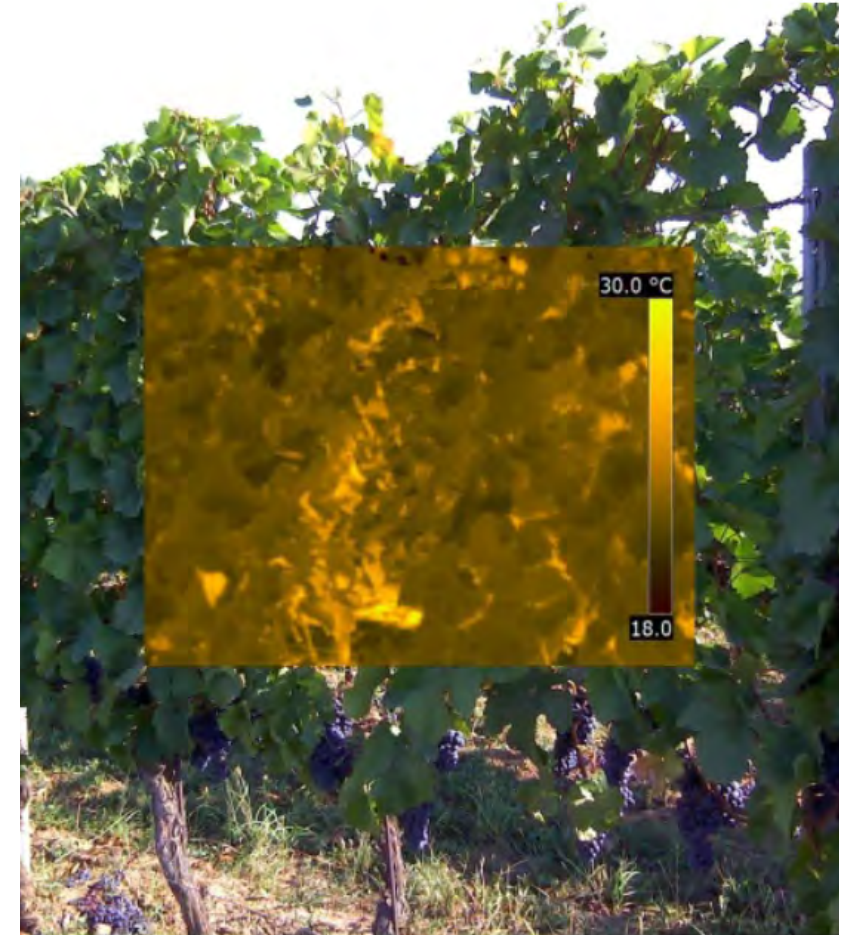
Generally, we operate under assumption that inoculum is ever-present and we aim to manage it.



Stage 2

**Plant environment is amenable
for pathogen to initiate infection.**

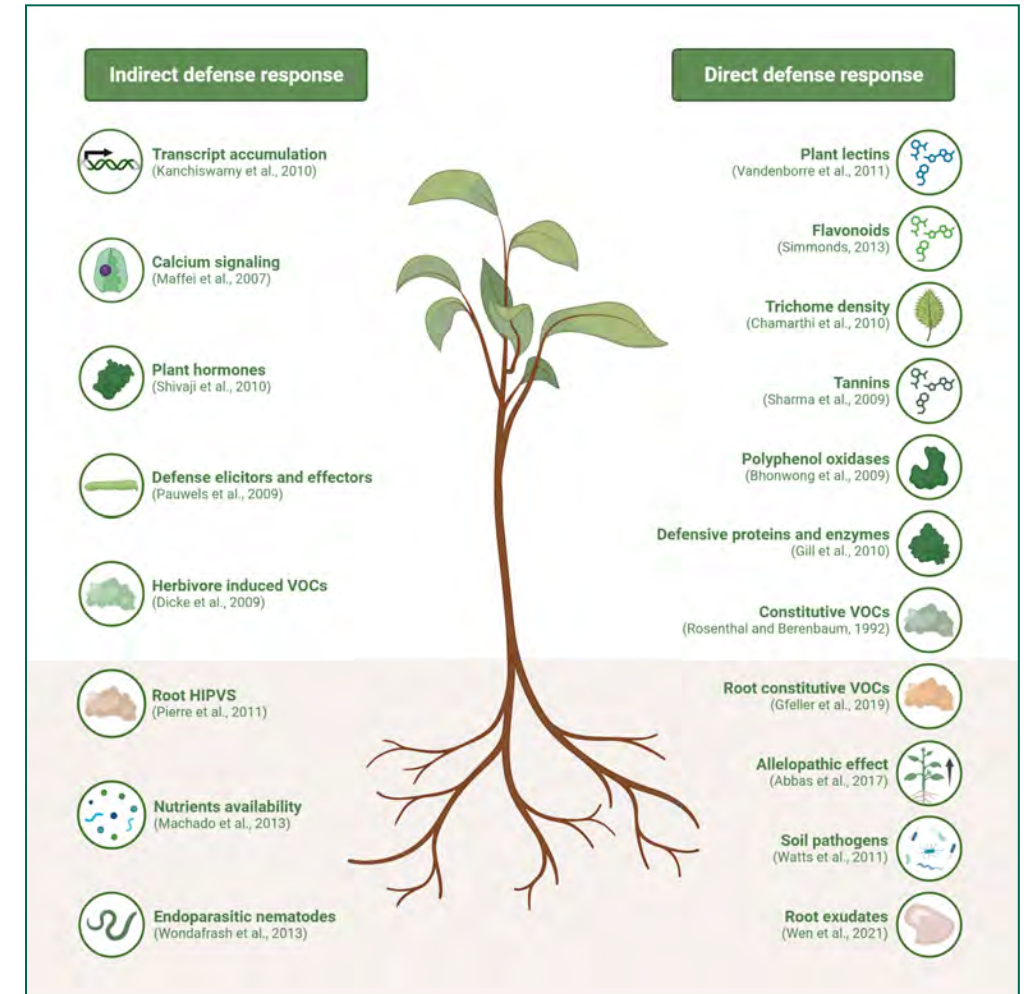
We can use fertilisation and crop training to
reduces presence of pathogen friendly microclimates.



Stage 3

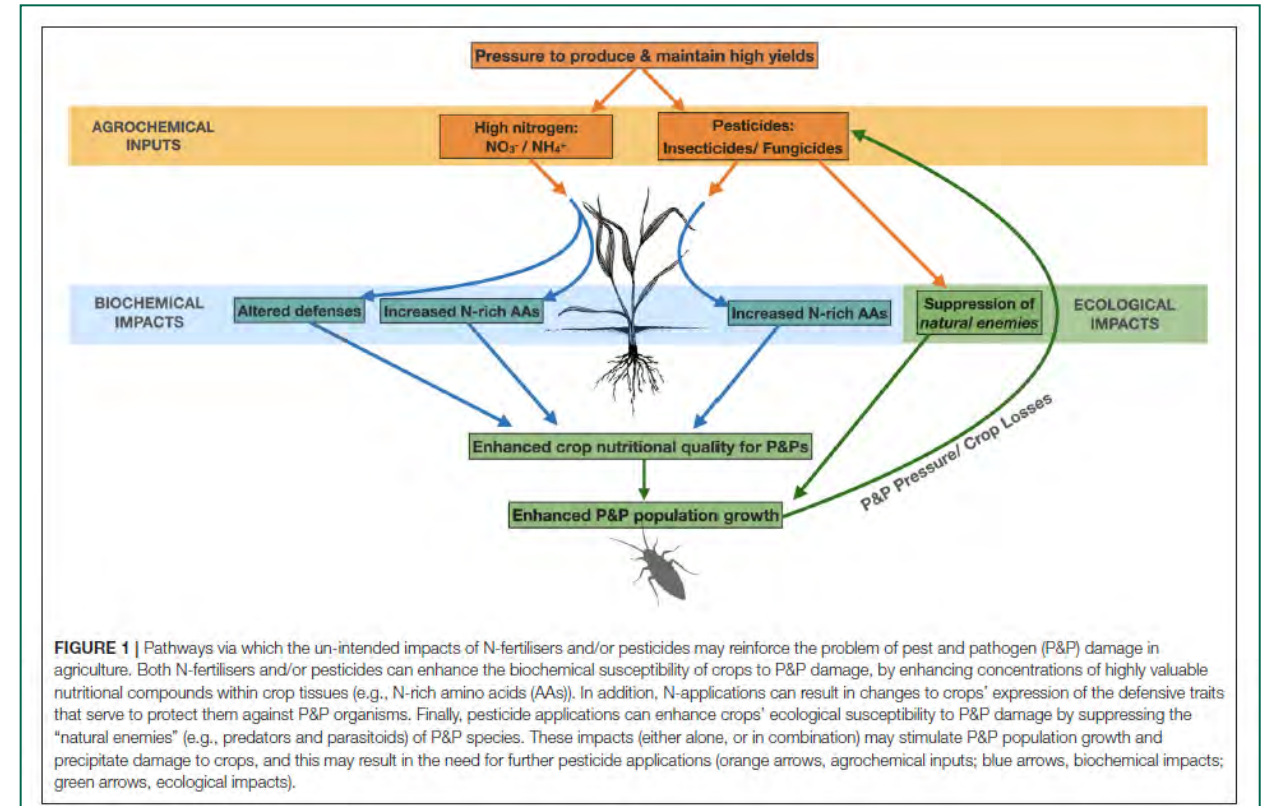
The defences of the plant are overcome by the pathogen.

- The first line of defence is the microbiome.
- The second line of defence is plant structural and biochemical defences
- Both are reliant on correct plant nutrition to function properly



Stage 4

Sufficient nutrition is available for it to establish.

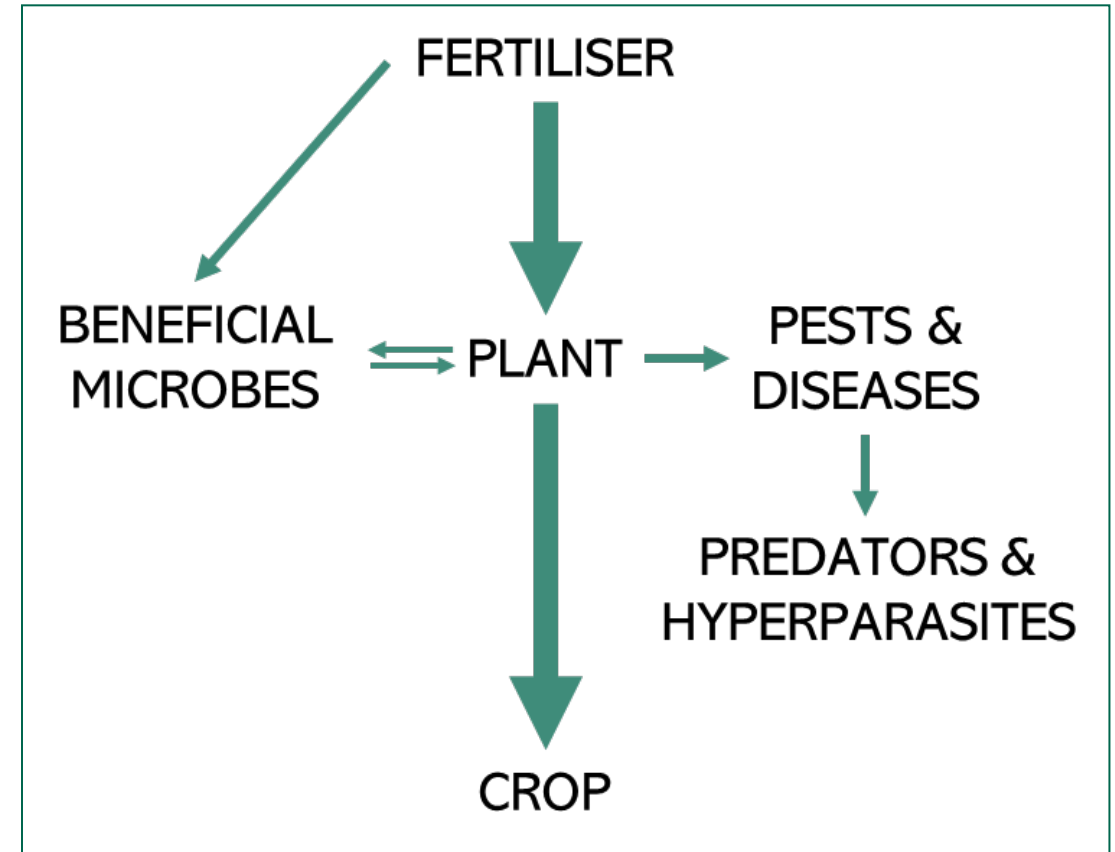


Conventional vs Holistic Approach

Independent programmes are created for fertilisation and pest & disease management.

Conventional approach

- Aims to ***replicate*** natural processes with chemistry.
- Can be **antagonistic** to one another - requiring ***curative*** actions and an ***increase in costs***.

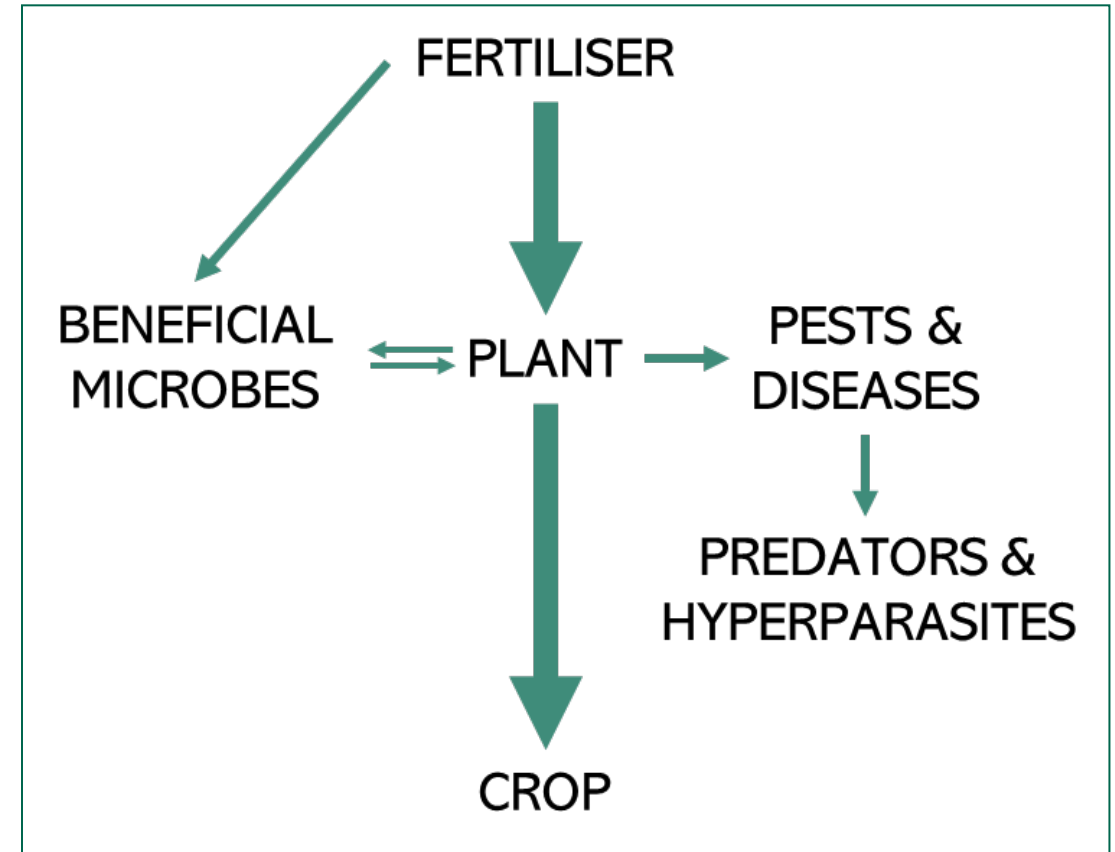


Conventional vs Holistic Approach

Interacting programmes are created for fertilisation and pest & disease management.

Holistic approach

- Programmes designed to be **complimentary** of one another.
- Aims to ***harness and enhance*** natural processes.
- Can **improve crop health** – providing ***preventative*** protection and ***decrease in costs***.

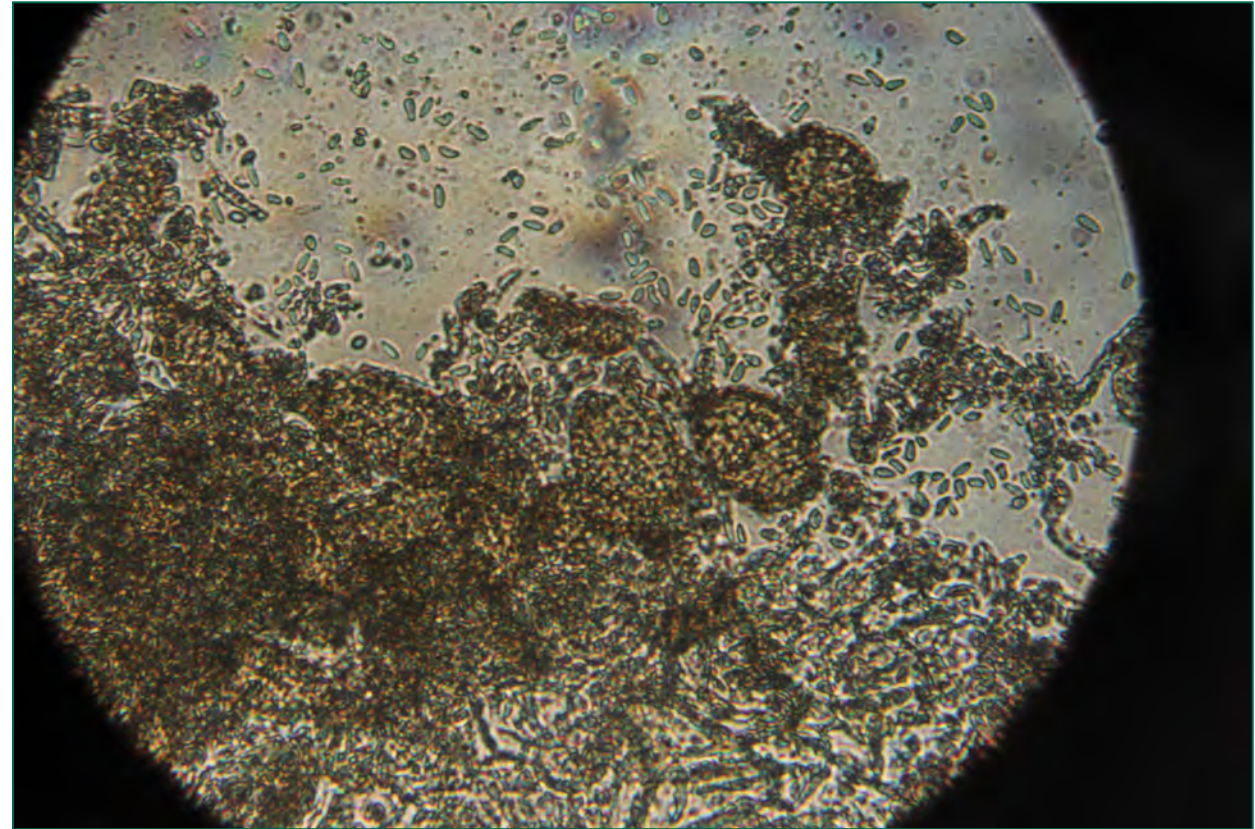


Biofungicides

Biofungicides have many capabilities that conventional chemical ones don't.

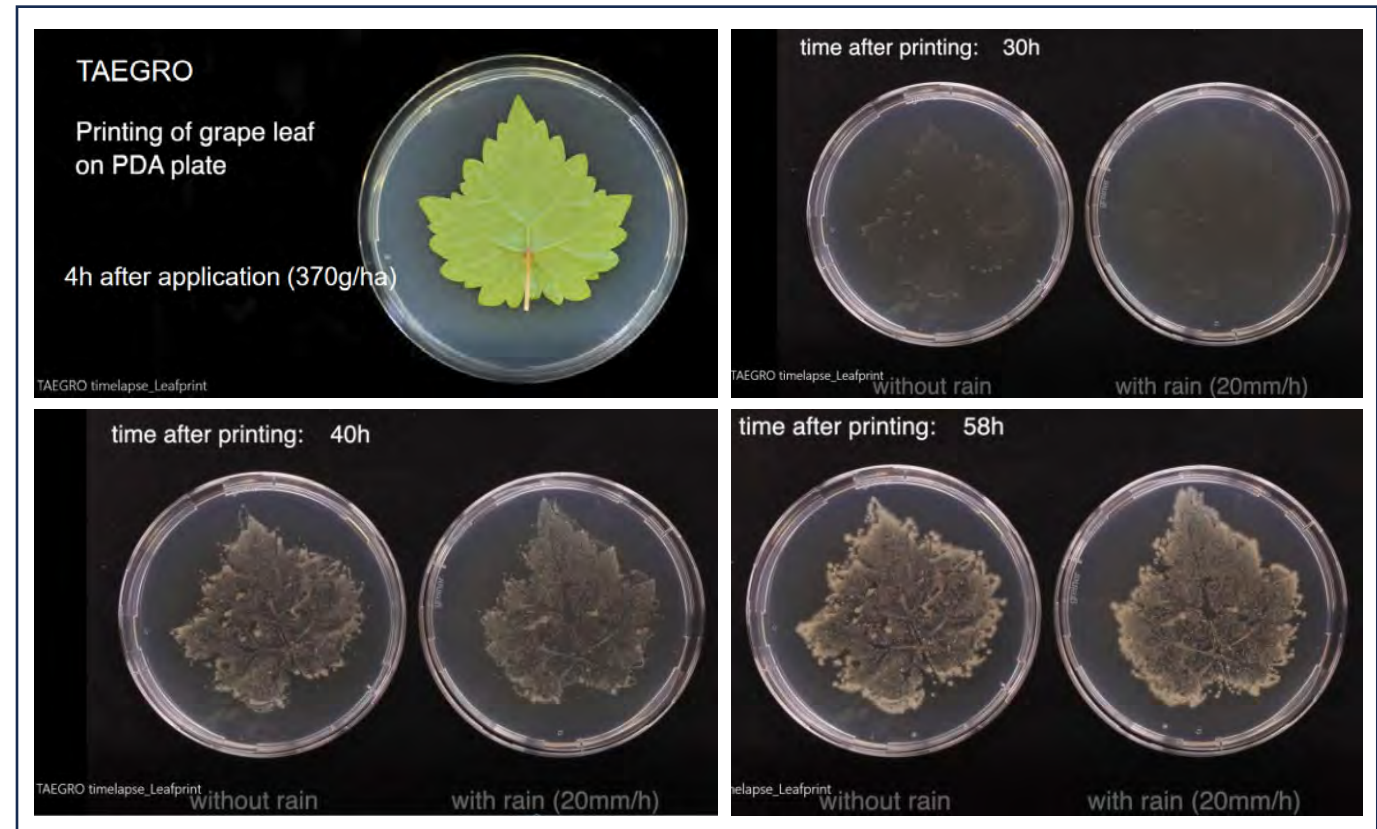
Types of biofungicides

- Microbial
- Contact
- Elicitors



Benefits of Biofungicides

Correctly fertilised plants will respond significantly better to biopesticides and increase their longevity.

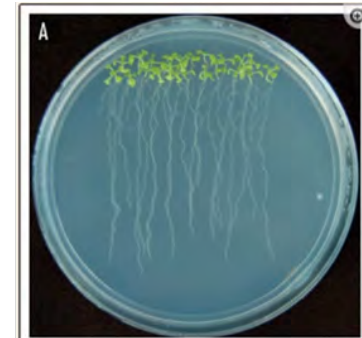


Benefits of Biofungicides

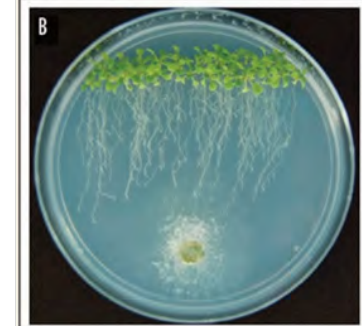
Many biofungicides will strengthen a plant rather than weaken it.

Correctly fertilised plants will show stronger positive response to stimulation by biopesticides.

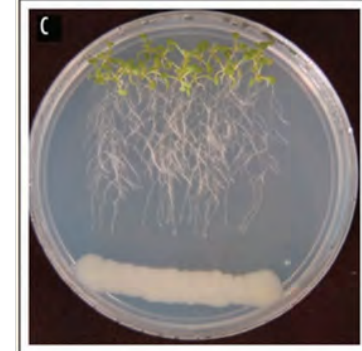
Uninoculated



With *Bacillus*



With *Trichoderma*

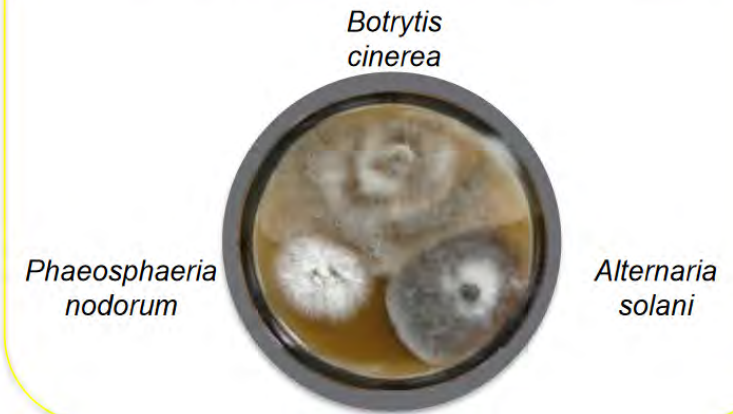


Source: Ortiz-Castro et al., 2009

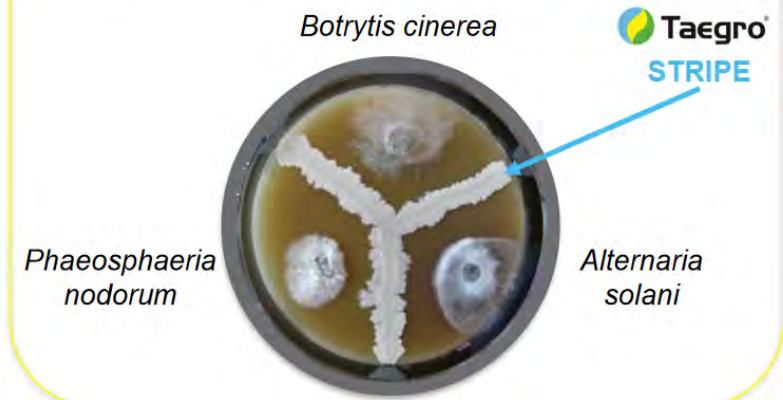
Benefits of Biofungicides

- Broad-spectrum control
- (Almost) no resistance risk

Pathogens free growth in Petri dish

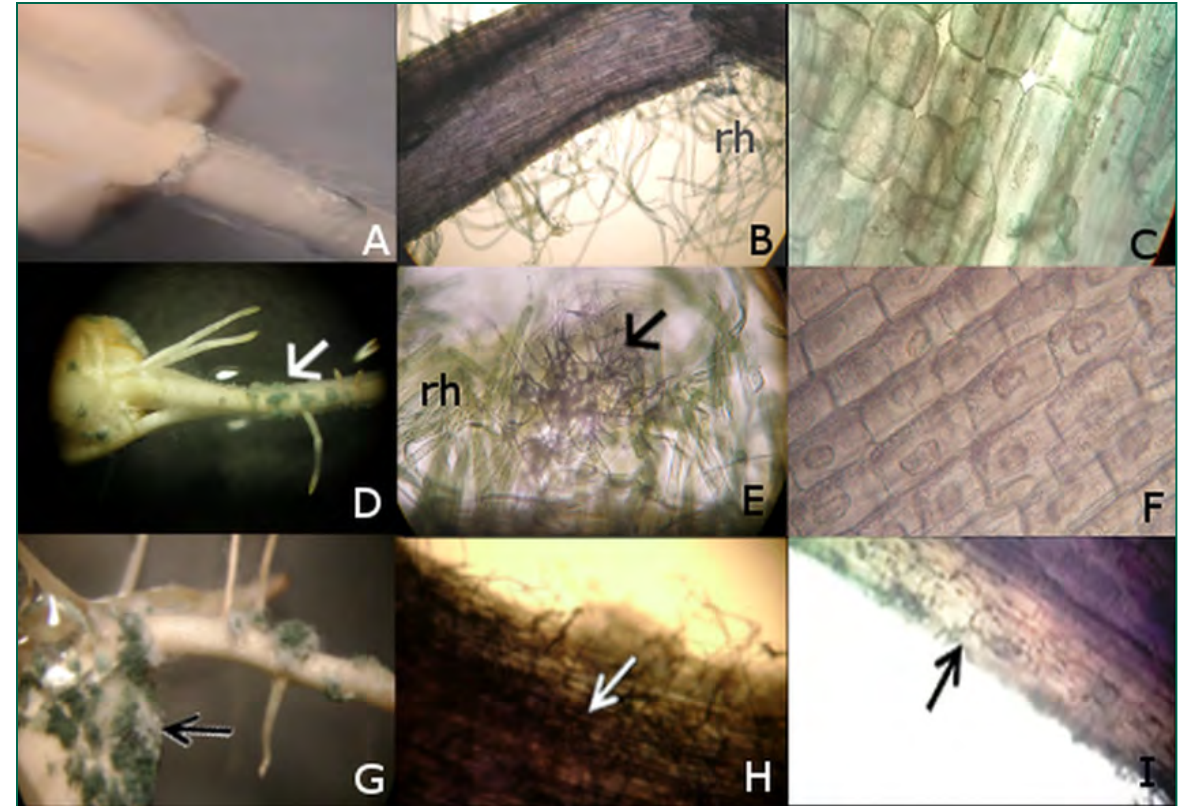


Pathogens growth inhibited by TAE GRO metabolites in Petri dish



Selecting the correct fungicides

- You must understand the activity and resulting strengths and the weaknesses of each product.
- We can select ones that support one another and avoid using any ineffectively.



Example Programme - Cucumber

Pesticides/ Foliar Nutrition/ Soil Ammendments

Application type:	Drench	Spray					
crop week	T34	SB Plant Invigorator	Romeo	Taegro	Haneia	Maxicrop	AQ10
1	•						
2			•		•		
3						•	•
4		•		•			
5			•		•	•	
6		•		•			
7			•		•		
8						•	•
...		Repeat week 5-7 <u>spray</u> applications until crop end					

Product information	T34	SB Plant Invigorator	Romeo	Taegro	Haneia	Maxicrop	AQ10
MAPP number	17290	N/A	19170	19204	N/A	N/A	19968
Application Rate	0.01g/L (substrate)	1L/ha*	0.5kg/ha	0.37kg/ha	1L/ha*	5L/ha	0.035kg- 0.07kg/ha
Max. number of applications	1	N/A	8	12	N/A	N/A	12
Pre harvest Interval	N/A	N/A	1 day	1 day	N/A	N/A	1 day
Approval	EAMU 20222339	N/A	On-label	On-label	N/A	N/A	On-label

*presumed concentration of 1mL/L at water rate of 1000L/ha

Manipulating the microbiome

Prunus lusitanica bacterial Shot-hole trial.

Holistically managed crop (left in images)
vs.
Conventionally managed crop (right in images).



Example Holistically grown crop

Cyclamen (1L pot)

Approximate costings

Media & fertiliser: £0.10 per plant

Pest Management Programme: £0.014 per plant

Disease Management Programme: £0.0006 per plant

TOTAL COST: £0.1146 per plant (£114.60 per 1,000 plants)

<99% of crop sold

fargro®
Natural & effective
FOLIAR DISEASE CONTROL PROGRAMME
for protected ornamental crops

THE PROGRAMME IN PRACTICE
Ferring Nurseries and Firewood
Littlehampton Rd, Ferring, Worthing, BN12 6PN
Crop: Cyclamen (12,000 plants)
Growing Environment
Unheated greenhouse
Application Method
Hand held spray
Water Rate
1000L/ha
Growing Media
Peat-free mix (combination of wood fibre, bark, coir, green compost, perlite and clay)
Fertilisation
Integrated Organic Granules
• 3g/L DCM ECORS (NPK 8-5-6)
• 1g/L DCM Vivilos (NPK 4-30-0)
• 0.7g/L DCM Micromix
Integrated Mineral Granules
• 0.7g/L Base fertiliser (NPK 17-10-14)
• 0.3g/L N fertiliser (NPK 31-0-0)
Liquid Mineral Fertiliser
• Calcium nitrate (1kg/10L dosed at 1% - every 3-4 days)
A correctly fertilised crop will increase efficacy of the spray programme.
Natural & Effective Foliar Disease Control Programme Page 4


Spray Schedule

WEEK (YEAR)	COMMENCING	WEEK (CROP)	TAGNO	USE PLANT INFORMATION	NOTED
27	03/07/2023	1			
28	10/07/2023	2			
29	17/07/2023	3			
30	24/07/2023	4			
31	31/07/2023	5	•	•	
32	07/08/2023	6			•
33	14/08/2023	7	•	•	
34	21/08/2023	8			•
35	28/08/2023	9	•	•	
36	04/09/2023	10			•
37	11/09/2023	11	•	•	
38	18/09/2023	12			•
Sale	25/09/2023	13			-

TECHNICAL 01903 256 858 EMAIL TECHNICAL@FARGRO.CO.UK
WEB WWW.FARGRO.CO.UK

fargro®
Natural & effective
FOLIAR DISEASE CONTROL PROGRAMME
for protected ornamental crops

THE PROGRAMME IN PRACTICE
Ferring Nurseries and Firewood
Littlehampton Rd, Ferring, Worthing, BN12 6PN
‘The spray programme was easy to apply and achieved complete control. We lost no plants to disease.’
DAVID COURTENAY LUSCOMBE
GROWER MANAGER, FERRING NURSERIES AND FIREWOOD

Results
Botrytis spotting of flowers is the primary disease concern with Cyclamen crops. We achieved 100% control with no flower damage observed in the crop – this is despite an unseasonably cool and humid July and August and no heating of the crop.
CONTROL LEVEL 100%

No Botrytis damage was observed on the foliage or flowers

Costings
PROGRAMME TOTAL COST* **£0.0006 per plant (£0.60 per 1,000 plants)**
*Product only
Benefits of Programme

- Lower cost than conventional programme
- Limits exposure of staff to hazardous chemicals
- No chemical residues on product
- Application is easy and practical
- Products work on natural plant processes and create stronger and more resilient plants – improving customer success when planting at home

Taisro MAPP Number 19204
Romeo MAPP Number 19170
TECHNICAL 01903 256 858
EMAIL TECHNICAL@FARGRO.CO.UK
WEB WWW.FARGRO.CO.UK
Natural & Effective Foliar Disease Control Programme Page 5
USE PLANT PROTECTION PRODUCTS SAFELY. ALWAYS READ THE LABEL AND PRODUCT INFORMATION BEFORE USE. FURTHER DETAIL ON WARNING SYMBOLS AND PHRASES IS INCLUDED ON THE LABELS AND LEAFLETS.