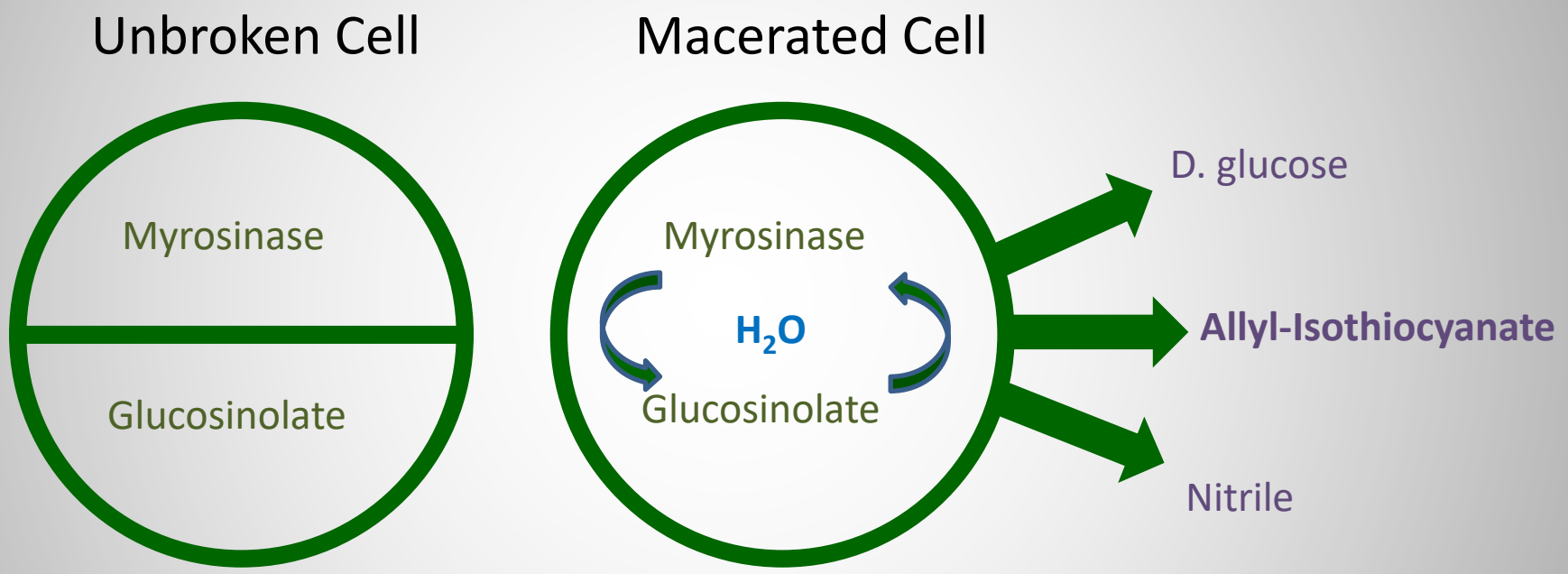
Alternative farming techniques for vegetable growers

Biofumigant crops for vegetable growers

“Biofumigation offers the opportunity to improve soil health, lower the incidence and severity of soil borne pests and diseases, and achieve sustainable crop production outcomes”.

How does biofumigation work?



The Glucosinolate – Myrosinase System

Smashed plant cells

Rapid incorporation

Is biofumigation an easy option?

Complex method

Purpose
Rotations
Time
Seed costs
Fertilise
Machinery / Termination
Irrigation

Low level of robustness

‘Historic’ drivers for Biofumigation

Drive to find alternatives to chemicals

- Methyl bromide (Methyl-isothiocyanate)
- Metham sodium

Increasing costs, legislation

Resistance, enhanced biodegradation

Sustainable management options - health

Market consumer demands

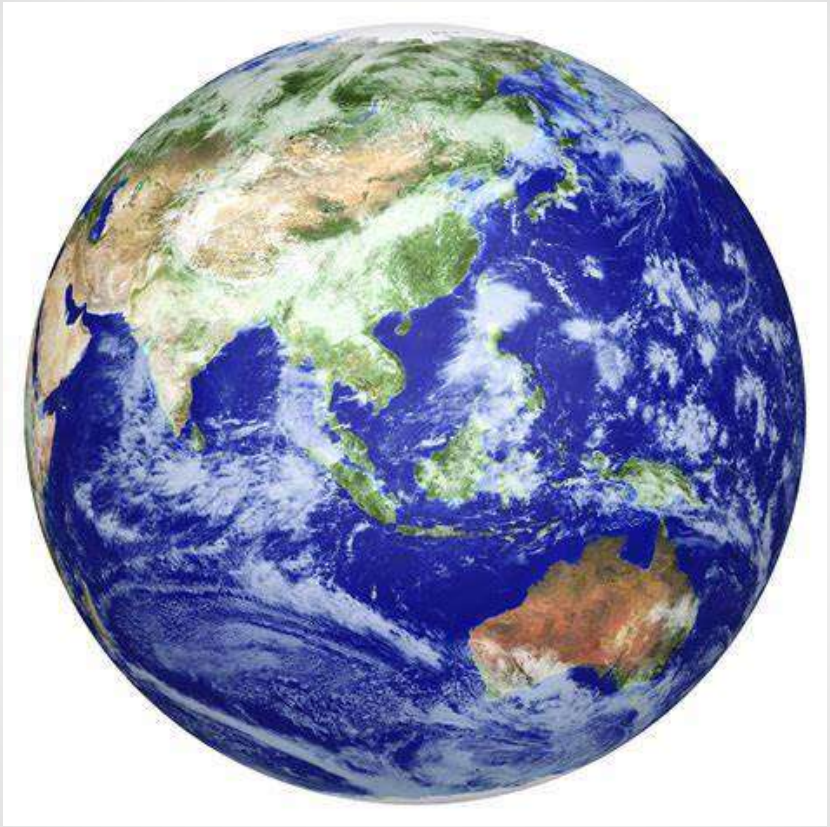
Growing population

Climate Change

Pollution

Declines in biodiversity

Water quality



COVID & rising costs

Availability of products

Declining pollinators

Environmental targets

Costs of pests & diseases to vegetable production

Producing healthy food for our families

Custodians of our soils

Biofumigation is gentle on soil biology

Why Biofumigants over other cover crops?

Potential benefits of a Biofumigant Crop

- Increased nutrient scavenging
- Enhanced disease & pest suppression
- Increased weed suppression
- Improved soil aggregate stability
- Greater reductions in soil erosion
- Improved soil microbial populations

Reduction in root rot (*Fusarium*) incidence
35% increase in yield

Serve-Ag & Peracto

Deon Gibson – Premium Fresh Tasmania

“It has been a revelation for us. We’ve never had such healthy-looking carrots. There are no nematodes, the crops have beautiful green, healthy tops and they’re in free-draining soil. And in terms of cultivation, the soil breaks down very easily and has plenty of organic material and worms and dung beetles.”

Biofumigation & Pathogen Sensitivity

Pathogen	IC50 (mM)	Sensitivity
Phytophthora cactorum	0.005 - 0.05	High
Phytophthora nicotiana		
Pythium irregulare		
Pythium ultimum		
Rhizoctonia solani	0.05 - 0.1	Medium
Sclerotium rolfsii		
Fusarium oxysporum	0.1 - 0.5	Low
Verticillium dalhiae		
Sclerotinia sclerotiorum		
Pyrenochaeta lycopersici		
Trichoderma harzianum		

Colletotrichum coccodes

0.8mM

R & D - Pathogen and pest suppression

Table 2. *Matrix of biofumigant efficacy against known soilborne diseases.*

Varieties	Season	Biofum	Black Jack Radish	BQ Mulch	Caliente	Cappucchino	Fallow	Fungisol	Mustclean	Nemat	Nemclear	Nemcon	Nemfix	Nemsol	Terranova Radish	Tillage Radish
Sclerotium rolfsii (basal rot)	Summer	•	••	•	••	•	••	•	•••	•	•	•	•	ND	ND	•
	Autumn	•	ND	•	••	ND	•	ND	•	ND	•	•	•	ND	ND	•••
	Winter/Spring	•	••	•	•••	•	•	•	•••	•	ND	ND	••••	••	••	•
Sclerotinia sclerotiorum (white mould)	Summer	••••	••	••••	•••	••	••••	•••	•••	••••	•	••	••••	ND	ND	••••
	Autumn	•	ND	•	•	ND	•	ND	•	ND	•	•	•	ND	ND	•
	Winter/Spring	••	•	••	•	•	•	•••	•	••	ND	ND	•	••	••	••
Macrophomina phaseolina (charcoal rot)	Summer	•••	••	•••	••••	•	•••	•	••••	•••	•	••	•••	ND	ND	•••
	Autumn	•	ND	••	••	ND	••	ND	•	ND	•	•	•	ND	ND	•
	Winter/Spring	•••	••	•••	•••	••••	••	••••	•••	••••	ND	ND	•••	••	•••	••••

Legend: Percentage mortality

•	0–25
••	26–50
•••	51–75
••••	76–100
ND	No Data

Source: Guide to Brassica Biofumigant Crops Managing soilborne diseases in vegetable production systems 2020

John Duff QDAF

What's new in Biofumigation?

Caliente 199

Terranova radish

Pantha mustard

Fungisol

Nemsol

Tillage radish

Cappuccino mustard

Nemfix

Marigolds

Trio rocket

Caliente rojo

Doublet radish

Nemat

Adventure radish

BQMulch

Watch for new varieties

Understand what varieties are best suited to your needs

Mixes – off the shelf

Tagetes - Marigolds

Assassin marigolds now available commercially

Significant reductions in RKN

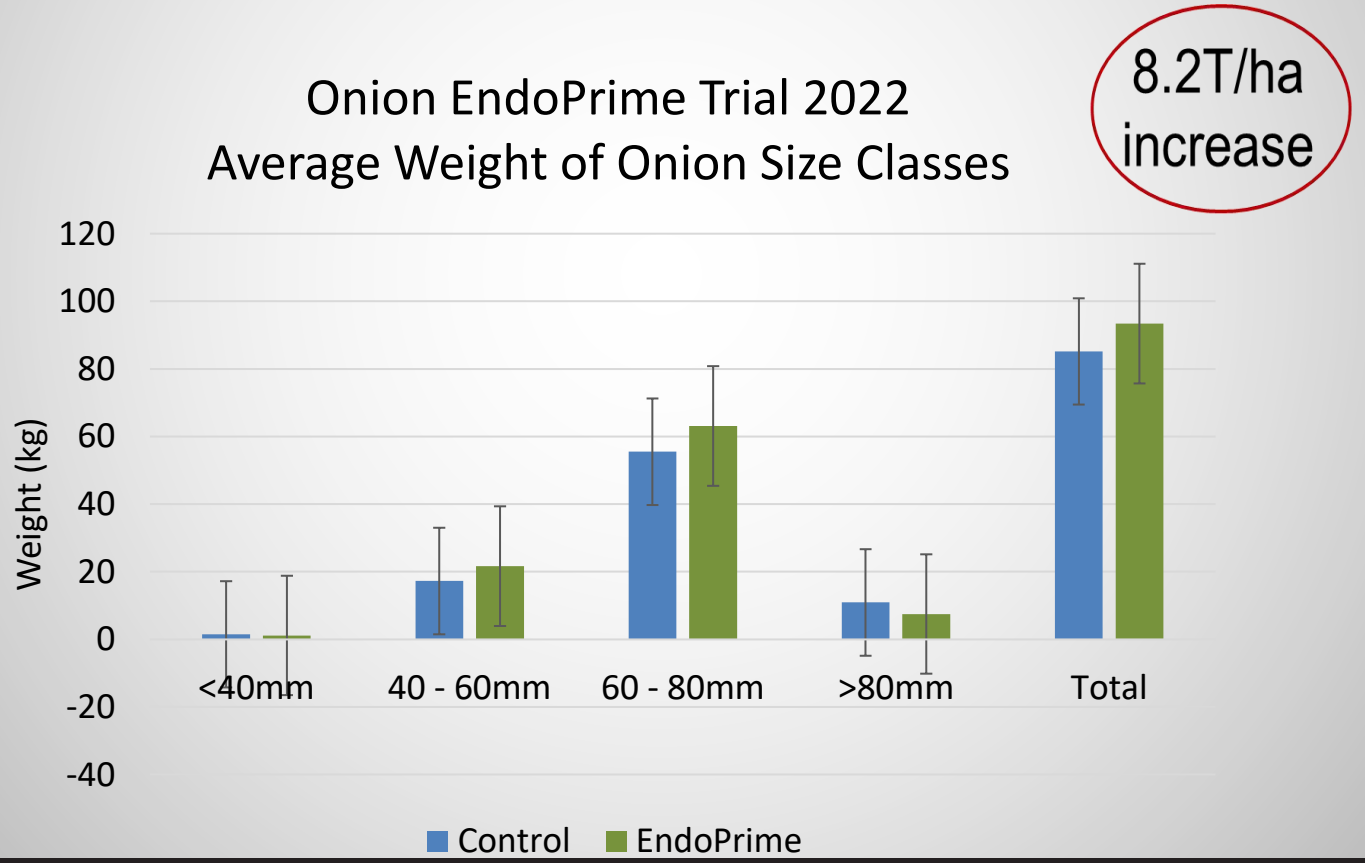
Increased yield in tomatoes

Mohamed Besri - Morocco

7th International Biocidal Symposium

Management options to boost biofumigation

Beneficial fungi



Management options to boost biofumigation

Enzymes

Control

Enzyme

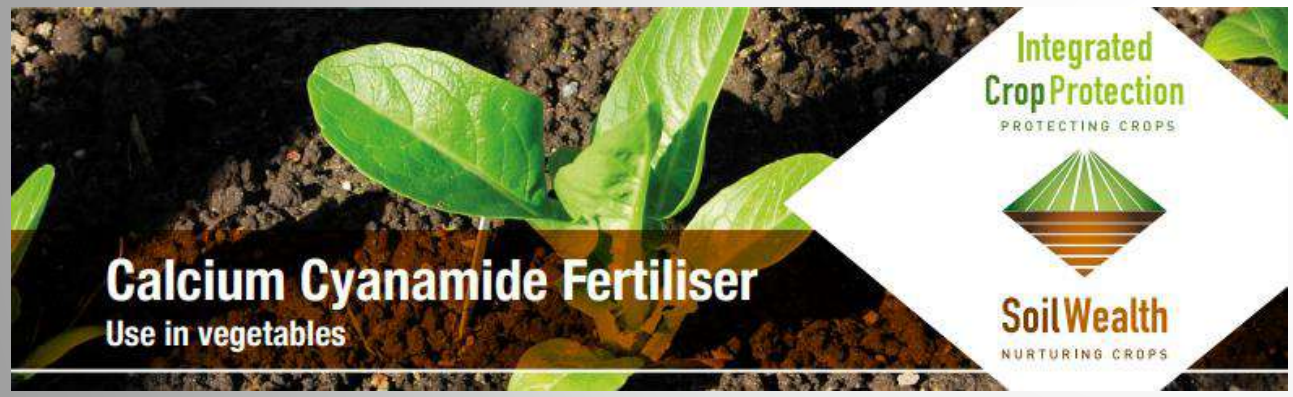
6% increase in head weight

22% reduction in disease counts

Other products?

Perlka – granulated calcium cyanimide fertilser

36% Ca & 19.8% N Non acidifying slow release N



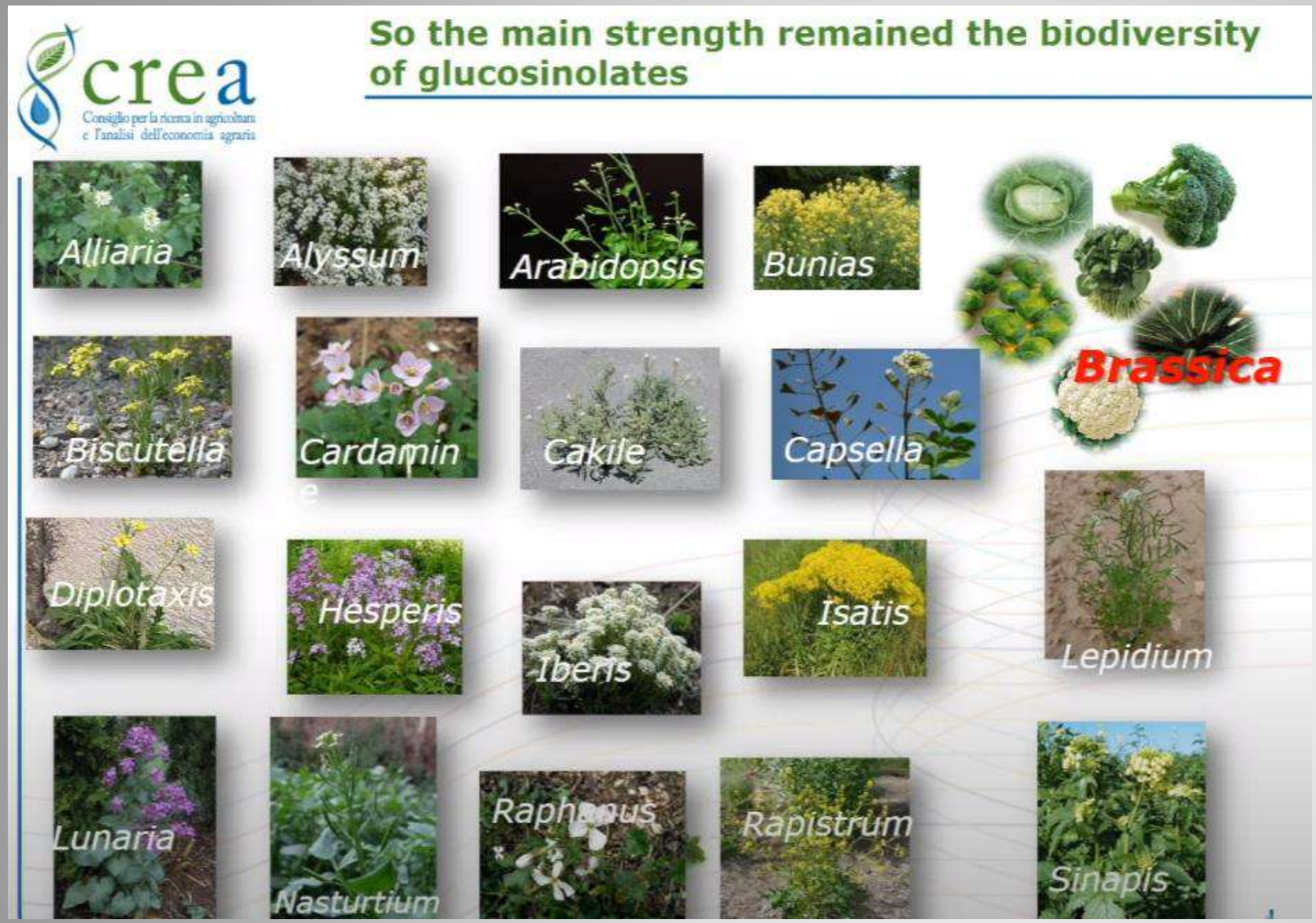
Disease & weed suppression

Club root

Phytopthora

Pythium

Biofumigation & Perlka Trial 2021– reductions in Black dot, verticillium dahlia, Pythium clade I, RLN (P. neglectus)



Luca Lazzzeri
7th International Biocidal Symposium

3700sp of brassica globally

Ecological Compensation areas

Farm to Fork 2030
Target 50% reduction in pesticides

Soil microbiome
Target 75% soils are healthy

Pollinators

Companion Planting

Companion planting in veg crops?

Lettuces, Tomatoes, Potatoes, Carrots, Peas, Peppers, Swiss chard

Attracts many beneficial insects such as: parasitic wasps, hoverflies, green lacewings

Alyssum

Thank you!