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A close-up photograph of a young green plant seedling with two leaves growing out of dark brown soil. A red ladybug with black spots is perched on the top leaf of the seedling. The background is a soft, out-of-focus green. A dark green banner is overlaid on the bottom right of the image, containing white text.

Healthy yields start with
healthy soils and roots

Why Soil Health?

- Healthy yields start with healthy soils/roots
- Healthy/productive/arable soil is a finite resource and availability is diminishing.
- Too much focus on pest management which is only 1 aspect of crop health
- ‘Pest management does not in fact increase the crops potential it can only serve to protect what the crop can already produce’ (R. Bell – CEO Croplife SA).
- In many cases there is little emphasis placed on understanding the environment below the ground and how it can impact crop health and yield potential.



Can't think just products!

- Improving **soil health** requires a holistic approach and can't be achieved overnight by applying any single product purchased in a bag/bottle.
- Biological products can play a significant role in promoting **healthy root development**.
- Both of crop and cover crop
- Improved root mass, root health, microbial diversity etc. can, with time, contribute significantly towards improving **soil health**.
- Must adopt a program approach integrating products and practices
- BUT – without wasting money on a shotgun approach

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Available inputs

Chemical intervention

- Systemic/curative chemical treatment has its place but should only be used when necessary as determined by soil testing and threshold levels.
- ‘Pressing the reset button’
- Where necessary it should be followed by a program focused on re-establishing the soil food web and filling any possible vacuum created.



Compost

- Aimed at increasing soil organic matter and carbon levels.
- Can be:
 - Produced on farm
 - Produced In Situ - Stubble digesters etc.
 - Purchased – raw/pelletized



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Cover crops

- Provide both diversity and continuity to support a healthy soil food web.
- Reduce soil erosion
- Biofumigation
- Farmers should look to farm their cover crops e.g. seed treatment applied to cover crops



Biostimulants (non-microbial)

- Can increase root exudates to better support soil food web.
- Biostimulants that increase photosynthesis result in improved assimilation of CO₂ from the atmosphere and deposition into soil through photosynthesis, exudation and humification.
- Biostimulants which increase vegetative growth can result in increased leaf litter – in situ compost production.
- Biostimulants can help plants tolerate stresses in the soil environment e.g.
 - Silica and salinity stress
 - Humics and improved P availability in certain soils

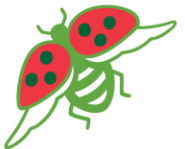


Beneficial Soil Microbes

- Beneficial fungi e.g. *Trichoderma* spp, Mycorrhizae, etc.
- Beneficial bacteria e.g. *Bacillus* spp., N fixers, etc.
- Improve nutrient availability and reduce need for synthetic fertilizer.
- Suppress soil borne diseases and pests
- Reduce severity of above ground pathogens and pests through SIR or by tackling soil borne phases in pest life cycles (e.g. *B. bassiana*).
- Stimulate root growth with larger root systems better able to acquire limited nutrients, water etc.



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The Madumbi approach

Not a 1 size fits all solution!

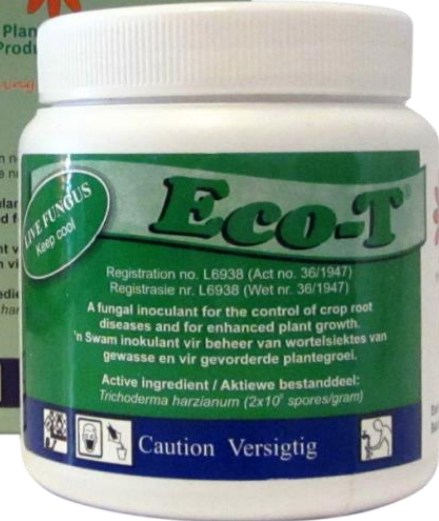
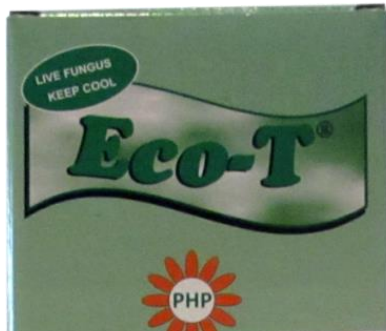
Not yet an exact science

1. Test – aim to determine the most important factor/s which are limiting production in a given soil
 1. Historical knowledge
 2. Conventional soil fertility testing
 3. Nematodes as indicators of soil health
 4. Molecular testing
2. Identify limiting factors – pH, nutrient availability, pathogens, nematodes, compaction, salinity, low soil C
3. Design specific program incorporating best products & practices.

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Madumbi Solutions



PLANT VITALITY

V¹² Initiate

Optimise nutritional support during initial growth phases



Typical Analysis

K	2.56 g/kg
S	63.83 g/kg
Ca	74.80 g/kg
Mg	1764 mg/kg
Mn	18 357 mg/kg
Zn	23 154 mg/kg
Fe	3 322 mg/kg
Si	69 700 mg/kg
Cu	222 mg/kg
Mo	41 mg/kg
B	4 043 mg/kg
pH	4.5
SG	1.3

Precautions:
When mixing with other fertilisers always jar test for compatibility.
Mix well before dispensing into application tank.
Agitate tank during application.
Do not leave to stand in application tank overnight.
Registered and Distributed by:
Madumbi Sustainable Agriculture
+27 (0) 33 342 3984
support@madumbi.co.za
www.madumbi.co.za

Mix well before use and maintain constant agitation during application

V¹² Initiate is specially formulated for use during the crop germination and initial crop growth phases.

Application:
Method: In furrow or foliar spray (min. dil. 1:50)
Rate:
- Row Crops (maize, wheat etc.) – 3-5kg (2.5-4L/ha apply in-furrow at planting or as a foliar spray after emergence).
- Veg & small fruit – 5kg (4L/ha) apply immediately after transplant or at beginning of new season (perennials).
- Orchards & vines – 5-7kg (4.5-5L/ha) apply just prior to bud-burst or to coincide with seasonal root flush.

Act 36 of 1947 Group II Fertiliser. Reg. B4513

Madumbi Humate Crystal

GROUP 2 FERTILISER Reg. Number B4797 Act 36 of 1947

Soluble Potassium Humate Crystals (85%)



Soil Food



Humic Acid is a valuable, carbon based soil conditioner recommended for use as a stand alone soil amendment or in conjunction with inorganic fertilisers. Madumbi's Potassium Humate Crystal, extracted from ancient Leonardite deposits, allows for easy combination with granular fertiliser applications.

Typical Analysis

Humic Acid	700 g/kg
Potassium	66.4 g/kg
Moisture	max 15%
Solubility	85%
Appearance	2-5mm Black Granule

Application:
- As part of granular planting blend
Apply 5-10 kg / ha or 5% of fertiliser blend
- As part of liquid fertiliser blend
- Make up a 12% Humate liquid
- Apply at 10 L / ha (Soil) or 1-5 L / ha (Foliar)
- **DIY Humate Liquid**
- Mix 1 kg Humate crystals per 5 L water.
- Allow to dissolve, the crystals are highly soluble but heat and agitation will improve this process.
- Filter resulting liquid to remove any insoluble product.
- 10-15% is insoluble.
Storage and handling:
- Keep dry
Registered and Distributed by:
Madumbi

AgriSil K50

GROUP 2 FERTILISER

Reg. Number B3756 Act 36 of 1947

Plant available Silica supplement



Typical Analysis

K	85 g/kg
Si	92 g/kg
pH	11
SG	1.23

AgriSil K50 is a specially formulated Potassium Silicate designed to supply high levels of plant available Silica for the nutritional support of plant immunity and stress tolerance.

Application:
Rate:
- Row Crops (maize, wheat etc.)
Foliar spray 0.5 L/ha at 20 days, repeat at flowering.
- Veg & small fruit
Foliar spray 1-2 L/ha every 7-10 days following emergence or transplant
- Tree crops
Root drench 5 L/ha every 1-2 months
Foliar spray 4 L/ha every 2-4 weeks as required.

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Batch No.

CAUTION VERSIGTIG

Net Contents 20 L / 5 L

Inputs – Decision making

• Limiting Factor	• Recommendation
• Soil borne disease (fungal)	• Eco-T & AgriSil K50 (Rhizovital?)
• Soil borne disease (bacterial)	• Rhizovital & AgriSil K50
• Limited availability of nutrients e.g. P, Fe, Ca	• Rhizovital, Mycorrhizae, Humates/fulvic
• Salinity	• Rhizovital, AgriSil
• Low soil carbon	• Humates, Compost, Cover crops/green manures
• Bacteria dominant soil	• Build Carbon and focus on Eco-T (Trichoderma) and mycorrhizae
• Soil compaction – low Ca:Mg	• Gypsum/lime/V12 Initiate
• Young trees - improved establishment & quicker to harvest	• Full program including several of above

Success stories from the field

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Citrus nursery



Stem diameter

A = 7.75mm

B = 5.09mm



Citrus orchard



Avocado's



Photos taken of the same avocado tree, in Wartburg, KZN, 2 months apart during the summer of 2019/2020. This tree represents the most severely affected and diseased tree in a *Phytophthora* infested orchard. An annual treatment with systemic chemistry was applied to control the disease within the tree. This treatment was followed with the Madumbi Root Health program, to build, support and enhance the root system better equipping it to withstand and fight future infection.

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Summary

- Addressing soil health requires a program approach and cannot just be product focused.
- There is a need for improved testing of soil biological parameters.
- Use what testing is available to develop a mental picture of the soil you are working with and what the main limiting factors are.
- Develop programs combining products and practices which best address these factors.



THANK YOU



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