

Healthy Soils, Hardy People, Happy Planet



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Nutrition Matters

Articles and Ideas from the Pioneers of Nutrition Farming®

Healthy Soils, Hardy People, Happy Planet

By: Graeme Sait



The NTS Story – From Soil Health to Planetary Health

- **Nutrition Farming** is an integrated, holistic system, recognising the profound links between soil health, crop resilience, animal vitality, farmer's health and planetary wellness.
- **Nutrition Gardening** is focused upon home production of nutrient-dense medicinal food with forgotten flavours. Minding your own patch can be your biggest contribution to the global warming challenge.

Nutrition Farming®

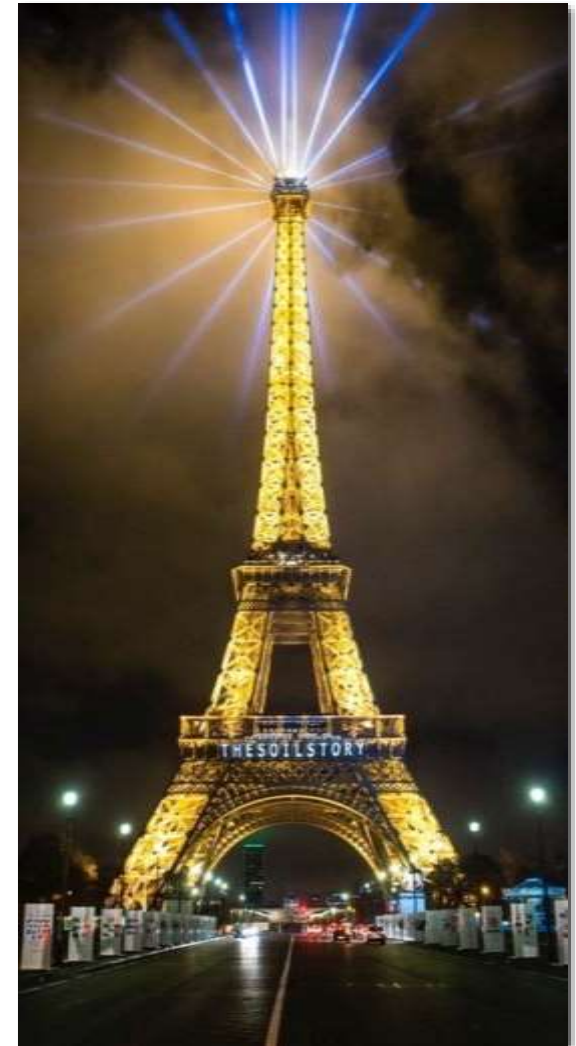


Anatomy of an Awakening

NTS is now consulting with major organisations and Governments globally.

This has included:

- Training **The Dole Corporation, Greenyard Farms** and **Driscoll's Berries** in the US.
- Training the entire **Agriculture Departments** in Laos, Singapore, Malaysia, Vietnam and Brazil.
- Meeting **Agriculture Ministers** in Canada, India, and the UK.
- Training growers from **Supermarket chains** in South Africa and the UK.
- Mentoring Climate Change **action groups**, like Kiss The Ground.
- Consulting globally with large **grower cooperatives**.



The Chemical Experiment

For the past ten decades, we have employed a **chemical, extractive model** for our food production.

We began this experiment by dumbing down crop nutrition to just **3 minerals**, while removing a little of all 74 minerals, with each season.

Soon after adopting this **simplistic nutrition**, we experienced unparalleled pest pressure and science stepped up to the plate.

The **toxic rescue chemicals** became our saviour, but we have increased their use every year thereafter.



The Wake Up Call

A global awakening is underway. We are finally recognising the unsustainability of this symptom-treating approach and many are seeking change. The drivers of this revolution include the following:

1. At our current rate of top soil loss, there is just **60 years** until zero remains.
2. We've lost **2/3** of our humus and that carbon is now the lion share of the CO₂ blanket trapping more heat and changing our climate.
3. Several studies of children have revealed a myriad of **health problems** relative to the accumulation of chemical residues and the unresearched '**cocktail effect**'.



The Wake Up Call

4. Our food has become a **shadow** of its former self, with less flavour, shelf life, and medicinal qualities.
5. **Degenerative illness** associated with compromised nutrition has become our largest killer.
6. There is a global movement towards '**putting a face to your food**' which is the basis of the global farmers market phenomenon, and a direct-to-consumer, supermarket model in Japan.
7. There is a growing awareness that **we are what we eat** and what we eat comes from a compromised soil.



Accepting The Challenge

- Our only response to the **global warming challenge** has been to ‘talk’ about reducing CO₂ emissions.
- If we were to cut emissions by **100%** tomorrow morning, then in 200 years time we would drop down to the atmospheric CO₂ levels present in **1975**.
- These levels are too high and the oceans continue to **heat and acidify**.
- There are very few scientists that would agree that we have **200 years** left.
- So, is it **all over** bar the shouting?



Accepting The Challenge

- This carbon lode from the soil is the **chief culprit** in thickening the blanket of greenhouse gasses which trap the heat, warm the oceans and dramatically impact our climate (**250 gigatons** from industry etc., **476 gigatons** from our soils).
- The solution is to **put the carbon back**, from whence it came. When we build organic matter in our soils, we are effectively stepping into the carbon cycle and **sequestering** carbon that would have otherwise returned to the atmosphere.



Fungi To The Rescue

- **'Active' carbon** produced by bacteria (lawn clipping compost) has a short shelf-life in the soil. It oxidises and returns to the atmosphere as CO₂ within 12 months.
- **Stable humus** is manufactured by fungi through creating a stable bond between clay and humus colloids.
- This form of carbon remains in our soils (and out of the atmosphere) for at least **35 years**.
- The sad story here relates to the **disastrous loss** of cellulose-digesting fungi from our farming soils.
- For example, there are now just **10%** of **mycorrhizal** fungi remaining in our soils.



The Critical Importance of Humus

Humus is the essence of soil health.

- This sweet smelling soil chocolate is created by microorganisms and serves as their **home base** and **support** system.
- Humus is the **storage** and **delivery** system for all minerals
- It also houses a suite of microbial exudates that help create **disease suppressive** soils.
- The higher the humus levels, the greater the **nutrient-density** and **medicinal value**, the less the need for stressful pest management and the greater your **gardening pleasure**.



The Top Ten Humus Building Hints

1. **Include legumes in every garden plot** – legumes, like lucerne, tend to feed fungi. These creatures generate the larger aggregates that create **crumb structure** (better infiltration and gas exchange). The legumes under your vegetable or fruit crops also deliver nitrogen and they release acid exudates to prize apart calcium and phosphorus (the two most important minerals for **photosynthesis**).
- Lucerne leaves can be harvested as a **highly alkalising**, nutrient-dense addition to salads or green smoothies.
 - The **edible flowers** are a sweet delicacy to die for.
 - The chop and drop potential provides the best known **fertilising mulch**, attracting both protozoa and earthworms.



The Top Ten Humus Building Hints

2. **Plant cocktail cover crops** – we now understand that the combination of five plant families in a blend, sponsors the release of phenolic compounds into the soil. These antioxidants spark beneficial soil-life.
 - **Soil structure** changes, humus creation hastens, and **soil-life** thrives.
 - The **five families** include: grasses, cereals, brassicas, legumes and chenopods.
 - **Chenopods** and **brassicas** should only make up 1 - 5% of the blend, as they release chemicals that dissuade friendly fungi.



The Top Ten Humus Building Hints

3. **Discover humic acid** – humic acid is the most powerful promoter of the beneficial, humus-building fungi that are missing in most soils. Humates also sponsor **crumb structure** that can help reclaim the humus building apparatus of your soil.
4. **Embrace compost** – compost provides vast diversity and numbers of beneficial organisms to reclaim humus building capacity.

Compost **stabilises** minerals with which it is combined, to prevent leaching.



Organic Matter Matters

Compost, compost, compost!

- Compost is cornerstone of **gardening vitality**.
- Every home needs a compost bin/ pile and a **vermi-compost** station
- Compost is a profound source of biodiversity with over **30,000** different creatures within the 5 billion good organisms found in a teaspoon of good compost. Compost increases soil carbon by many times more than the carbon it contains.
- Compost is both an invaluable source of **stable humus** and a **triggering** mechanism to reclaim the humus building potential of your garden.



4. Embrace Compost

Building a compost heap

- Build your pile in **25 cm** layers
- Alternate **carbon** layers (straw, council mulch, prunings, autumn leaves etc.) with **nitrogen** layers (manure, lawn clippings, green waste etc.)
- Sprinkle **lime**, soft rock phosphate, crusher dust, and previous compost (which serves as a starter) on each layer.
- Thoroughly **wet down** each level as you build your layer cake
- When the pile is complete, cover with **wet sacks**, or an old carpet, and turn it several times over the next **3 months**.



4. Embrace Compost

BAM Composting

- Anaerobic bacteria are often **undesirable**, opportunistic pests behind garden disease.
- However, there is another group of anaerobes that are **immensely valuable**.
- They can protect from disease, while creating humus, **stimulating plant growth**, delivering minerals and improving soil structure.
- BAM composting delivers a beautiful product in just **8 weeks** with a much higher conversion rate.



The Top Ten Humus Building Hints

5. **Minimise digging** – fungi do not favour the intrusion of cold steel. In fact, digging slices and dices beneficial fungi. Every time we open our soil, we oxidise carbon and the negative impact is **quadrupled** in the wet.

 - There are up to **5 kgs** per square metre of **soil life** in your garden and most of these creatures prefer minimum disturbance.



The Top Ten Humus Building Hints

6. Never use glyphosate on your property

- Glyphosate was originally patented as a chelating agent and can wrap around cations and make them unavailable.



- **'Yellow flash'** on soybeans is a glyphosate induced **manganese** deficiency.
- Glyphosate also reduces the population of **soil organisms** responsible for making **manganese** and **iron** available.
- In one of **Professor Don Huber's** studies there was a 90% reduction in manganese reducing organisms. In another, where just **2.5%** of the applied glyphosate reached the soil, there was an **80%** reduction in manganese uptake and **50%** reduction in the uptake of iron.

Glyphosate and Your Health

- **Chronic illness** – exposure to glyphosate correlates with chronic illness. Sick people have substantially higher levels of glyphosate in their system.
- **Beneficial gut bacteria** – glyphosate destroys these organisms – this is well researched in chickens and cattle. It may be linked to an increasing rate of allergies and gluten intolerance.
- **Magnifies vaccines** – glyphosate makes vaccines more toxic. Exposed children are much more likely to react badly.



Glyphosate and Your Health



- **Reduced nutrient uptake** – glyphosate is a chelating agent that kills plants through shutting down nutrients, it works the same in humans. Glyphosate-induced vitamin deficiency may have a cancer link.
- **Non-Hodgkins lymphoma** – exposure to glyphosate doubles the likelihood of B-cell lymphoma.
- **Debilitates cytochrome P450** – this is the longevity gene related to detox enzymes.
- **Kidney failure** – Sri Lanka has just banned glyphosate due to an overwhelming number of liver and kidney problems.

The Top Ten Humus Building Hints

7. Bring back your earth worms – Earthworms are missing in most soils, and there is a price to pay for this loss.

- Earthworms create humus **4 times** more rapidly than standard decomposition.
- They also produce a **fertiliser** from their rear ends, featuring 10 times more potassium, 7 times more nitrogen, 5 times more phosphorus, 3 times more magnesium, and 150% more calcium.
- If you can achieve the holy grail of **25** earthworms per shovelful, they will produce **300 tonnes** of earthworm castings per hectare annually.
- Earthworms also **incubate** a unique group of beneficial organisms that will be lacking in your soil, if the earthworms have gone.



The Top Ten Humus Building Hints

8. Embrace Vermi-composting

- The liquid passed through a worm farm contains **billions of beneficial organisms** that are unique to the earth worm.
- These organisms stimulate plant growth and provide **protection** from disease
- It can be foliar sprayed or applied to the soil and should always be combined with some **nutrition**.
- A DIY worm farm can be made from a **1000 L shuttle** for as little as \$200. This can produce luxury amounts of both worm juice and **vermi-compost** (the very best compost known).



The Top Ten Humus Building Hints

9. **Enhance residue digestion** – In a living soil, residues should be fully decomposed within 6 weeks.
 - If this is not happening, then you need some **help**.
 - **BAM™** is proving a highly efficient input for the conversion of your garden residues to humus.
 - **Fungal-dominated** compost teas are another option.
 - In all cases the inoculums should be combined with **humic acid** (the lunch box approach).
 - Humic acid will also stimulate existing cellulose digesters.



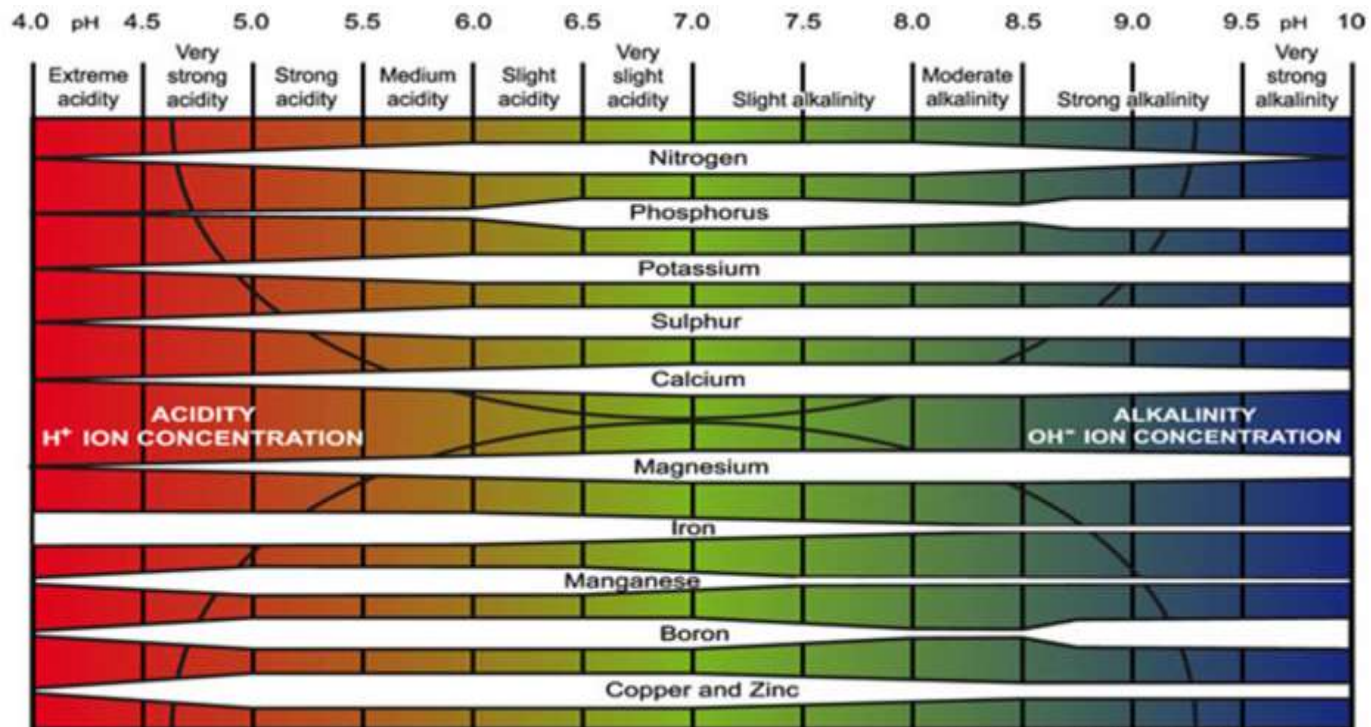
Healthy Soils, Hardy People, Happy Planet

10. **Provide oxygen for your humus builders** – oxygen is the single most important element for crop vigour and resilience.
- Management of **gas exchange** is a key role of a nutrition gardener.
 - The calcium to magnesium ratio governs the **breathing** of the soil.
 - **Gypsum** is of great value in tight, closed soils.
 - Fungi create **aggregates** to improve oxygen flow.
 - Interplanting **legumes**, stimulates fungal crumb structure.



Getting Started With Nutrition Gardening

- **Nutrition gardening** is about managing minerals, microbes and humus.
- **Soil pH** is a major determinant of mineral availability to your fruit and vegetables.
- This, in turn, directly effects the immune capacity and **resilience** of your crop.



Correct your soil pH

- An ideal soil pH is **6.4**, which ensures you are accessing maximum nutrition from your fresh food.
- You can test your soil pH with an **inexpensive kit** from a hardware store.
- Correction might involve **limestone** on a heavier soil, or a combination of lime and **dolomite** in sandy soil.
- **Gypsum** or sulphur might be required to help reduce soil pH if the soil is too **alkaline**.
- **Calcium** is the single most important mineral flocculating the soil, to allow **oxygen** entry and CO₂ exit.



Managing Mineral Balance

- After checking your **soil pH** and addressing your calcium requirements, the next step is to ensure full mineral nutrition.
- Utilise a complete, balanced **mineral fertiliser**, which covers all trace minerals, including **molybdenum** (which is missing in most garden soils).
- **Life Force® Gold** contains all trace minerals in a compost base (putting the microbes behind the minerals).
- This fertilising compost is typically applied at **1 kg per 5 sq mts.**



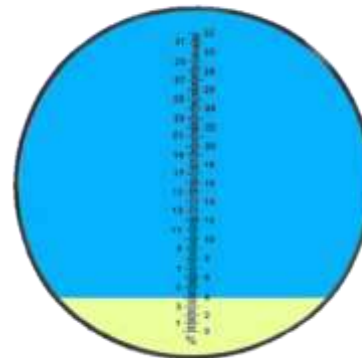
Measure for Mineral Mastery

It is important to avoid driving blind when producing high quality food. There are several simple monitoring tools that ensure some precision in our nutrition.

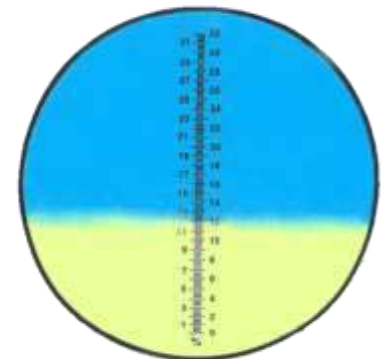
- The **refractometer**- this simple tool measures food quality. The higher the brix level, the more flavoursome the food, the greater the **medicinal value**, the longer the shelf life and the more problem-free the gardening experience.
- The refractometer can also be used as a meter to monitor the most important of all **minerals** - calcium.



Poor Calcium



Good Calcium



The Secrets of Growing Problem-Free Food

Direct inject your nutrition

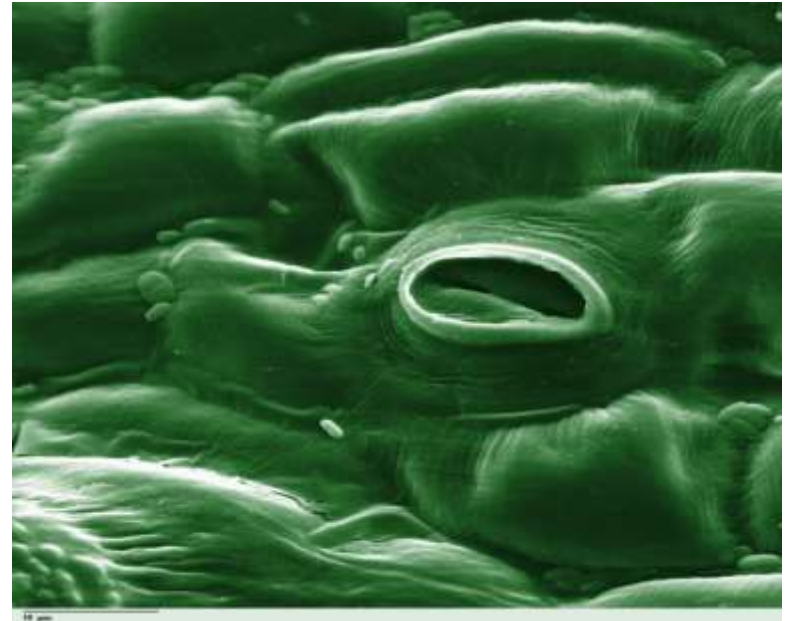
- No mineral is an island and it is very common for **excesses** in the home garden to limit the uptake of several other minerals. **Phosphate** from chicken manure is a good example.
- **Excess P** shuts down calcium, potassium, zinc, iron and copper. Three of these minerals are key players in resilience.
- **Foliar fertilising** is **12 times** more efficient than mineral delivery via the soil.
- The foliar route is a **direct injection** of nutrition, not limited by mineral dynamics in the soil.



Direct inject your nutrition

There are several key tips to successful foliar fertilising including:

- Always direct the spray on the **underside** of the leaf.
- Don't spray in the middle of the day. **Early morning** or evening are better.
- **Calcium** is particularly important as foliar because this mineral is poorly translocated (Life Force Trio).
- Broad spectrum **trace minerals** (Life Force Total Cover) are also important as they fuel plant immunity and impact flavour.



Making your own living liquid fertiliser

- The introduction of a **new workforce** can be species-specific or it can involve broad spectrum micro-organisms to increase **diversity**.
- Compost tea and worm juice are examples of **broad spectrum inoculums**.
- Compost tea is a remarkably **cost effective** biological strategy, as it involves just 1 Kg of compost per 100 litres along with 1 litre of food.
- **Worm juice** involves the unique organisms incubated in the gut of an earthworm. If you do not have earthworms on your farm, you do not have these important organisms.



Making your own living liquid fertiliser

Protozoa Tea – nutrient cycling and larger roots

- **Protozoa** are a hugely important balancing mechanism in the soil. They are responsible for maintaining a manageable bacterial community.
- A healthy soil can contain **one million** protozoa per teaspoon, but that declines to less than **one thousand** in a stressed soil.
- Protozoa can be easily **brewed at home** to replenish your workforce.
- **Lucerne hay** contains large numbers of all 3 forms of protozoa. Hay is added to the brewing tank at 3-5%, along with **liquid fish** and molasses. The mixture is then brewed with oxygen for 2 days.



Making your own living liquid fertiliser

Protozoa Tea – Five key benefits

1. **Recycling nitrogen in the ammonium form** – one watermelon sized protozoa consumes ten thousand pea sized bacteria each day and spits out the nitrogen excess for plants to utilise.
2. **Root structure architects** – protozoa stimulate much more branching and root surface area particularly in grasses, cereals, and sugarcane.

A trio of root-building benefits:

- Amoeba produce auxins (root stimulating hormones).
- Protozoa stimulated bacteria also release auxins.
- Nitrifying bacteria are also stimulated and the nitrates trigger lateral root elongation.



Making your own living liquid fertiliser

Protozoa Tea – five key benefits

- 3. Recycling all minerals** - protozoa are constantly mineralising elements found in organic matter and bacteria.
- 4. Stimulation of earth worms** - protozoa are the favourite food of earth worms. One course participant reported an increase from 1 earthworm per 11 shovelfuls, to 11 earth worms per shovelful, after a single application of protozoa tea.
- 5. Stimulation of nitrogen fixers** - 'grazing' by protozoa stimulates nitrogen fix in bacteria just as pruning stimulates your fruit trees.



Beneficial Anaerobes - Multiple Benefits of BAM™

Beneficial Anaerobes

- Professor **Teruo Higa** recognised the profound importance of the anaerobic side of soil life.
- He developed a product call **EM** which has transformed much of Asian agriculture.
- The NTS product, **BAM™**, is based upon the original EM formula with some new inclusions.
- **BAM™** contains over **80 different microbe varieties** including lactobacillus, purple non-sulphur bacteria (pnsb), fermenting fungi, yeast, and actinomycetes.



Beneficial Anaerobes - Multiple Benefits of BAM™

- **Boosts nitrogen fixation** – BAM™ includes PNSB (anaerobic nitrogen fixers), and their aerobic counterparts, azotobacta.
- **Powerhouse compost accelerant** - BAM™ can be used to produce an eight-week, anaerobic compost with a 910 Kg yield. It can also be used in aerobic compost to speed the process considerably. However, the yield will not be as high.
- **Suppresses pathogens** – these anaerobes have proven highly effective in the soil and on the leaf surface as antagonists of disease organisms.
- **Detoxification** - these anaerobes can speed the decomposition of chemical residues. In fact, they are one of the few organisms capable of removing dioxins from water and soil.



Beneficial Anaerobes - Multiple Benefits of BAM™

Beneficial Anaerobes - multiple benefits of BAM™

- **Highly effective residue digester** – can be sprayed on crop residues to speed breakdown and conversion to humus.
- **Pet probiotic** - Apply to water bowls at 0.01% (1:10,000).
- **A living fertiliser** – BAM™ can be watered in or foliar sprayed to boost plant growth, health and yield.
- **Clean septic tanks** – 500 mLs added to the tank removes smells.
- **Household cleaner** - can be used in the bathroom, shower, and kitchen benches. Will also deodorise smelly carpets.
- **Removes dog smells** - apply to the coat of the animal and to the bedding.
- **A living deodorant** - BAM™ kills the organisms responsible for underarm odours and removes the anaerobic smell.



The Gardeners Role

- Humankind can enrich and contribute to our **web of life**, and gardeners are at the forefront.
- **Biophilia**, is our innate connection to this web, without which, mental illness, anxiety, and depression reign.
- The horrifying **suicide rate** may well relate to the sickening **loss** of this connection.
- I strongly suspect that there is a much less likelihood for suicide amongst passionate gardeners.



The Loss Of Precious Insects

- There are **50,000** species of **parasitic wasps**, most of which are specific to their caterpillar hosts.
- Generalists, like **trichogramma**, lay their eggs on **200** pest moth larvae.
- **Lacewings** are called the ‘aphid lion’, but they control much more than aphids.
- The larvae is the predator, and it feeds upon all **soft-bodied insects**, including aphids, mites, scale, mealy bugs, thrips, white fly, psyllids, leaf hopper, and small caterpillars.



The Loss Of Precious Insects

- In **2008**, German researchers determined that the vibration of **honey bees** above blossoms deterred **caterpillars** from feeding. They could not distinguish between the bees and the parasitic wasps.
- In a 3-week lifespan, a single **lacewing larvae** can consume 11,000 spider mites, 400 aphids, 250 leaf hopper nymphs, and 6,500 scale eggs.
- **Spiders** can number up to 500,000 per acre, trapping all insects.



The Loss Of Precious Insects

- A research project, completed in Germany earlier this year, revealed a loss of **75%** of flying insects, over the past **27 years** (check your windscreens).
- **Pollinators** like bees, beetles, moths, and butterflies, do much more than pollinate our food. They are integral to an energy-rich, food web, and the wheels fall off without them.
- **Beneficial insects** are some of the most underappreciated, underutilised, and environmentally impacted creatures in the natural landscape.



Increasing Biodiversity Through Building Habitats

- **Snags**, nesting boxes and stem bundles, to attract **beneficials**, are simple and fun to construct.
- Snags can be simply created by **drilling holes** in a dead tree, stump or log.
- The **hole diameter** should be 2.5-10mm. Holes less than 6.5mm (1/4 inch) should be 3-5 inches (8-13cms) deep.
- The distance between the holes should be $\frac{3}{4}$ inch (19mm) between centres. Make sure the holes are **not tunnels**.



Increasing Biodiversity Through Building Habitats

- Another simple native **pollinator refuge** is called a '**stem bundle**'.
- This simply involves a bundle of weeds or **bamboo**.
- Cut sections after a **natural node**, to create a back wall and avoid a **tunnel**.
- **Strap together** with wire, string or tape.
- Snags, nesting boxes, and stem bundles must be positioned to the east, **facing the morning sun**.



Your Garden and Your Health

- A genuinely holistic approach to home food production should also have a focus upon the health of the gardener.
- It is now understood that the smell of a healthy soil stimulates the production of serotonin (the feel-good hormone).



In Conclusion...

Your food garden is your ultimate wellness tool. I trust that you are now better equipped to create pest-free, nutrient-dense food with forgotten flavours and enhanced medicinal qualities.

The **Nutrition Farming Podcast** covers many aspects of soil, plant, human and planetary health.



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