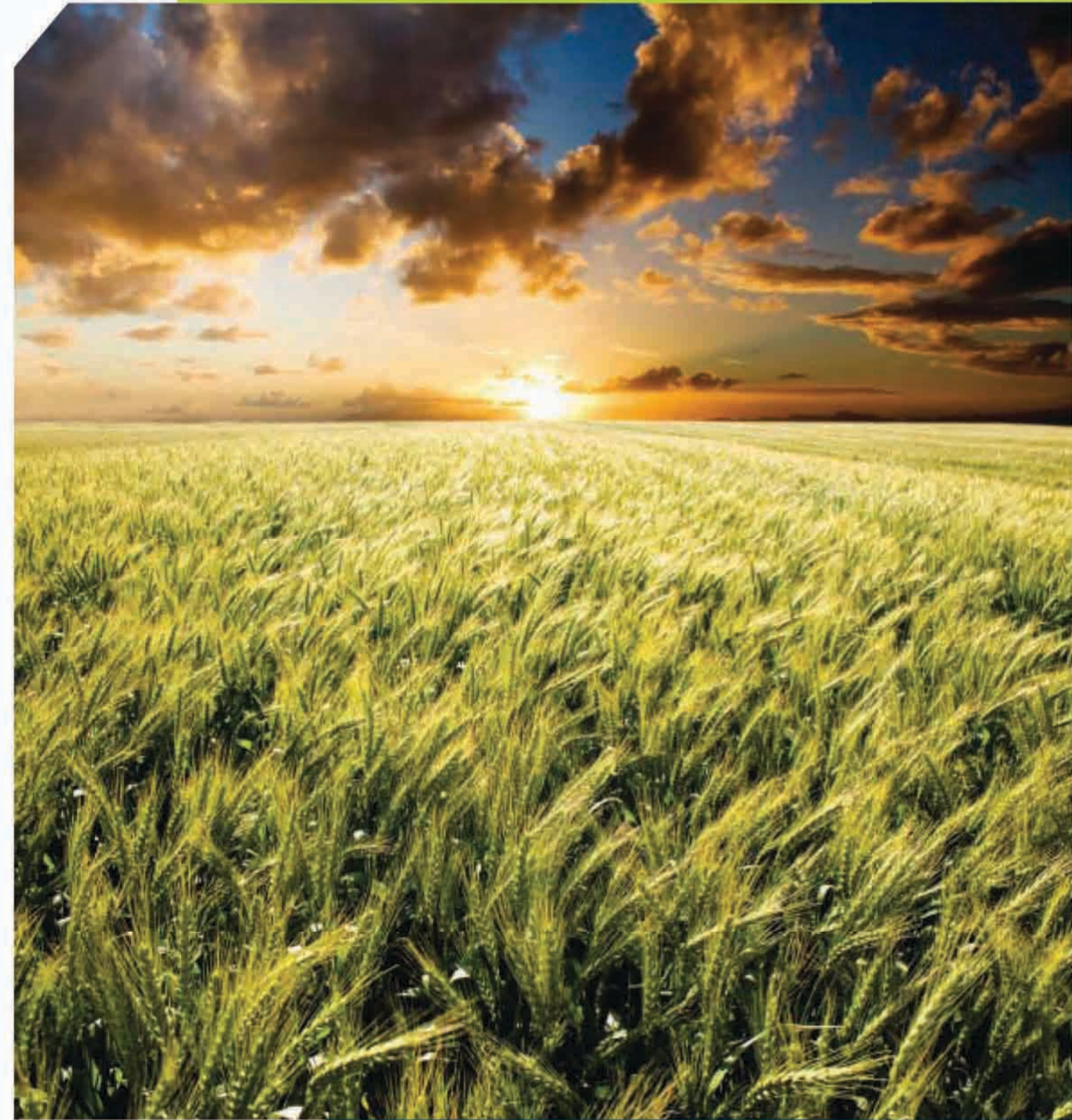


Climate Friendly Farming



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AgriPower

*Climate Friendly Farming:
Silicon (Si) Organic Fertilisers
& Carbon Sequestration*

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Introduction

Pollution

- Toxic Chemicals
- Methane Emissions
- Carbon Pollution
- Soil Degradation
- Nutrient Leaching
- Water Scarcity
- Industrial Runoff
- Algal Blooms
- Crop Failure
- Food Quality
- Over Fertilisation



2009 – Agriculture worldwide faces a number of critical Climate Change hurdles.



One of Australia's most valuable industries, agriculture, is about to be hit by a tidal wave of issues in the face of impending world wide legislation, changing consumer-driven demands, international competition and sustainable practices. Australian agriculture must pro-actively respond to this in order to survive.

Agriculture's most damaging by-products are:

1. POLLUTION - of soil, waterways and oceans through the leaching and runoff from nutrients and chemicals used in fertilisers and insecticides and
2. METHANE EMISSIONS - from ruminant digestion processes (cattle, sheep, goats etc), animal-waste management and nitrous oxide from organic decomposition.

As a result, *agriculture is Australia's second largest source of greenhouse gases.*

- Currently, domestic agriculture has not been included in formal regulated carbon markets under Kyoto.
- Pressure on legislators and shifting international priorities could leave our industry stranded.



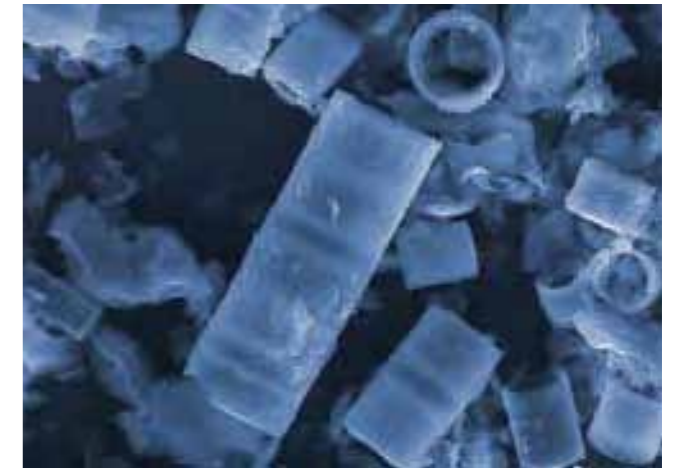
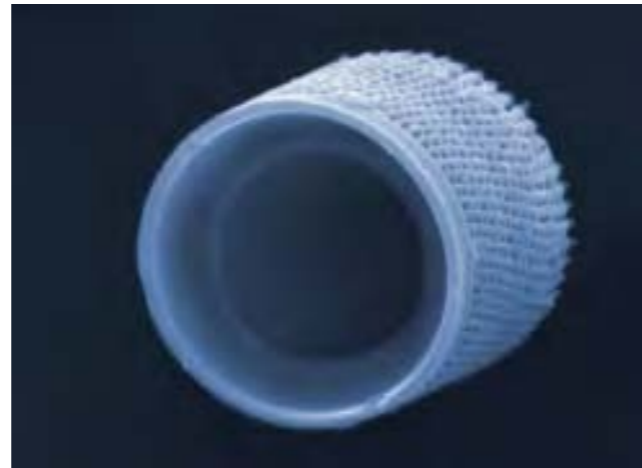
For agriculture it couldn't get much worse. Factor in:

1. fossil fuel energy, irrigation, pesticides and chemical fertilisers to address poor soils
2. leaching of nutrients and chemicals which pollute inland water systems and marine habitats
3. losses due to product spoilage in transport and delivery
4. high carbon footprint or "food miles" to Australia's food export markets
5. soil degradation, salinity and diminished water retention from exhaustion
6. carbon released from timber clearing, pulping and processing
7. decomposing agri-waste releases methane and carbon

2010 and beyond... AgriPower offers opportunities and solutions to combat these liabilities.

The information herein explores the science of climate friendly farming with Silicon (Si). With AgriPower, farming, as you will see, is neither complicated nor expensive.

It will on the other hand prove to be highly productive, highly profitable and highly sustainable.



AgriPower – ‘Oils ain’t Oils’

Diatomaceous Earth (DE) is the fossilised remains of either salt or freshwater organisms called diatoms. These diatoms are predominantly composed of silica (SiO₂). Diatoms make up about one quarter of plant life by weight and produce at least one quarter of the oxygen we breathe. However, confusion exists about this naturally occurring substance. As they say ‘oils ain’t oils’ and the same applies to DE.

To date, DE has not been extensively used in agriculture as a silicon fertiliser due to widespread cristobalite contamination. Virtually all DE produced around the world contains cristobalite which is either inherent and/or increased during processing. Producing marketable DE requires an intense heat process called ‘calcining’ to clean and bind the particles together. This process creates additional cristobalite to that already present in the raw material. Cristobalite is recognised by the World Health Organisation (WHO) as a deemed carcinogen. Cristobalite is a health hazard if inhaled, similar to asbestos dust. Any spreading for agriculture would create dust, as it does with other forms of fertiliser, which would be inhaled by those spreading the DE as well as potentially by people in the downwind area. To date the risks involved have been too significant for DE to be widely used in agriculture.

The DE produced by AgriPower Australia Limited contains no cristobalite.

However... the DE produced by AgriPower Australia Limited contains no cristobalite. It has been the subject of numerous independent tests and has received clearance as a safe product for a broad range of uses including agriculture and horticulture.

What is different about AgriPower’s DE?

- AgriPower diatoms were formed from fresh-water organisms.
- AgriPower’s DE diatoms are composed largely of *amorphous silica* (not crystalline silica as is most internationally produced DE).
- AgriPower’s diatoms are of an exceptionally high quality in two ways: their shape and their porosity. In the world of diatoms, this makes them a ‘high performance’ grade product.
- AgriPower’s diatoms, being of a naturally superior quality, *require no calcining whatsoever*.
- AgriPower DE is 100% organic, non-pollutant, non-carcinogenic, safe for animals, safe for humans, safe for the environment.

AgriPower Australia Ltd mines and processes their DE locally, in Australia, into high value agricultural products which will contribute significantly to the future of Australian farmers and the industry overall.

But first we need to understand *the importance of Silicon (Si)* and it’s relation to plants, soils, water and animals... in other words, the environment.

Silicon (Si) via DE –
Agriculture's Magic Bullet

From Silica to Silicon

Silicates are formed from the element Silicon (Si). Silicon is a beneficial element for plants and is found in significant quantities in most plants. Plants can contain Silicon at levels higher than any other mineral. Plants typically absorb bio-available Silicon as a Silicate (H_4SiO_4 – known as monosilicic acid or orthosilicic acid).

Silicon is deposited as silica in the plant cell walls, improving cell wall structural rigidity and strength, plant architecture and leaf erectness. Silicon in plants can stimulate plant photosynthesis, decrease susceptibility to disease and insect damage, alleviate water and various mineral stresses and decrease the toxic effects of aluminium.

Plant Available Silicon - PAS



AgriPower delivers Silicon (Si) in a highly plant-available form known as *Plant Available Silicon (PAS)*. PAS increases the translocation (movement) of nutrients within the plant and increases water efficiency by reducing transpiration. The benefit of the high PAS content in AgriPower's product is that it delivers organic amorphous Si (as opposed to crystalline Si*) in an easily accessible form to the crop root zone.

PAS when delivered in the form of DE is the magic bullet of plant medicine with tests proving many extraordinary and significant benefits:

- It is the critical element required for plant immunity and cell construction.
- It promotes healthy root growth by aerating the root zone (i.e. the soil around).
- Adsorbency improves soil water retention significantly.
- It locks nutrients in the root zone.
- It increases root growth by 20-200%.
- It dramatically increases cation exchange capacity, boosting nutrient uptake.
- It increases Phosphorous uptake by 45-80%.
- It increases Potash efficiency by 30-40%.
- It boosts photosynthesis and increases cell strength.
- It improves survival rates, especially under stressful conditions such as drought.
- It increases plant resistance to pathogens and pests.
- It reduces nitrogen draw down.
- It increases crop yield per hectare.
- It increases Brix levels (eg sugar cane up 30-70%).

- It reduces spoilage during packaging and transport.
- It improves soil condition.
- It reduces the effect of salinity.
- It reduces irrigation discharge by 30-40%.
- It reduces chemical runoff into waterways and coastal areas in two ways:
 1. More chemical fertiliser additives are taken up by the plant and not lost to leaching.
 2. It holds the chemical fertiliser in the soil root zone.

A major CSIRO study on silicon fertiliser applied to sugar cane in Australia obtained very good results. The CSIRO trial used calcium silicate slag to replicate its usage in the USA. Calcium silicate slag is a metal slag mass that is a waste product. A large volume is required because of its low PAS content and therefore due to the high application rates, it requires considerably more spreading which increases costs considerably. The lower cost of DE and the reduced spreading required makes using DE far more economical than calcium silicate slag.

What the AgriPower studies demonstrate is that the PAS in AgriPower is well in excess of that contained in calcium silicate slag. This represents a significant cost advantage and no heavy metal soil contamination as with the calcium silicate slag.

* Interestingly, if DE is calcined which nearly all DE producers around the world do in their processing, the DE loses a significant amount of PAS. This is because the PAS is now 'locked up' through what could best be described as a glazing effect on the silicon due to the heat processing during production. Because AgriPower's DE is not calcined, its high PAS content is retained and deliverable.

Silicon (Si) via DE –
Agriculture's Magic Bullet (contd.)



AgriPower – a few healthy facts

AgriPower contains high levels of PAS. This, together with its mineral content, delivers still more benefits to agriculture. Here are a few notable highlights:

- It promotes High Cation Exchange Capacity (CEC) making more nutrients available to the plant.
- It helps tie up aluminium.
- It is not acidic and also reduces soil acidity.

- Mixed with phosphate fertilisers it delivers other benefits to plants because:
 - it actually increases plant absorption of the phosphate during crop cycles and
 - it significantly reduces the leaching of the phosphate between crop cycles, reducing the amount of phosphate required to remediate the soil
- It offers an economic alternative to high cost chemical usage, and helps to realise the full potential of the soil, resulting in good yield and quality from crops.

Soil Science – The Basics

The success of a mineral fertiliser program is very much dependant on the effect of soil microbiology on the mineral fertilisers. Standard agricultural practices treat the soil as a medium simply to hold a plant in place. This incorrectly assumes that the only nutrients needed therefore are those required by the plant. Little or no consideration is given to how soil works or what it needs to convert nutrients into bio-available nutrients.

Let's take another look and regard soil firstly as a living identity and therefore secondly as the most important asset a farmer has. Thinking this way considers all the dynamics of soil chemistry, biology and geology and will better equip farmers to farm better.

In many areas across Australia (and world wide), continuous cropping and established agricultural management practises have resulted in losses of organic matter and a decline in soil structure. The unfortunate side effect is the belief that fertiliser and more fertiliser again will fix the problem. However this usually does more harm than good over the long term. It is important to understand that certain soil microbes take up the nutrients and either pass them directly to the plants, or eventually die and release the inorganic nutrients back into the soil in a bio-available form for the roots to utilise. So, the science is, feed the microbes and they will feed the plants. Living soil is achieved when a natural balance occurs between three important sources: minerals, microbes and mulch. AgriPower plays a significant role in the first two.

When 'synthetic' and mineral fertilisers are used in tandem, more efficient use is made of the soluble component of the fertiliser. Better crops result because the mineral fertiliser encourages the living aspects of the soil, and helps negate the adverse effects of 'synthetic' fertilisers. Because mineral fertilisers are a long-term proposition, they will continue to realise improvements in the soil. The soil can therefore maintain maximum nutrient availability to feed the crop, as it is required.

Minerals play a substantial role in micro-organism, plant and animal nutrition. Macro minerals are required in larger amounts (eg phosphorous, potassium, calcium, magnesium, sulfur and silicon). Micro or trace elements can simply be defined as those minerals that make up less than 0.01% of the dry weight of an organism and are required in minute amounts, but are essential for its normal health, function and development (eg selenium, boron, cobalt, copper, nickel, molybdenum, manganese etc).

Silicon-based fertilisers play a key role in plant nutrition, insect and disease resistance and soil absorption capacity and can optimise physical and structural properties of the soil. AgriPower is a superior quality silicon-based mineral fertiliser with the potential to impact both significantly and positively on the way the world farms for the future.

AgriPower Solutions

- Higher productivity
- Higher crop yields
- Lower production costs
- Lower water usage
- Reduces soil salinity
- Organic
- Non toxic
- Clean rivers
- Totally safe
- Healthier reef
- Healthier humans
- Sequesters carbon



Fertiliser

AgriPowers' high PAS levels deliver organic amorphous Si in an easily accessible form to the crop root zones. Si in this form is proving to have many extraordinary and significant benefits such as increased Brix levels, resistance to pests and pathogens, higher crop yields, less transportation spoilage and superior crop quality to name a few. That AgriPower is organic (non chemical) speaks for itself.

The addition of AgriPower to soil gives farmers and livestock produces better quality and higher productivity of their crop or animal product (eg meat, wool, milk).

- Improved nutrient uptake
- Crop performance
- Soil aeration
- Salinity reduction
- Increased root zone mass
- Cost effective
- Cation exchange
- Improved fertility

Soil Remediation

“The report (Australian Federal Government’s State of the Environment Report) indicates that if nothing changes, up to 10% of soil suitable for agricultural production will be unusable in 20 years. This poses a significant threat to agricultural production, the economy and the environment”.
Kathy Ridge, Nature Conservation Council of New South Wales.

Poor soil quality whether inherent, from toxicity and acidification, exhaustion or salinity is a rapidly increasing world wide problem. Throughout Australia, huge tracts of soil are essentially ‘dead’,

depleting our environmental bank balance. (Source: CSIRO researcher Dr David Freudenberger from the Sustaining Our Future conference, April 2002).

With growing populations versus agriculture’s negative side effects, soils need to be repaired, preserved and nurtured for sustainable food production. The addition of AgriPower significantly improves soil health through aeration, better water retention and nutrient availability. It substantially increases nutrient uptake by plants, decreasing acidification and leaching, resulting in improved organic soil science.

Water Retention

The quality of AgriPowers' diatoms enables the product to deliver outstanding performance in the field of water retention in soils and plants compared to competitor products. The porous structure of these diatoms allows the retention of greater amounts of water and its slower release, especially

in soil. The significance of this, in a country as drought-affected and prone to extreme climate conditions as Australia, is obvious.

- Root zone capture
- Slow release
- Reduced erosion
- Reduced water consumption

Mechanical Pest Control

Chemicals used for the control of pests in the field and in grain silos are harmful to humans and animals. AgriPower’s Pest Control acts ‘mechanically’ by lacerating the protective waxy membrane surrounding the pest’s body, causing it to lose fluids resulting in death. Due to the products high absorbency, fluids are drawn out of the insect at an increased rate causing rapid desiccation. Because this pest control works mechanically rather

than chemically, pests cannot develop resistance. Research has shown long-term protection (months to years) with no chemical residues in crop storage and maintenance of grain quality. Treated produce is safe for consumption and acceptance by the NASAA Organic Standards and Certification Scheme. It is significantly less expensive than chemical pesticide and easy to apply.



Animal Health

Livestock require continual treatment for intestinal parasites. An unhealthy animal increases production costs, and lowers financial returns. The treatment for parasitic infections is a chemical drench. Sheep and cattle are drenched to remove parasites from their internal systems, on average, every 90 days. Sheep particularly are becoming drench resistant. Australian Wool Innovation Ltd (AWI), have stated that drench resistance in sheep is currently a \$220 million a year problem and will grow to over \$700 million within the next few years. Cattle are experiencing similar problems.

DE has been shown to eradicate harmful parasites from cattle and sheep via application to grazing pasture, dry feed and lick-blocks. The animals cannot develop resistance to this natural product. Additional benefits are manure and waste resistance

to fly larvae reducing fly infestation especially in feedlots. The manure will have more efficient decomposition in the soil which will strengthen pasture growth. The livestock also has increased growth and avoided interruption of reproductive cycles of livestock as they are not affected by chemical intake. This delivers higher yields and improved quality of animal products such as meat, dairy and wool. From a consumer point of view animals raised and treated organically have more market appeal.

Benefits to the beast, the farmer and the soil can be achieved by adding AgriPower to feed, to lick blocks and by drenching.

Friend of the Great Barrier Reef

There is a growing awareness that Australia is in imminent danger of losing one of Planet Earth's most precious natural environments: the Great Barrier Reef. In addition to the ongoing destruction of an ecosystem, losing the Great Barrier Reef would be losing one of Australia's biggest tourism dollar earners. So how is this disaster happening, the answer is easy:

1. Chemical fertilisers: as soils do not hold these fertilisers, they find their way into rivers, estuaries and ultimately the ocean through leaching and runoff, causing algal blooms, phytoplankton overpopulation, eutrophication and ultimately coral bleaching (dead reefs).
2. Pest control: pesticides found in run off that occurs in erosion of farm soils contain heavy metals such as lead, mercury, arsenic and other toxins which is harmful not only to humans but also marine life.
3. Animal waste (methane): cultivation of animals, especially intensive feedlot farming, heightens methane production which is over 20 times more destructive a greenhouse gas than carbon dioxide. It enters the atmosphere causing higher UV radiation absorbency and water temperature increases. Minor fluctuations in temperature have already caused widespread damage to the sensitive Great Barrier Reef ecosystem.

Eutrophication is the excessive growth of microscopic plants caused by abnormal levels in water of nitrogen and phosphorous. When these tiny plants accumulate, die and decay, they lower oxygen content in the water. Red tides or algal blooms are associated with eutrophication, with a single species of phytoplankton multiplying at the expense of all other species. The crown-of-thorns-starfish is another threat, devouring huge tracts of coral reef. The direct link between this dangerous animal and reef loss is caused simply by the abundant growth of the favourite food of the crown-of-thorns-starfish: phytoplankton.

A staggering 80% of the coastal belt adjacent to the Great Barrier Reef is farmland that supports predominantly intensive sugar cane cropping and major beef cattle grazing.

AgriPower's Fertilisers, Pest Control and Livestock Health Systems can offer the Great Barrier Reef hope by reducing chemical, nutrient, heavy metal and methane impacts on its fragile future.

- Pollution intervention
- Lower fertiliser runoff
- Healthier corals
- Reduced chemical leaching
- Cleaner rivers

AgriPower's Benefits



Performance, Improved Bottom Line, Easy + Organic

Performance – farming with AgriPower will result in:

- Healthier soils.
- Higher crop yields.
- Increased crop survival rates.
- Significant increase in crop appeal (eg Brix levels).
- Crop resistance to pathogens and pests.
- Better water retention by soils and plants.
- Healthier livestock.
- Improved quality of meat, dairy, wool.

Improved Bottom Line - farming with AgriPower will result in:

- Significantly lower outlay on chemicals.
- AgriPower cost per tonne is comparatively very inexpensive.
- Increased income from higher yields and better quality crops.
- Increased income from healthier livestock and produce.
- Increased income through lower spoilage losses.
- Carbon trading potential.

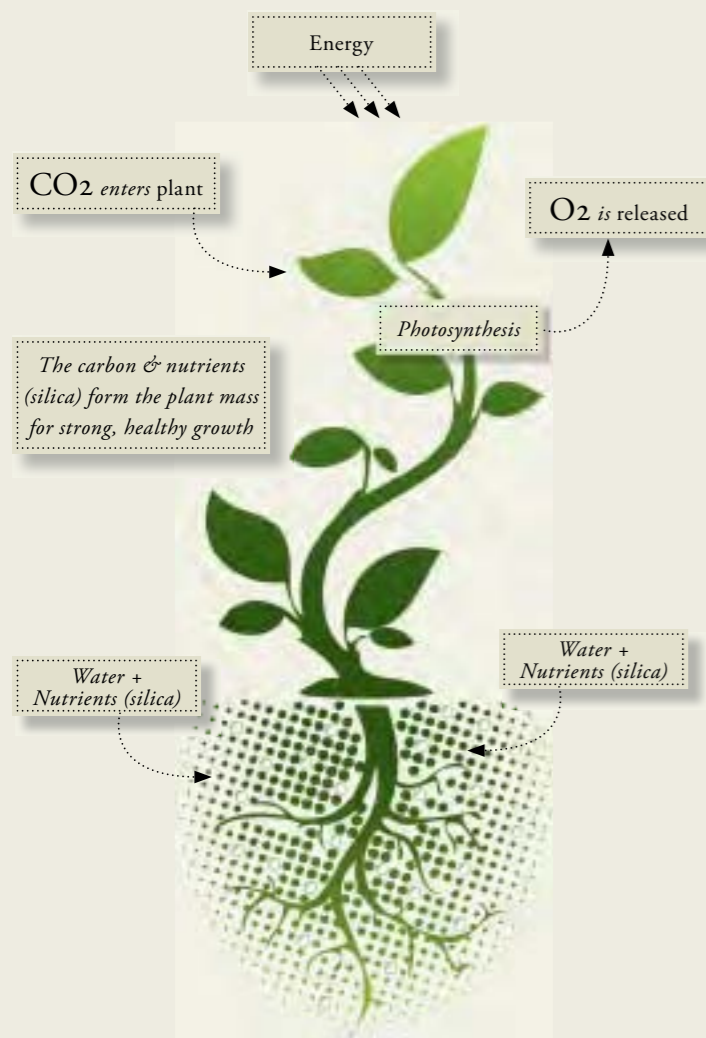
Easy – farming with AgriPower is:

- Simple to apply.
- No new machinery/methodology required.
- Delivery to crop/animal via granule, powder or liquid form.
- Able to be customised to individual farmer requirements.

Organic – farming with AgriPower:

- Is 100% natural, organic.
- Is 100% safe to animals and humans.
- Is non-toxic.
- Is non-pollutant.
- Is appealing to the 'organic consumer' market.

Silicon Sequestration



- *Robust capture in a silicon vault*
- *Plant phytoliths retain carbon for 35,000 + years*
- *Far more effective than forestry for generations*
- *Measurable and verifiable*
- *Reduced carbon footprint*
- *Profitable and sustainable farming*
- *Effective carbon management*



Phytolith images courtesy Terry Ball www.byu.net/tbb/

The Silicon Vault

Phytoliths and their role in carbon sequestration are an Australian development. The work has, through extensive testing, proven that significant potential exists in agriculture through improved and enhanced bio-mineralisation of silica in plants, to increase the rates of organic carbon sequestration. This naturally occurring process in plants can play a vital and significant role in countering CO₂ emissions and global warming.

- All herbaceous plants produce phytoliths.
- Phytoliths are silicified plant cell structures created by uptake of silicon from soils.

- Silicon saturates the phytolith's cell wall forming a glass-like coating of 'opalised silica' which captures carbon.
- Phytoliths are very stable and highly resistant to degradation with 35,000+ years proven carbon capture.
- The more silicon applied to soils the better plant growth, performance, growth, quality and yield. A plant with higher silica levels may sequester larger amounts of carbon.

Silicon Carbon Sequestration

By adding AgriPower's Si fertiliser, there is a dramatic increase in the production of phytoliths in certain plants and crops. Additionally, within crops such as sugar cane, some strains are more productive than others enabling enhancement in phytolith production through selective agronomy. This is a real opportunity for long-term carbon sequestration with seasonal cropping. It is not about soil carbon sequestration, this is carbon locked in a silicon vault.

Current phytolith carbon sequestration is estimated at 300 million tonnes pa with potential for significant increases globally with the adoption Si fertilisers such as AgriPower and crop selection. Crops with a high phytolith carbon count such as sugar cane will have a huge commodities market advantage, which is especially beneficial to Australia.

Phytolith carbon sequestration is easily and inexpensively measured and verified and AgriPower is working to have this sequestration accredited alongside forestry to enable carbon farming.

Plant species shown to produce phytolith carbon capture include:

- Pasture legumes (clovers, sub-clovers, medics etc).
- Pasture and weed grasses (kangaroo grass, serrated tussock etc).
- Crops (sugar cane which rates very highly, barley, millet, rice, sorghum, corn, wheat, canola etc).
- Rehabilitation and other vegetation (herbaceous plants, tall wheat grass, saltbush, bamboo etc).

The quantity of phytolith carbon in any given single plant is not significant, however over thousands of acres of cropland, year after year it will build a significant carbon credit bank. Currently in Australia alone, 20 million hectares are under grain crops. Forests are important carbon sinks however hardly any trees produce phytoliths and trees, when harvested or burned, release carbon. Land needs to be protected, rehabilitated (eg soil or acid sulphate affected) or improved and constructed (eg wetland areas) for crops, because with populations growing, the world needs to eat and sequester carbon.

Climate Change



Low Cost, Easy Implementation Innovation, Effective Solutions

Worldwide, governments and industries are looking for solutions and practices to reduce adverse impacts on the future of the planet. They need solutions that are innovative, easy to implement, low cost, and effective.

AgriPower, a 100% Australian product, can deliver these four key drivers to the agricultural (crops and livestock) industry, making a significant contribution to sustainable farming globally.

Farming with AgriPower

- Will increase carbon sequestration
- Will lower farmers 'carbon footprints'
- Will significantly reduce chemical usage
- Will be low cost to buy
- Will not require expensive machinery or new technology to apply or produce
- Will improve water quality in rivers, lakes, coastal and marine environments

- Will contribute to developing sustainable agricultural systems, thereby promoting balanced ecosystems
- Will enable export of Australian consumables with lower 'food miles', enhancing Australia's global reputation as a provider of environmentally aware agricultural products
- Will deliver significant agricultural, financial and environmental benefits to all stakeholders

Methane - some filthy facts:

- Globally ruminants (eg cattle, sheep, goats) produce about 80million metric tonnes of methane p/a.
- A ruminant can produce 250-500L of methane per animal per day (eg a beef cow grazing in northern Queensland produces approx 1500Kg p/a).
- Livestock in Australia are our third largest source of greenhouse emissions, nearly equal to all transport emissions.
- Methane is over 20 times more destructive a greenhouse gas than carbon dioxide.

AgriPower will lower livestock methane emissions via better grazing and animal health:

- Si dietary supplement to feed (better bones, hoofs, tissues, teeth etc).
- Reduce parasites by ingestion of AgriPower.
- Maintain Australia's position as world's largest meat exporter and third largest dairy product exporter.
- Recent scientific trials in Germany and Thailand using diatomite (refined DE) have shown positive effects on ruminal ammonia and blood urea nitrogen regulation and that the increase in rumen ammonia can be lowered if diatomite is added to the feed.

Nitrates & Phosphates - some filthy facts:

- China's use of nitrogen fertiliser increased a dramatic 271% between 1977-2005 with Chinese farmers using six (6) times more nitrogen fertiliser than USA farmers, generating nearly 23 times more excess nitrogen.
- "Dead Zones" created in rivers, lakes and oceans are created by heavy fertiliser pollution, particularly nitrates. Expanding annually, The Mississippi Basin 'dead zone' already covers 7,700 square miles.
- 10-20% of the world's coral reefs have been degraded beyond recovery due primarily to agricultural pollution effects, particularly eutrophication, causing coral to bleach and die.
- A staggering 80% of the coastal belt adjacent to the Great Barrier Reef is farmland supporting predominantly intensive sugar cane cropping and major beef cattle grazing.

AgriPower reduces leaching and runoff of nitrates and phosphates:

- AgriPower's fertiliser enables increased plant absorption of both organic and chemical nutrients.
- AgriPower's fertiliser enables higher cation exchange, reduces soil acidity and restores pH balance.
- AgriPower's fertiliser stimulates healthy soil biology, microbe diversity, health and survival.

AgriPower

Millions of Years in the Making

Higher productivity
Higher crop yields
Lower production costs
Lower water usage
Reduces soil salinity
Organic
Non toxic
Clean rivers
Totally safe
Healthier reef
Healthier humans
Sequesters carbon

