

Remineralize the Earth

Remineralize the Earth promotes the **regeneration of soils and forests worldwide with finely ground rock dust** as an economically and ecologically sustainable alternative to chemical fertilizers and pesticides, creating fertile soils much as the earth does.

Not only do we need to recycle and return the organic matter to the soil, **it is equally vital to return all of the mineral nutrients**, which create fertile soils and healthy crops and forests.

Remineralization is essential to **restore ecological balance and stabilize the climate**.



What do we mean by finely ground rock dust?

- There are millions of tons of by-product from the aggregate and stone industries, which come from hard silicate rocks of **igneous, metamorphic and sedimentary** origins, containing a full spectrum of minerals and trace elements.
- The industry refers to this by-product as **mineral fines**.
- Remineralization also includes sea solids, diluted sea water, limestone, rock phosphate, paramagnetic rocks, humates, and numerous other natural mineral amendments.



Soil remineralization and the Climate

Soil Remineralization (SR) creates fertile soils by returning the minerals to the soil much the same way the Earth does:

- **Glaciation** - during an Ice Age, glaciers crush rock onto the Earth's soil mantle, winds blow the dust in the form of loess all over the globe.
- **Volcanoes** erupt spewing forth minerals from deep within the Earth
- **Alluvial Deposits**



Volcanic eruptions such as Mount St. Helens fertilize soils

Remineralization of the world's soils and forests will dramatically increase carbon sequestration and is crucial to stabilizing the climate.

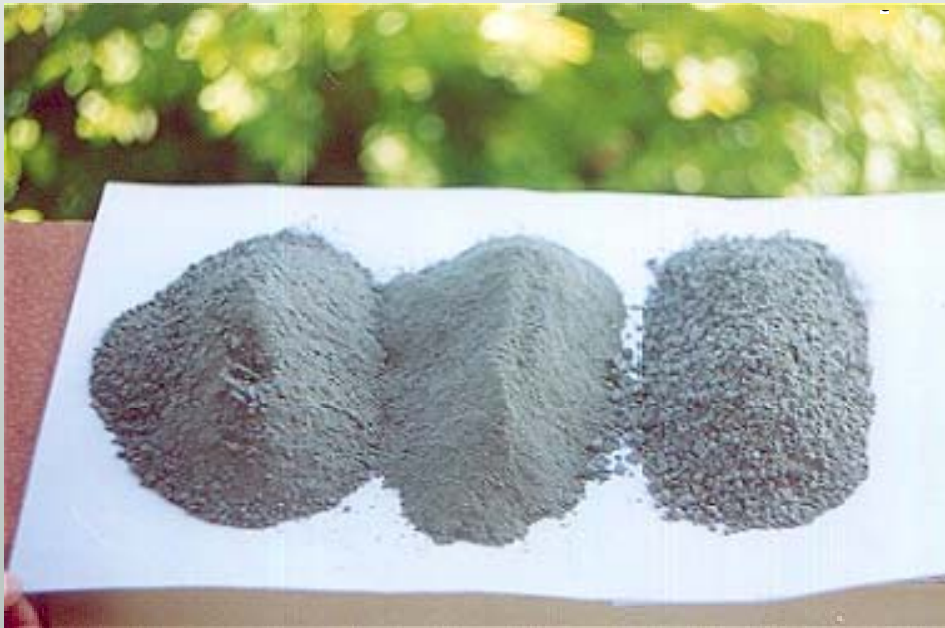
Why Remineralize?

- Provides slow, natural release of elements and trace minerals
- Increases yields as much as 2-4 times
- Increases nutrient intake of plants
- More nutritious crops
- Rebalances soil pH
- Increases microorganisms and earthworm activity
- Builds humus complex
- Prevents soil erosion
- Increases the storage capacity of the soil
- Enhances flavor in crops
- Decreases dependence on fertilizers, pesticides, herbicides
- Increases resistance to insects, disease, frost, and drought



A Rock Dust Primer

- Local source
- Commercial source



Basalt rock dust used for citrus and ornamentals by Carlos Cristan in Minas Gerais, Brazil.



Composting with Rock Dust

- Increases composting rate
- Increases heat generated during composting
- Reduces odors generated by composting
- Binds up ammonia into the soil
- Improves compost fertility



Approximate Application Rate Conversions

U.S.

3 tons per acre =	14 lb. per 100 sq. ft. =	1.25 lb. per sq. yd.
10 tons per acre =	46 lb. per 100 sq. ft. =	4 lb. per sq. yd.
20 tons per acre =	92 lb. per 100 sq. ft. =	8 lb. per sq. yd.

Intl. (Metric)

7.5 tons per ha =	750 kg per 1000 sq. m =	75 kg per 100 sq. m =	750 grams per 1 sq. m
25 tons per ha =	2.5 tons per 1000 sq. m =	250 kg per 100 sq. m =	2.5 kg per 1 sq. m
50 tons per ha =	5 tons per 1000 sq. m =	500 kg per 1000 sq. m =	5 kg per 1 sq. m

Particle Conversion Chart



PARTICLE SIZE CONVERSION	PARTICLE DIAMETER (MICRONS)	MESH
Fine Sand	250 - 100	50 - 125
Very Fine Sand	100 - 50	125 - 250
Silt	50 - 2	250 - 6000
Clay	2 or less	6000 or more

Application of Silicate Rock Dust for the Amelioration of Forest Soils

Von u. Sauter and K. Foerst

The Bavarian Research and
Experimental Institute for Forestry,
Munich, Germany, 1986



- Long term experiments released in 1986 in Europe showed that in a forest where pine seedlings were remineralized, **after 24 years the wood volume was four times higher** than in the untreated area.
- **One application lasted for 60 years**

The Effects of Basalt Rock Dust Emissions on Spruce Trees at the Albert Basalt Quarry in Huhnerberg

Fritz Leipold, Germany

The results showed that the spruces near the basalt quarry were **healthy due to the basalt emissions**.

- The high content of **magnesium** plays an important role in the life of plants and soil.
- The needles of the plants near the basalt quarry are much stronger and sharper because of the element silica, which gives the needles a solid structure and tight surface.
- **Silica** is absolutely essential for the building of cells and can substitute phosphoric acid in the soil.



Spruce branches with rock dust
taken for mineral analysis



Spruce branches without rock dust
taken for mineral analysis
(just outside the range of emissions)

Men of the Trees in Western Australia

Field and nursery trials directed by
Barrie Oldfield, President



Men of the Trees rock dust trials 1991. Comparison of the *E. gomphocela* seedlings grown with the rock dust soil amendment and inoculant with the control seedlings.

Results:

- **Five times the growth** for the same species of trees.
- **The potting out time has been shortened from five months to six weeks.**
- Men of the Trees plant 1/3 million trees per year, mostly in arid climates in Australia and Africa.
- Material used: granite dust from Pioneer Quarry



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of GUELPH

OAC

Dr. Peter van Straaten
Project Leader
Land Resource Science Department
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Ontario, Canada



Agrogeology

...is a new field of geology in which geologists are carrying out projects for agriculture worldwide utilizing rock dust for soil remineralization as well as other natural by-products.

- From humble beginnings in Tanzania in 1984 to the establishment of a course at the University of Guelph, to the official opening of an Agrogeology Centre in Indonesia, the field of agrogeology is gaining wider global interest and exposure.
- The first Rocks for Crops International Conference took place in Brasilia, Brazil on November 7-14, 2004.
- A Partnership Initiative in Kenya, Uganda, Tanzania, Zambia and Canada.
- Their project to develop multi-media learning materials on the topic of agrogeology is used in university courses and as a resource for NGOs and extension agents is well underway.



Dr. John Todd of Ocean Arks International is an internationally recognized biologist and a visionary leader in the field of ecological design who was named a "Hero of the Planet" by Time magazine.

Model Carbon Sequestration Program Utilizing Remineralization

Costa Rica Agro-forestry Project for Commercial Hardwoods, Fruit Trees and Jatropha for Biofuel

- **First off, I believe that remineralization is the basis of restoring soil fertility.**
- **Secondly, that Costa Rica's volcanic rock ground up has enormous potential.**
- **Thirdly that we have to increase organic matter in the soils and add clay-based humic materials to finish off the mix.**

Jatropha

Promising Sustainable Biofuel

- The Jatropha, a small tree well known for its oil production and its soil building properties.
- Yields around 1,590 kilograms/hectare/year (3,500 lbs/ha/yr) of oil highly suitable as a biodiesel fuel, to be used as a local source of energy.
- This particular species promises to be cutting-edge in its ability to both produce fuel and enhance soil fertility, distinguishing it from other many other commonly used sources of biofuel which are highly unsustainable.



Jatropha tree budding after 7 months on remineralized soils

"I would conclude It's too early to make any conclusions, but that there is anecdotal evidence of a remineralization boost with most species under trial."

-John Todd

Increased Growth of Jatropha



Re mineralized Jatropha tree
(above)



- Comparing the growth and health of trees and shrubs planted with and without rock powders
- Rock powders of volcanic origin quarried near the project
- Both mineralized and non-mineralized planting soils were mixed with compost and aged cow manure. Current planting mix used 750 lbs rock dust per acre.
- We are now preparing our next planting mix with +/- 6 lbs of rock dust per tree, which at 1,000 trees/acre (2 meter spacing) equals 3 tons/acre.

A Biodiesel Fuel that Builds Soils and Sequesters Carbon

- It will be innovative and promising to show that a biodiesel fuel can be produced that simultaneously builds soils and sequesters carbon.
- We look forward to demonstrating the potential to rebuild and regenerate soils and produce energy and food at the same time.
- This would be a breakthrough development that could lead to larger scale sustainable practices in the future.
- This will shift us into environmentally successful and responsible policies, good news for Lester Brown of the Worldwatch Institute as well as peak oil experts such as Richard Heinberg.



Compare larger root growth and plant density with rock dust on the left



Healthy seeds

From Sudden Oak Death to Sudden Oak Life



SUDDEN OAK LIFE is led by Dr. Lee Klinger, an independent scientist and oak specialist with over 20 years of experience in the fields of forest ecology, geochemistry, and earth system science at leading institutions in the US, UK, and China. Dr. Klinger has and over 50 peer-reviewed publications in the fields of ecology, botany, atmospheric chemistry, geology, geophysiology, and complexity; and has held scholarly appointments at the National Center for Atmospheric Research, the University of Colorado, the University of Oxford, the University of East London, Naropa University, and the Chinese Academy of Sciences.

- When trees and forests are unhealthy and dying they release carbon dioxide into the atmosphere.
- Healthy remineralized forests have the potential to sequester as much as four times the carbon than unremineralized forests.

Saving California Oaks with Rock Dust



Before (March 2, 2004)



After (March 22, 2007)

Suddenoaklife.org

Saving California Oaks with rock dust

Sudden Oak Life

Case No. 20060104.16 - Hearst Castle, San Simeon, CA
Coast Live Oak - sick, infected; treated 2x with Azomite & limewash



Jan. 4, 2006



Jan. 2, 2008

Suddenoaklife.org

Saving California Oaks with rock dust

Sudden Oak Life

Case No. 20060104.12 - Hearst Castle, San Simeon, CA
Coast Live Oak - sick, infected; treated 2x with Azomite & limewash



Jan. 4, 2006



Jan. 2, 2008

Suddenoaklife.org

The Real Food Campaign

The **Real Food Campaign** will make nutrient dense foods available in the marketplace and create a new standard for food quality.

The **Real Food Campaign** is educating and networking with consumers and retailers, farmers, scientists and policy makers about the need for nutrient dense foods.

The Real Food Campaign coordinates and supports all programs that produce healthier and more nutrient dense crops for our food supply.

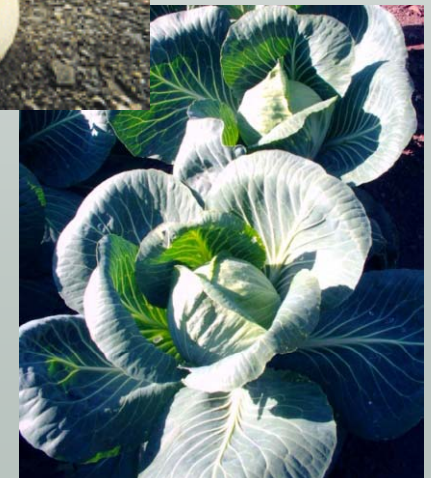


Remineralize the Earth Executive Director
Dan Kittredge at a Whole Foods Market near
Boston

Nutrient Dense foods are healthier, more vibrant, tastier and last longer.

The Real Food Campaign is:

- **Organizing consumers and consumer groups** to lobby retailers to provide nutrient dense crops on their shelves.
- **Recruiting farmers** producing nutrient dense crops who can provide them to retailers who will want them.
- **Coordinating specialists** in the field to develop standards for nutrient density.
- **Creating educational materials** that explain the importance of nutrient dense crops to share with active consumer groups.
- **Allying with agronomists and consultants** to farmers to educate their clients about new markets and premiums.
- **Creating a coherent strategy** for the campaign by actively listening to and integrating the wisdom and experience of all constituencies.



For Agriculture

John D. Hamaker,
co-author with Don Weaver,
The Survival of Civilization
Michigan, 1976-1977

Glacial moraine gravel dust
spread on 10 acres.



- In an area of sparse rainfall and dry summers, and with no irrigation, the corn produced **65 bushels per acre, compared to yields of under 25 bushels per acre** from other local farms.
- Independent analyses revealed the following increases in nutrients, compared with the same type of corn grown with chemical fertilizers nearby:
 - » **28% more protein**
 - » **47% more calcium**
 - » **57% more phosphorus**
 - » **60% more magnesium**
 - » **90% more potassium**

Bananas: Cost-Benefit Analysis for Min Plus (Volcanic Basalt Rock Dust)

T.D. Edwards

The Harding Brothers farm in Queensland, Australia

The Results:

- Fertilizer applications reduced by 80 percent
- Dolomite application reduced by 50% with no sign of magnesium deficiency
- 25% higher yields
- 20% increase in growth rate
- 80% increase in production



**Fertilizer savings per year
\$3,647/Ha**

**Increased crop value per year
\$53,125/Ha**

**Total cost benefit per year
\$56,722/Ha**



In the long term healthy remineralized plants will not be plagued by insect infestations as they become healthier and more insect resistant.

Detering Insects

In the short term very fine dust sprayed directly on plants and trees has been shown in research in Germany to deter insect infestations very effectively.



The Importance and Effects of Rock Dust in Orchards and Gardens

Fritz Leipold, Germany

Photographs shows **tomato plants after harvest**.
The ones with basalt rock dust are much larger and
more substantial than those only fed with fertilizer.



Close-up of tomato roots,
Remineralized plant on the left



Tomato plants after harvest
(The plants and root systems of
those fed with Simolith rock dust
are impressively larger and more
substantial.)

Many Hands Organic Farm CSA, Barre, Massachusetts



Abundant Harvest



Leaf and Plant



Infestations Way Down



Flavor



Vibrant color



Turgidity and Waxiness

Volcanic Rock Dust Therapy for Soil

400% increase in rice yields in Malaysia with rock dust plus soil micro-organisms

"Volcanic Rock Dust Therapy for Soil", an article in the business section of The Star Online, reports that volcanic rock dust combined with a bacterial-based soil conditioner may soon become indispensable in the Malaysian agricultural sector.

Robert W. Taylor, chairman of MRD Inc. is doing trials with the Agricultural Department and they have tried it out with rice fields, pineapple farms, and banana orchards with good results.

"There has been no downside to using the volcanic rock dust, and it is **50% cheaper than phosphate**, which is dependent on oil prices...the results speak for themselves. **The yield (for rice) that was produced in Kedah was four times more in the first season than previously.**"



Pad'i field treated with volcanic rock dust (pH level 7). The plants are much greener, fresher, and have many branches.

Remineralization in China



Biotech Bodisen, a large organic agricultural fertilizer company in China, was recently named the 16th fastest growing company in China by Forbes Magazine.

Located in the country with the largest fertilizer market in the world (US \$17 billion per year), Biotech Bodisen markets bio-based, fully degradable fertilizer products. They have recently acquired a large quantity of fossilized mineral deposits, which has been integrated into their product line.

They currently hold one of the world's largest agricultural product distribution networks, reaching over 60% of China's agricultural markets, up to 900 million farmers.

RockAll in Brazil



RockAll is the first and only company in Brazil to produce natural fertilizers made of minerals found in rocks.

Established by two geologists, the company is based in the the mid-western Brazilian state of Mato Grosso and the fertilizer is now ready for the international market.

SEER Centre in Scotland



Go to their website to find out more at SEERCentre.org.uk

An Economics of Abundance

- Rocks are the most abundant resource on earth. We can move from an economics based on scarcity using fossil fuels to an economics of abundance through remineralization.
- According to Peak Oil expert Richard Heinberg, 37% of the U.S. energy budget is for agriculture. Remineralization and local food systems are a key strategy to transition us to a low energy based economy.
- Low energy input + nutrient dense

Remineralize the Earth WIREC Pledge

RTE's **Agroforestry Project in Costa Rica** with award-winning ecological designer John Todd of Ocean Arks International, intercropped with commercial hardwoods, fruit trees and Jatropha, a sustainable biofuel producing plant, is a model project to sustain local communities and sequester carbon.

RTE's **Become Carbon Neutral Program**, in partnership with Ocean Arks International is the only program that offsets carbon emissions through soil remineralization, greatly enhancing growth and carbon sequestration over other reforestation programs.

RTE's **Real Food Campaign** organizes, networks and promotes healthier nutrient dense foods for our food supply through remineralization.

Remineralize the Earth networks and promotes remineralization projects and initiatives worldwide and looks forward to forming partnerships with foundations and educational institutions, sustainably committed policymakers and governments, international development agencies, the international business community and NGOs.