



*Proceedings of the Sixth International Permaculture Conference  
September-October 1996, Perth, Western Australia*

*© Copyright Permaculture Association of Western Australia Inc. and authors.*

## **Rock Dust Puts Out More Than You Think**

*Barrie Oldfield (Australia)*

*[Submitted Paper]*

Twelve thousand years ago the great glaciers of the last Ice Age finally melted away revealing a deeply scoured, rock-strewn landscape pregnant with new life. Ice sheets three kilometres thick are heavy. They creak and groan their way down the valleys. They grind the igneous crust of the earth mercilessly. And in 90 thousand years, the length of an Ice Age, they leave behind a bed of pulverised rock dust up to three metres thick.

This rock dust is the mineral base of the soil; rich in elements needed for plant growth, complementing the hydrogen, carbon, oxygen and nitrogen in the atmosphere.

In Europe, North America, and Russia, agricultural soils have been renewed ten times in the past million years. But not so the soils of Australia, for our country was too close to the equator to be covered by ice.

Australia's soils are, as a consequence, extremely poor. Phosphorus, copper, zinc, molybdenum, cobalt, and sulphur, are all in short supply. Our native vegetation is highly adapted to scavenge for every last atom of these elements in the litter of past life. Conventional farming knows nothing of this, pours on synthetic plant food to grow a crop, treats the soil as a hydroponic base, the cruelest blow to the last surviving life forms in the darkness of our land.

Six years ago Men of The Trees in Western Australia began work on rock dust, a by-product of the quarrying industry, to see if they could restore our 'non-glacial' soils. The results were astounding. Tree seedlings grew at five times the normal rate in the nursery. When planted out they continued to leap ahead, helping restore degraded farmland in our semi-arid wheatbelt.

But was it the plant food in the rock dust that did the trick or were other factors at work? Certainly adverse effects were apparent when rock dust was tested on wheat crops at the Society's trial farm, Amery Acres, near Dowerin.

Rock dust improves soil hydrology, it tends to buffer acid soils, it can provide potassium to plants on demand. But, most striking of all, it may defend trees from the

effects of harmful electromagnetic radiation such as the excesses due to our thinning ozone layer.

This paper explores our observations to date.

## **Rock dust – a lesson from the ice ages**

In the past million years or so the Earth has gone through possibly ten Ice Ages. For reasons we don't quite understand the planet cools down by a few degrees. As a result, the ice sheets, which normally cover only the poles, spread out and extend as far as the mid latitudes. In fact they reach almost half way to the equator. This period of glaciation lasts for about 90,000 years. Then, just as inexplicably, the Earth warms up a little and the ice recedes back to where it is today down in Antarctica, or up around the North Pole.

Ice sheets are very thick. They can be anything up to 3000 metres deep. Not only that, they move slowly, slipping their way down hill, grinding out valleys and rubbing down mountain sides. They are tremendously heavy. You know how heavy a bucket of water is. Imagine lifting that bucket if it were solid ice and twenty times as high as the Central Park tower!

This slipping, grinding ice scours away at the bed rock of the Earth itself. As it moves it loosens bigger rocks and boulders and these too help grind away at the granite underneath. And after 90,000 years of this there can be a whole new layer of ground-up rock up to three metres deep!

So when the ice melts there's this deep new bed of freshly ground rock containing all the minerals needed for the foundation of a good soil. This is why the soils of Russia, Europe and North America are so good today. They are rich and deep and farmers can go on ploughing them year after year.

Australia missed out. Our soils are millions of years old. The minerals in them have almost leached away so that what is left will only grow crops if we pile on superphosphate, potassium and all sorts of trace elements such as copper, zinc, manganese, boron and molybdenum. Of course if the soils are lacking in the essential minerals the plants will be lacking too. In fact some plants won't grow at all unless we constantly feed them with all kinds of supplements.

## **The role of micro-organisms**

Now even though plants may take up some elements directly through their roots, there are other minerals essential to life which feed the micro-organisms in the soil. Every gram of soil contains perhaps a billion living organisms! Astounding isn't it? And only when all these single-celled creatures are healthy and thriving do all the processes of life come into full play. The micro-organisms provide food for other creatures, they help fungus to spread through the soil, the fungus attaches itself to plant roots and helps the plant to take up nutrients whilst the fungus takes a wage in sugar from the plant. And there are probably many other little games going on about which we know very little. All we can be sure of is that when everything is in balance the whole system is healthy and the plants really flourish.

Now that is what Men of The Trees is all about. We want our trees to flourish. We want them to grow fast and reliably under the most exacting conditions of our semi-arid country. So we are adding rock dust to the potting mix.

The first time we did this we made an astounding discovery. Every species we tried grew twice as tall as the control – and twice as healthy too! So that is one reason why Lucy Rogers has rock dust included in all the potting mix we use today at St Barbe Grove Nursery. It's also the reason why Men of The Trees has leased 23 hectares of land just east of Dowerin so that field trials can be undertaken to find out what we can about rock dust, how it works, and how it might benefit not just trees but all our crops and pastures as well.

But it will take many years before we can really be certain how rock dust works. One thing is sure. Being in at the beginning of a research project like this, discovering how to reverse the trend to desertification, how to grow healthy crops to feed healthy people, how to restore prosperity to our country is very exciting. And there's plenty of room for you to share in this venture too!

We hope that what we learn may also benefit farmers throughout the third world who also missed out on those Ice Ages and finished up with impoverished soil like ours.

## **Background**

The Men of The Trees is an International Society of volunteers dedicated to tree planting for the protection of landscapes from desertification. The Society began in Kenya in 1922. Its first task was to save the tribal lands of the Kikuyu people from the advancing desert. The work was largely successful, not only in planting trees and stabilising the soil, but in bringing about a new ethos, that this task was the responsibility of all people. Social forestry was born.

The idea spread world-wide. Today the Society is active in 48 countries around the world. In Australia there are branches in all mainland States. In Western Australia members number 1500. In 1996 they collectively planted 589,030 trees. mostly in the wheatbelt.

## **The quest for excellence**

Being volunteers, the only reward members seek is the knowledge that they have done the best possible job. This has led to a considerable sharing of observations and experience over the years and the undertaking of a number of specific trials related to improvement of tree survival under semi-arid conditions. Today the Society holds an enviable record in this regard.

Trials aimed at improving seedling quality included, among other things, the incorporation of granite quarry dust as a fraction in the propagation mix. The results were outstanding. (*Slides were shown demonstrating the growth rates and vigour of nursery seedlings grown in the 1991 trials.*) Granite dust from the Pioneer quarry at Herne Hill was added at a rate of 15 to 20 tonnes/hectare. As the seedlings are grown in 50mm square pots this means each plant gets about 3.75 to 5 grams. Not very much indeed – yet sufficient to set that tree on its way, growing anything up

to five times faster than without dust. Moreover, experience has shown that once the seedlings are propagated in this way they need no more rock dust even when planted out. They just keep on growing!

The success of the nursery trials in 1991 brought pressure on the Society to continue these trials in the field. In particular it was felt that the technique of using rock dust, sometimes referred to as 'remineralisation', should be assessed under semi-arid farming conditions for its possible value in improving the inherited non-glacial soils of Australia.

### **The establishment of Amery Acres**

Largely drawing upon its own resources, the Society in short time leased an area of land from the Dowerin Shire Council and set about providing machinery, accommodation, infrastructure and a resident Manager to establish a 23 hectare trial farm.

We were delighted to receive offers of active support from the outset in the practical conduct of the field trials and in the tabulation and assessment of results:

1. Bob Gilkes, Professor of Soil Science, University of Western Australia, provided considerable support and encouragement. In 1993 he supported the setting up of eight initial trial plots under the supervision of Visiting Fellow Dr Philippe Hinsinger from INRA, Montpellier, France.
2. Dr Mike Bolland, Plant Nutrition Officer, WA Dept of Agriculture and Mike Baker, Technical Officer worked with us in the field giving excellent instruction in the setting up and conduct of field trial plots. At harvest they assessed and tabulated results and provided commentary.
3. In 1994 support continued in the work of Masters Student, Catherine Corneos, working under supervision on pot trials at UWA. Her report showed not only a potential for uptake of potassium from rock dust but also a greater availability of this element to the plant than in the soluble form.

A side effect upon which she made comment was the increased water infiltration rate noted in non-wetting soils in the presence of quite small amounts of rock dust.

4. In 1994 a complex field trial was undertaken involving the setting up of 96 trial plots in an attempt to observe a range of hitherto anomalies and anecdotal observations in one scientific trial precinct. The result of these trial plots was to reinforce an observation made by a neighbouring farmer, Malcolm Borgward.

### **The local farmer who showed the way**

Malcolm Borgward farms 3040ha at Minivale, East of Dowerin. He has been applying modest dressings of rock dust (not granite) since 1991.

He describes the land as 'medium mallee country', sandy loam over clay, maintaining a steady pH6 because he always puts the trash back and reckons this is the key to preventing acidity.

In 1992 the paddock had produced a Lupin crop. The land was top dressed with 250kg/ha rock dust and the Lupins were sown with 40kg/ha 'double super' in the box.

In 1993 he observed that weeds were becoming a 'rare and endangered species' so he decided not to cultivate nor apply herbicide. He spread another 250kg/ha rock dust. Having ascertained that the residual phosphorus in the soil was 25ppm he decided to use no artificial fertilisers at all, and with an offset disc air seeder put in the wheat crop. The wheat (Cadoux) was sown direct into the previous year's lupin stubble.

As the crop emerged, he again observed that weeds were no real problem, and decided against using a post emergent herbicide. As the season moved into September he noticed some germination of the Lupin, but again, before the critical flowering stage was reached the wheat took hold and out-grew the competition.

At harvest his crop went 2.2 tonnes/ha with protein in the range 9.5 – 10.8%. He had broken out of the exclusively chemical approach to cereal farming and demonstrated the possibility of meeting the Australian Wheat Board's target of 'Two by Ten by 2000' whilst reducing his costs and, in all probability, improving his soil.

### **Linking with other researchers at home and overseas**

Malcolm Borgward's experience goes down in our books as 'anecdotal'. Much more work needs to be done in the field to verify his observations and to replicate his results.

The Society is therefore engaged not only in promoting field trials at Amery Acres and in providing every assistance to researchers but it is also forging links with those engaged in similar research overseas.

1. In 1994, Sallie (Oldfield) and I visited Austria to make personal links with those who have already done a great deal of research in this field.
2. A videotape was produced featuring Professor David Bellamy (explaining the principles of remineralisation) and Georg Abermann who markets rock dust successfully to dairy farmers in Austria. (That tape, *Bellamy's Big Bang Theory*, is available for \$50.)
3. The Society produces a report describing work done majoring on results of scientific trials. The emphasis in these reports is upon good science although interesting observations and anecdotal remarks are included to give insights into possible future directions for research.

A mailing list is maintained numbering some 550 recipients as at October 1996. Two thirds of these are in Western Australia. All are named individuals who are on the list as a result of expressing interest in the work. I am happy to include your name and address as a free service provided you give me a request in writing.

The cost of printing and mailing the Rock Dust Reports is met by Pioneer Quarries.

## **The field trials at Amery Acres for 1996**

It is our policy to follow local farming practice in all we do at Amery Acres. The crop sown last year was Lupin as we were then in the legume phase of the rotation.

Feedback from Austria and earlier observations made in the nursery trials phase lead us to believe that soil bacteria, and particularly N-fixing bacteria, may be enhanced by the rock dust. The results were most interesting. Lupins grown on granite enriched soil outperformed those grown on the plot with the superphosphate/urea treatment. A heavier yield had been obtained at a 'fertiliser' cost of one twentieth that of conventional farming practice.

Yet when the trials had been conducted for wheat a year earlier the performance was quite the opposite. In one plot we even managed to grow headless stalks! And so simple explanations based on nutrient supply do not necessarily hold up. Other factors are at work.

### **Rockdust trials – the scientific imperative**

The following is a brief summary of our experience in the application of rockdust as a soil amendment. We believe that whilst numerous theories exist on how rock dust works, and even more anecdotal stories abound, none of this work will come to anything unless there is good science to back it up.

Whilst our nursery and field trials have been conducted under scientific supervision even these results must be treated with caution. Field trials on one location, over a four year period of contrasting seasons, can have only modest empirical value. Nevertheless they do give an indication for further trials on wide ranging sites. If resources and funding can be found we will extend the trials and fit together the mounting evidence.

Two things beyond all: we need the trust, gifts and goodwill of those who share the vision of healthy landscapes, and we need the patience to do all things well. May both prevail!

### **A summary of our reporting to date**

- Granite dust promotes the fast and healthy growth of tree seedlings in the nursery.
- Granite dust particularly benefits nitrogen-fixing trees.
- Granite dust can provide some potassium to plants on demand.
- Although granite dust has a high pH it does not seem to raise significantly the pH of acid soils.
- Granite dust has been shown to reduce the yield of wheat under field conditions.
- Diorite dust may reduce weed competition to the benefit of a wheat crop.
- Quarry dust improves water infiltration rates to the benefit of non-wetting soils.

- Quarry dust improves water retention in free draining soils.
- Quarry dust benefits dairy pastures by promoting legume growth at the expense of less productive species when applied as an additive to slurry from cattle sheds.
- Granite dust has given a marginally higher yield from a lupin crop than either chemical fertiliser or a commercial rockdust blend.
- Composting earthworms prefer a feed ration to which rockdust has been added.
- Quarry dust may affect the way plants respond to electromagnetic radiation, in particular excess solar radiation.
- Granite dust does not seem to benefit well-nurtured gardens.
- Nevertheless a granite and marble dust mixture appeared to benefit garden crops grown on an alluvial loam.
- Granite dust contains 27ppm lanthanum, a rare earth considered by the Chinese to be a plant growth promoter.
- Quarry dust may deter wingless grasshoppers.
- Tree seedlings raised in a soil mix containing 5% granite dust appear to resist insect predation.
- Tree seedlings raised in a granite dust enriched potting mix appear to continue fast healthy growth after planting out under adverse climatic and soil conditions typical of the West Australian wheatbelt.
- There could be a link between the use of rock dust and the noted absence of fungal attack in the early stages of seedling growth.

(Putting observations 10 and 19 together may indicate a direction for research into controlling Anthracnose, a fungal disease threatening a \$200million industry in WA alone!)

## **Valued input**

Throughout the past seven years since the first very tentative rockdust trials were begun we have been well served by our Western Australian scientists:

- From Curtin University: Assoc Prof J. E. D. Fox and Assoc Prof Jonathon Majer.
- From the University of Western Australia: Prof Bob Gilkes, Assoc Prof Lynette Abbott, Dr David Jasper and Visiting Fellow Dr Philippe Hinsinger.
- From Edith Cowan University: Dr Frank Flanagan and Dr Adrienne Kinnear.
- From Agriculture WA: Dr Mike Bolland and Mike Baker.

To these and all their students who did so much of the field work and number crunching we offer our warmest thanks. As for the hundreds of days of voluntary

work by members of Men of The Trees, well we just do that for the earth in the style of our founder, Richard St Barbe Baker, who set so rich an example.

### **The radiation stress theory**

Let me conclude with an observation which may be just as valid as any based upon more conventional science. It has been suggested by a group of Austrian researchers, among them the late Dr Gernot Grafe, Dr Maria Felsenreich and Dr Alexander Fries Tersch, that our planet and the life forms upon it are now suffering radiation stress. Their experience stems from the desperate need to restore Europe's dying forests and their observation that the worst affected forests were close to the alignment of the old Iron Curtain along which both sides were in the habit of aiming high intensity radar at territory on the other side.

In order to find a remedy they began by using humus materials in a logical move to restore good organic material to the soil. They chose grape remains from the vineyards. Grafe had already spent many years perfecting the composting of this material, one of the best ingredients for any compost heap! But as their work developed they found a need to include fresh minerals, and this they derived from quarry rock dust.

From the rock dust they developed a range of cylinders, castings and egg-like stones whose properties were able to benefit life forms, and particularly the water bodies over a wide range. Placed in the ground they acted rather like acupuncture treatments for the forest and the farmlands.

Have I an explanation for all this? There is one good example. Think of your watch. Possibly it is called a 'quartz watch'. If so it has a crystal of quartz (Silica) as its regulating mechanism, and it keeps very good time too! Granite comprises up to 70% of quartz. When stimulated by a small voltage the quartz crystal oscillates at a very precise rate.

All plants require solar electromagnetic stimulation for their life energy. Perhaps, just perhaps, there is something in the rock dust, a crystalline resonator for instance, that amplifies the beneficial radiation energies whilst blocking out the spurious radiations which we have inadvertently introduced through weakening the protective ozone layer and introducing all our communication technologies, our power grids, X-rays and atomic accidents, etc.

From around Australia, and many parts of the world, evidence is mounting that electromagnetic stress needs all the study and remedial treatment we can muster. The Felsenreich observations open a window of opportunity and action. In her wake a small but expanding group has taken up this work in Western Australia.

Like DDT, electromagnetic radiations of our making do not disappear harmlessly. But unlike DDT it is inconceivable that civilisation, as we know it, could not exist without its radiation generating tools of communication and welfare. Protection and remedies are therefore imperative.



## References

1. Philips A., Mayhew N., and Williams T., *Living with Electricity*, Powerwatch UK, 2 Tower Rd. Sutton, Ely, Cambs CB6 2QA. £9 +p&p.
2. Kervran Prof C. Louis, (English translation, Abehsera M.), *Biological Transmutations*, Happiness Press, Magalia, California.
3. A number of information sheets are available on our rock dust trials taking place on our farm 'Amery Acres' at Dowerin. Drop a line to Barrie Oldfield, 3 Over Avenue, Lesmurdie WA 6076.
4. *Remineralise The Earth*, a periodical published two or three times a year by Joanna Campe, 152 South Street, Northampton, MA 01060, USA. Subscription \$US25.
5. *The Felsenreich Manual*, published by the Natural Resonance Study Group, \$25. Chair: Anne Miller, 23 Morley Street, Maddington, WA 6107.