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Soil phosphorus fertility for broad-acre organic cropping systems

This paper is written by Dr. Jeffrey Evans Senior Research Scientist, NSW Department of Primary Industries, Agricultural Institute, Wagga Wagga.

Phosphorus (P) is an essential component of plant and animal tissue, hence harvesting of plant and animal products for agricultural production depletes the soil of its P reserve. Australian soils are inherently deficient in P, and it has therefore been necessary to replenish or improve soil P reserves to optimise and sustain agricultural productivity.

Establishing whether a soil is deficient in P for optimal crop and pasture production has been determined by calibration of various soil P tests with known plant responses to P fertilisers. In this manner 'critical soil P levels' have been developed for different P tests, plant species and soil types, and though these are approximations, they nonetheless provide reasonable benchmarks as to whether soils require improvement in P fertility. This article refers to the Olsen P test and a benchmark 'critical' Olsen P level of 15 ppm P (ie., mgP / kg soil) for cereals and pastures in central and southwest NSW.

In a small survey of organic or biodynamic properties in southwest NSW the author has found Olsen P levels frequently less than 6 ppm P. This is perhaps a warning for organic and biodynamic farmers to regularly monitor levels and trends in plant available soil P. As P is an essential plant nutrient, worsening soil P levels below the benchmarks will eventually lead to the collapse of productive, cropping systems.

Managing to correct P deficiency on a broad-acre organic farm is the next question. Soil addition with reactive phosphate rock (RPR) is probably the only practical strategy for the broad-acre organic farmer. However, in a national project on the role of RPR in Australian agriculture it was generally concluded to be ineffective, except in areas of acidic soils in environments with at least 700-800 mm of rainfall; ie., atypical of the southern Australian cropping zone. Should farmers in the southern cropping zone therefore expect to abandon organic cereal production systems? Perhaps not.

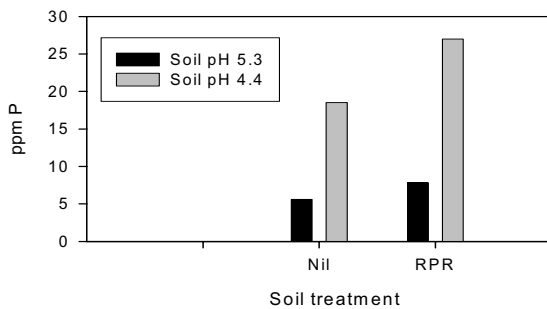
Rock phosphate is only slowly soluble in soil but solvation is essential to release the phosphate that is necessary to increase soil P fertility. The more reactive the rock phosphate (% P soluble in citric acid) the greater its potential for solvation, and solvation should be enhanced when a greater surface area of the RPR is exposed to soil: so granulating RPR and not incorporating RPR with soil work against this. Solvation is ultimately highly dependent on reaction of the RPR with H⁺ ions (acidity), hence soil acidity is important for effective use of RPR.

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To illustrate this, consider Fig. 1, for which the pH values are those measured in CaCl_2 solution. In the strongly acidic soil (pH 4.4, CaCl_2) maintained at a high moisture level (the moisture level immediately following drainage of free-water by gravity, ie., so called field capacity moisture content (FC)), incorporation of RPR with soil resulted in a substantial increase in plant available P (Olsen P). For the soil of less acidity (pH 5.3, CaCl_2), the increase was less.

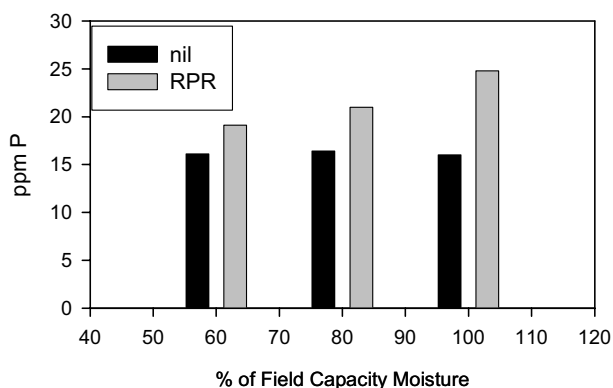
Under field conditions, however, soil is only briefly sustained at high moisture content. When soil moisture is less than FC, the effectiveness of RPR is reduced, as can be seen in Fig. 2. {Note: the RPR used in the study was ARAD, 30% citric acid soluble P}. Therefore, under field conditions in the southern cropping zone (< 600 mm rainfall), the use of RPR alone may have only a minimal effect on Olsen P, as can be seen in Fig. 3 when the nil soil treatment is compared with soil treatment with RPR. The data in Fig. 2 suggest that farming practices that maintain soil moisture should help solvation of RPR: however, research is required on this issue.

Fig. 1. Influence of ground reactive phosphate rock (RPR) and soil pH on increase in plant available soil phosphate (Olsen P) at sustained high soil moisture.



Solvation of RPR, though, may be increased by its co-treatment with elemental sulphur (S), ie., the yellow powder form of S. Some soil micro-organisms use this element, and in so doing this natural process generates acidity, which can be used to enhance phosphate release from RPR. Fig. 3 shows the 'added' effect on Olsen P of co-treatment of RPR with S, at the strongly acidic and less acidic sites referred to in Fig. 1. These results were achieved with both the RPR and S in ground form to increase reaction, with a one-off application in 2001, and following incorporation with soil. Agronomically significant increases in Olsen P have been sustained for at least 3 years following soil treatment.

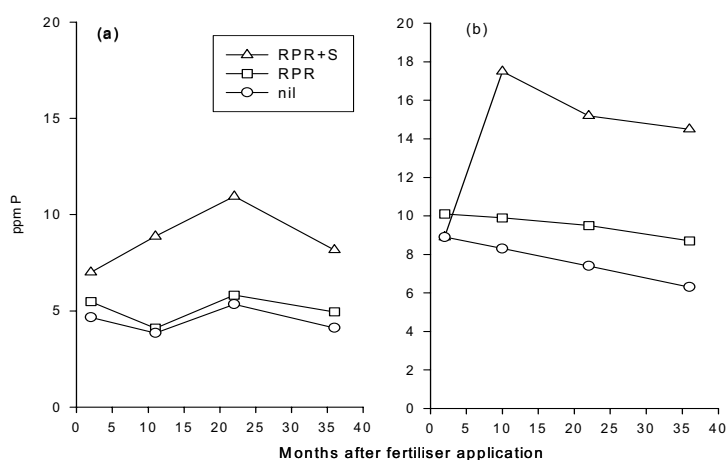
Fig. 2. Influence of soil moisture level (% of field capacity: see text) on the effect of ground reactive rock phosphate (RPR) on plant available soil phosphate (Olsen P).



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The rates used in these field experiments were high for experimental reasons, especially the sulphur rate. These are not general recommendations, for example, recent experiments have shown that the sulphur rate may be optimal at a ratio of RPR : S of 2 : 1). Although high rates may be needed to rapidly recover soils already strongly depleted in available P, ie., Olsen P well below critical levels, management for incremental recovery of plant available soil P may be a more economically optimal solution, but more research is required on this aspect. Furthermore, where only maintenance of plant available soil phosphate is required, substantially lower rates will presumably apply.

Fig. 3. Influence of a one-off soil application of ground reactive rock phosphate (RPR: 500 kg/ha) without and with elemental sulphur (S: 500 kg/ha), on plant available soil phosphate (Olsen P) at (a) a mildly acidic site (pH = 5.3, CaCl₂) and (b) a strongly acidic site (pH = 4.4, CaCl₂), under field conditions.



Conclusion

Although more research is required, co-treatment of reactive phosphate rock with elemental sulphur, both in ground form, pre-mixed and incorporated with soil, may offer a strategy for effective use of phosphate rock under the relatively dry conditions of the southern cropping zone. Farming practices that help preserve soil moisture should be useful, and avoiding liming soil during recovery of soil P fertility would also be judicious. Agricultural production usually leads to soil acidification so that farmers could select the more acidic paddocks for treatment with rock phosphate – sulphur mixes. During this ‘acidic’ phase of a rotation, when phosphate would be released from the rock phosphate into soil solution and into organic P (via plant uptake), acid tolerant crop and pasture species could be used to maintain productivity. The soil may be subsequently limed to promote mineralisation of the organic P. In addition, to avoid the need for large fertiliser rates, organic farmers should be watchful of their soil P fertility and consider using rock phosphate – sulphur mixes as a strategy for maintenance of soil P fertility. Studies are continuing.

WARNING: In the dry state, ground sulphur is potentially explosive. However, this hazard can be eliminated provided that the amount of sulphur relative to phosphate rock is controlled. The proposed RPR- S product should therefore be developed at the industry level. Furthermore, recent developments in applying fertiliser in a moist or ‘sludge’ form, will allow safe application of RPR-S even at high S rates.

Acknowledgements

The author is grateful for financial assistance from the Rural Industries Research and Development Corporation (RIRDC), and to Mr Allen Druce (Green Grove, Ardlethan) and Mr Chris Murphy (Bethungra Park, Illabo) for provision of land for field studies.

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Soil biology and sustainable olive orchards

This paper is written by Justine Cox Soil Health Scientist, NSW DPI Centre for Tropical Horticulture, Alstonville

Introducing the soil organisms

Soil contains an incredibly diverse and abundant suite of organisms, from microscopic bacteria to giant tunnelling earthworms (collectively called the soil biota). Generally 75% of soil organisms are found in the top 10cm of soil. This is because the requirements for these organisms include adequate moisture, oxygen and carbon (food). The top few cm of topsoil are usually teeming with soil life. Soil organisms can be grouped according to size:

Classification	Examples	Size (1 μm = 1/1000 mm)
Microflora	bacteria, fungi, algae, actinomycetes	1 μm – 20 μm
Microfauna	protozoa, nematodes	4 μm - 200 μm
Mesofauna	collembola, mites	200 μm – 10mm
Macrofauna	earthworms, beetles, termites	> 10mm

A single gram of soil (about 1/5 teaspoon) can contain over 100 million bacteria, 1 million actinomycetes and 100,000 fungi with hyphae if strung together would measure 5 metres in length. The diversity of soil easily rivals that of any other above ground ecosystem. The quote “out of sight out of mind” is quite appropriate here!

Soil biology as a part of soil health

Soil biology is an equal partner with soil physics and chemistry that characterise soil health. Soil organisms contribute to soil structure, water holding capacity, pH and nutrient availability, while the physical and chemical soil environment determines what organisms can live in the soil profile. There is a strong interaction between all of these components, where changes in one aspect, will influence the others. The holistic approach of looking at the soil as a system will enable us to use the natural soil processes to improve orchard production, health and yield in the long term.

What are their functions?

Organic matter decomposition

One major function of soil biota is the breakdown and release of nutrients from organic matter decomposition. Carbon is the major component of organic matter and a vital source of energy. The microbial population (biomass) is responsible for the rate of this breakdown and the more diverse and abundant the carbon source is the more diverse and abundant the micro-organisms are. Micro-organisms make up 80-90% of the soil's biological activity. Soil physical characteristics, climate, plant tissue composition and the chemical status of soil also influence breakdown rate. Specific organisms break down different types of organic matter, for example there are particular organisms that break down cellulose, lignin and polysaccharides.

Other organic nutrients are mineralised by the microorganisms, such as nitrogen, phosphorus and sulphur into nitrates, phosphates and sulphates. These mineral nutrients can then be taken up by the plant roots, leached down the soil profile or lost through volatilisation (turned into a gas). Nitrifying bacteria (*Nitrosomonas* and *Nitrobacter*) convert ammonia nitrogen into plant available nitrate. Phosphorus solubilising bacteria (eg *Penicillium* spp) convert soil bound P into phosphate. Mycorrhizal fungi play a vital role in solubilising phosphorus for tree crops. They form close associations with plant roots (either inside the root or around the outside) to increase the plant's ability to uptake phosphorus (and zinc) by most agricultural crops. The fungi receive a benefit from the plant in the form of carbon substrates for its own growth. Olives have several mycorrhizal species associated with their roots.

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Total number of described species of various soil organisms (Hawksworth and Mound 1991; Brussaard *et al.*, 1997; Wall and Moore, 1999).

Described at

<http://www.fao.org/WAICENT/FAOINFO/AGRICULT/AGL/agll/soilbiod/soilbtxt.stm>

<i>Size Class Organism</i>	No. Species described	Estimated no. species
<i>Microorganisms</i>		
Bacteria and archea	3,200	90,000
Fungi	approx. 35,000	1,500,000
<i>Microfauna</i>		
Protozoa	1,500	100,000
Nematodes	5,000	500,000
<i>Mesofauna</i>		
Mites (Acari)	approx. 30,000	
Springtails (Collembola)	6,500	
Diplura	659	
Symphyla	160	
Paupoda	500	
Enchytraeids	>600	
<i>Macrofauna</i>		
Root herbivorous insects	approx. 40,000	
Millipedes (Diplopoda)	10,000	
Isopods	2,500	
Termites (Isoptera)	2,000	
Ants (Formicidae)	8,800	
Earthworms (Oligochaeta)	3,627	3,000

Nitrogen fixing bacteria that live inside nodules of legumes convert atmospheric nitrogen to plant available forms (*Rhizobium* and *Bradyrhizobium* spp.). These are symbiotic microorganisms where the plant provides the right environment for the organism and in return gets nitrogen supplied. There are non symbiotic microorganisms that live freely in the soil and fix atmospheric nitrogen near crop residues and the rhizosphere (*Azospirillum* and *Azotobacter*).

Improvement of soil structure

Soil organisms play an integral part of soil structure. Microorganisms secrete sticky polysaccharide chemicals which bind soil particles and organic matter together. These clumps are then strongly bound into larger aggregates by the threads of the fungi. The fungi maintain strong stable aggregates, which can then withstand disturbances such as water erosion and destruction by machinery. Soils with good structure provide pore spaces for a diversity of organisms and a stable habitat for all biota. Larger macrofauna such as earthworms and beetles tunnel into the soil, mixing and aerating the soil profile. Organic matter on the soil surface is then brought into closer contact with the decomposing organisms. The channels also improve water infiltration. Earthworms can have a significant effect on the soil's fertility as they also deposit highly nutritious waste products in the tunnel lining, and new roots seek these sites out.

Interaction with plants

Soil biota can have both positive and negative effects on plants. If conditions are ideal in the soil for pathogenic organisms, then disease (or pests) can build up and decimate a crop. Pathogenic fungi can act to cause disease by invading the plant cells and mining the nutrients, or by excreting toxic chemicals to kill the plant (Gupta and Roget 2004). *Phytophthora*, *Pythium* and *Rhizoctonia* are fungal diseases of

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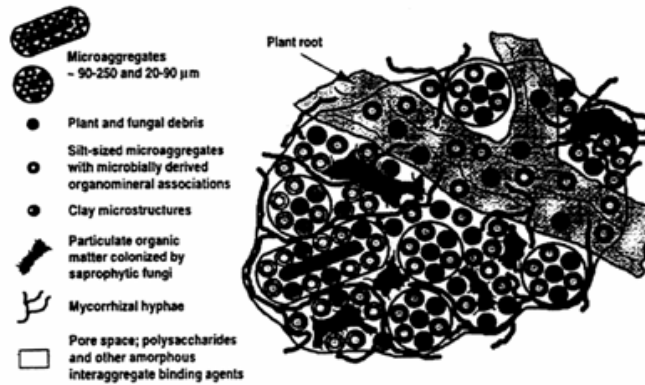


Fig. 2. Conceptual diagram illustrating the diversity of organic matter and their relationships with other soil components at varying scales (from Jastrow and Miller, 1998).

Olives (and others) which rot or damage the root system of plants. Often the condition for severe disease pressure is wet soil for extended periods which keep the roots moist all of the time. The *Verticillium* fungi also enters the roots and travels through the vascular system of the tree.

In healthy soils the high diversity and presence of antagonistic microorganisms provide natural suppressiveness to pathogenic organisms. High levels of fungal feeding organisms (amoeba) have shown to suppress *Verticillium* and *Rhizoctonia*. In Spain, two *Pseudomonas* spp (bacteria) have been shown to delay the onset and reduce disease incidence of *Verticillium* wilt in olive plants (Mercado-Blanco *et al.* 2004). In a healthy soil, native organisms out-compete pathogens, produce toxic chemicals specific to them or do not allow them to colonise root surfaces, and predators feed on them when they get too abundant.

All soils show some suppressive ability from very little to extremely protected. High organic matter in soil and diverse food sources for the microorganisms will ward off a disease threat if conditions remain good. Soils that have been totally denuded of organisms, for example by fumigation, have been shown to be very susceptible to increased disease expression afterwards.

How does management affect them?

Every management practice that disturbs the soil environment changes the soil biota. In some cases the change will be small and the system will recover. In more severe disturbance (eg tillage) the balance of organisms may alter permanently. Most research has been focussed on the grains industry as they have a dedicated section to address this issue (the Soil Biology Initiative). Reduced tillage has led to increased microbial activity, maintained food web structure (as determined by nematode community structure analysis) but these effects were not large as climate (eg drought) had a larger effect (Bell *et al.* 2004).

Organic matter addition has shown to increase the soil biota in many agricultural systems, eg vineyards, pastures, cereal crops, macadamia orchards. Buckerfield and Webster (2000) found increased earthworms in the soil under grape vines after composted mulch was applied. It also improved compaction, infiltration rates and water holding capacity of the soil, which resulted in higher grape yields without affecting quality. Compost addition under macadamia orchards in far north NSW increased microbial activity, carbon, water holding capacity and improved the acidic pH of the soil to levels soil organisms could tolerate. (Cox *et al.* 2004).

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There are many pesticides applied to agricultural land and the effect of these on the soil biota is not known in most cases. Glyphosate has been shown to reduce bacterial populations and increase fungi and actinomycetes, while slightly increasing microbial activity over the short term. High soil copper concentrations (from fungicides) have totally inhibited earthworm populations so that no organic matter incorporation occurred under avocado orchards (Van Zwieten *et al.* 2004).

Soil compaction from machinery use and soil erosion from bare soil surfaces also severely depletes the soil biota and their function. These changes to the physical environment of the organism's habitat reduce their ability to remain active in the soil. Management practices which reduce soil disturbance and improves soil habitat (eg organic matter addition, green manuring, animal manures, reduced traffic, soft chemicals, inter-row planting) will benefit the orchard through a healthy soils and healthy trees.

How do you measure them?

Growers cannot send soil samples off to a lab to get a "soil biology" test very easily, and when there are commercially available labs which measure such things, what do they mean? Sending a soil sample to get chemically analysed brings you back information about the pH, carbon content and nutrients. These numbers have usually been benchmarked for the region and an advisor would be able to tell you to add specific fertilisers or composts to prepare for the season's plant growth. On the other hand, there is not the information available about how many organisms are required to have a functioning soil and what groups. Season, clay % and type, rainfall, root types, farming system and many other factors play a big part in what organisms would end up in a soil sample and so it is difficult to interpret what this means.

Soil biology researchers have used many laboratory methods to characterise the soil biota. This includes direct counts of individuals (eg bacteria plate counts), groups of organisms (eg nematodes, earthworms), biodiversity (Biolog™ plates, FAME test, DNA fingerprinting), carbon based fractions (labile C, microbial biomass C), microbial processes (enzyme activity, mineralisation rate, substrate induced respiration) and fungal/bacterial ratio (direct count, PFLA, SIR methods) (Abbott and Murphy 2004). These help us understand the dynamics of the soil biota in a particular system.

It will take time to be able to use information about the soil biota to improve orchard sustainability, although new technologies are becoming more refined to field kit stages. Unfortunately some of these tests will be quite expensive, and many samples are required to describe the variability in the entire orchard. What is required by growers is a simple inexpensive method to monitor the activity of soil organisms in different locations of the orchard, throughout the seasons and also for evaluating different management practices. One possible method is the cotton strip assay (King and Pankhurst 1996). It involves inserting a piece of unbleached calico (3cm strip or 20 x 20cm pieces have been used) vertically into the soil for a period of time (can range from 1 week in the tropics to several months in the arid zone) and evaluating the amount of decomposition by microorganisms. The calico acts like cellulose, so this is a measure of the cellulose decomposers. The calico can be scored visually for decomposition (1-10), measured for loss of strength, or the area left after major decomposition can be estimated/measured (I am planning to develop a method to assess these strips accurately for growers, in the future). This method like all others has no benchmark, so that interpretation of "good" or "bad" is difficult at this stage. However, indications such as very low levels of decomposition in a fertile soil or region can be an early indicator of soil biology problems. Generally, the greater the amount of decomposition the better, and the pieces will show the location of greatest activity down the soil profile.

For further information contact Justine Cox at: justine.cox@dpi.nsw.gov.au

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Kialla appoints National Grain Manager

ROB WILSON has been appointed National Grain Manager for Kialla Pure Foods.

Rob has more than 12 years experience in the agriculture industry and in the past few years has become an organic grain and cattle producer.

As National Grain Manager, Rob's responsibilities will include arranging for Kialla's current and long term market contracts. His initial attention will focus on writing contracts for 2005 winter crops of hard and soft wheat, spelt, rye and Kamut. By the middle of this year Rob will be seeking contracts for 2006 summer crops of soya beans, corn, popcorn, sunflower, buckwheat and millet.

Rob will organise and facilitate the farmer workshops which Kialla has presented in the past two years. In addition, throughout the year, he hopes to extend these workshops to various rural areas.

Rob looks forward to offering general support to the Kialla network of farmers. He will be available to organise seed supplies and answer grower enquiries or concerns. The contact numbers for Rob are: Mobile: 0427 634 467 or Office: 07 46970 300.

You are invited to be part of the: Physical & Cultural Weed Control Working Group

"Combining weed science and agricultural engineering to assist the development of sustainable weed management systems in Australia"

The objectives of the Physical & Cultural Weed Control Working Group are:

- Maintain and develop an information network of scientists, engineers, practitioners, and those interested in physical and cultural weed control.
- Gather and document global information on physical and cultural weed management techniques.
- Encourage research, development, extension, and development of technologies in Australia that incorporate physical and cultural weed control techniques into existing weed management systems.
- Stimulate discussion and ideas amongst members for relevant events and activities that will assist in the development and adoption of these technologies.
- Establish and maintain contacts with international physical/cultural weed control groups.
- Undertake activities that encourage physical and cultural weed control project work.
- Organise and conduct workshops at CAWSS & SEAg Conferences.

If you wish to be included in the network, please forward your email address to: Michael Walsh, (mwalsh@uwa.edu.au), Telephone 08 6488 7872

GRDC soil biology information

A new GRDC-sponsored review on organic matter and its effect on soil properties is available at www.grdc.com.au/growers/res_summ/CSO00029/summary.htm. The June-July issue of GRDC's newspaper Groundcover included a 16 page booklet on soil biology research, available at <http://www.grdc.com.au/growers/gc/gc56/supplement/index.htm>. Groundcover also featured a story on a mobile DNA laboratory which is testing the health of Victoria's soils. Read the story at <http://www.grdc.com.au/growers/gc/gc56/soils.htm>.

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Soil biology books

Some useful soil biology reference books:

- **Microorganisms in soils: Roles in genesis and functions** (2005) Buscot, Francois; Varma, Ajit (Eds.)
- **Fundamentals of soil ecology** (2004) David Coleman, D. A. Crossley, Paul F. Hendrix
- **Communities and ecosystems: linking the aboveground and below ground components** (2002) David Wardle
- **The living soil: Fundamentals of soil science and soil biology** (2004) Jean-Michel Gobat, Michel Aragno, Willy Matthey
- **The world beneath our feet: A guide to life in the soil** (2003) James B. Nardi, Jim Nardi
- **Out of the earth: Civilization and the life of the soil** (1992) Daniel Hillel
- **Understanding soil change : Soil sustainability over millennia, centuries, and decades** (2001) Daniel D. Richter (Foreword), Daniel Markewitz
- **Soil microbiology and biochemistry** (1996) Eldor Pal, Francis Clark

(From: Soil Life, NSW DPI June 2005)

Web-based soil information service offers 'click-on' local soil info.

NSW Department of Infrastructure Planning and Natural Resources have a web-based soil information service, where you can literally click on a spot on the map of NSW and all the soil profile descriptions done in the area will be available for you to have a look at. The information will vary from a full description to a few notes. It should include soil type, horizons, texture and other useful facts. At the moment there is no soil biological information, except possibly root density, and evidence of earthworms. It is called SPADE Pro and is useful if you are going out to a new area (or old) and you want to know what soil type/characteristics you might expect. <http://spade.dlwc.nsw.gov.au/>

(From: Soil Life, NSW DPI June 2005)

Soil Biology Websites

- US National Science and Technology Centre, page on soil biological communities <http://www.blm.gov/nstc/soil/>
- Soil biology movies from Iowa State University <http://www.agron.iastate.edu/~loynachan/mov/>
- University of Minnesota Extension Service – Series on soil biology and soil management <http://www.extension.umn.edu/distribution/cropsystems/DC7403.html>

(From: Soil Life, NSW DPI June 2005)

Seed Production Guide for Organic Brassicas Available On-line

The Saving Our Seed Project announces the publication of the Organic Brassica Seed Production Guide. This is number five in a series of seed production manuals that Saving Our Seed created in response to the limited availability of organic and open pollinated heirloom seed. The organic agriculture movement has seen negative impacts due to this shortage, but Save our Seed is working to increase the availability of regionally adapted, open pollinated, certified organic seed and to develop a Southern seed network.

The Organic Brassica Seed Production Guide is a 24-page guide providing a detailed reference for production for organic broccoli, cauliflower, cabbage, collard, kale, mustard, and Brussels sprout seeds in

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the Southeast. The other four guides already produced include: The Bean Seed Production Manual; The Tomato Seed Production Manual; The Isolation Distance Guide; and The Seed Processing and Storage Manual. All are available free online with response to a brief survey. URL: <http://www.savingourseed.org/>

Possible R&D Levy for Organics

The chair of the Organic Federation of Australia, Andre Leu, has met with Horticulture Australia Limited (HAL) to discuss the possibility of establishing marketing and R&D levies for the organic industry. Industry consultation and further discussions with Government will be pursued by the Organic Federation of Australia.

A review of leguminous fertility-building crops, with particular reference to nitrogen fixation and utilisation

Fertility building crops are a key component of organic rotations where they help to provide nitrogen required for optimal crop performance. It is important that rotations and management are planned which optimise the capture and use of this nitrogen. Estimates are available of the nitrogen production from fertility building crops, but further research is required to produce a more comprehensive assessment of likely nitrogen fixation, release and availability under different circumstances.

The Defra (U.K Department of Environment, Food and Rural Affairs) project 'The development of improved guidance on the use of fertility building crops in organic farming' aims to provide guidelines to enable organic farmers to better estimate the nitrogen supply to a rotation following fertility building crops. This will be done by a mix of literature review, empirical measurements, model development and farmer participation.

The results will be of value to the organic producer, providing a better understanding of nitrogen accumulation under fertility building crops and its subsequent release. Implications for pest and disease in the rotation will also be included. Advisory guidelines will be produced as a part of the project. Written as a part of the Project, a review of leguminous fertility-building crops, with particular reference to nitrogen fixation and utilisation has been prepared. The authors of the review are Dr Steve Cuttle Institute of Grassland & Environmental Research, Dr Mark Shepherd ADAS Gleadthorpe Research Centre, and Dr Gillian Goodlass ADAS High Mowthorpe Research Centre.

The report can be found at: <http://www.organicsoilfertility.co.uk/reports/review.html>

Baby's Best seeking new business partners in the organic sector

Baby's Best are an Argentine company specializing in the production and sale of aseptic organic concentrated fruit pulps and organic vegetables packaged in an aseptic system. They also process organic virgin, cloudy and clarified juice concentrates from Apple, Pear, Apricot, Peach, Plum, Grapes, Pumpkin, etc. Their products are used in the production of **Compote, Puree, Baby Food, Juice, Yogurt & Jam**. Baby's Best is certified with "ORGANIC EU-IFOAM"; "ORGANIC USDA-NOP/JAS"; "OU-KOSHER PARVE"; and "HACCP".

Baby's Best is aiming to expand their commercial network and are looking for new business partners in the organic sector. If you are interested and think that your company profile matches theirs contact:

Patricia Guerrero

Export Department, Baby's Best SA

Elortondo 1830 Beccar CP:1642

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Organic News.

Organic Prime Lamb Project Pasture Walk, Rutherglen 19 July, 2005

DPI Victoria will conduct an Organic Prime Lamb Project Pasture Walk and information day on 19 July 2005 at Rutherglen Agricultural Research Institute. Topics include organic prime lamb, sheep health (internal parasites), live animal assessment, perennial pasture, and organic standards. For more information contact Michelle Smith or Viv Burnett DPI Victoria on 02 6030 4500.

Sydney Organic Expo, 29-31 JULY 2005

Sydney Exhibition and Convention Centre will be the venue for the Sydney Organic Expo, Australia's first major organic expo. For more information contact: Lena Smeaton – 0413 043 287 or Mary Hackett - 0414 306 689

15th IFOAM World Organic Congress, Adelaide, 20-23 September 2005

For more information contact: Jan Denham 2005 Organic World Congress Co-ordinator General: +61 8 8339 7800 Direct: +61 3 5027 9249 E-mail: ifoam2005@nasaa.com.au or got to the Congress Website: <http://new.webtemplate.com.au/bridgehead/NASAA/>

Organic & Natural Korea - Convention & Exhibition Centre, Seoul July 15-18 2005

Amid growing interest in health and well-being, Korea's organic food sector has experienced 30 to 40 percent growth over the past couple of years with the number of stores that sell organically grown foods estimated at more than 1,000. According to industry experts, the size of the organic food market is expected to reach 600 billion won (AUD 70.5 million) next year from 300 billion won (AUD 35.2 million).

Australia's clean and green image gives Australian suppliers a strong advantage to gain access to this growing market. Strong opportunities for organically certified suppliers are in the following organic sectors: Dairy - Grains and Cereal, Meat (beef, pork and chicken) - Ingredients for weaning foods and health foods (Soy powders, milk powder, grass powder, fruit puree and concentrates etc) and processed foods (especially baby foods, sauce, juice, honey and jam).

Austrade Seoul, Korea and Queensland Department of Primary Industries and Fisheries will be assisting Australian companies to participate in the upcoming Organic & Natural Korea event.

Those interested in exhibiting should contact:

Operators based in Qld - Geon Shim Prydon, Department of Primary Industries and Fisheries on (07) 3239 3067 or e-mail to geon.shimprydon@dpi.qld.gov.au.

Outside Qld - Hae Sook Chung, Austrade Seoul on 822 398 2812 or e-mail to hae.sook.chung@austrade.gov.au;

For further information on the event, visit the website at www.organicshow.co.kr.

Do you have any Organic News?

Do you have any research results, field day reports or other information that may be of relevance to organic agriculture? If so, let us hear about it! Send your contributions to:

Robyn Neeson
Editor Organic News
NSW Department of Primary Industries
Yanco Agricultural Institute
YANCO NSW 2703

Email: robyn.neeson@agric.nsw.gov.au

Note: Electronic format is preferred. Text - Times New Roman 11 point.

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DISCLAIMERS

The information contained in this publication is based on knowledge and understanding at the time of writing. However, because of advances in knowledge, users are reminded of the need to ensure that information upon which they rely is up to date and to check currency of the information with the appropriate officer of New South Wales Department of Primary Industries or the user's independent adviser.

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