

# **December 2005 E-Zine**

## **1. Meetings**

- a. San Mateo, California, Jan 19 - 21
- b. London, England, Jan 4 to 6, 2006

## **2. Notes from Elaine**

- a. **Scientific trials show that tying up nitrate by adding bacterial foods suppresses weeds.**
- b. Methyl Bromide Escapes... again!
- c. Explanation and forms for a Management Program with SSI

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## **1. Meetings**

Dr. Elaine Ingham will be in **San Mateo, California** for a 2 day intensive seminar on managing soil biology/ecology for plant and environmental health in January 2006. The seminar is arranged in 3 levels to allow you to participate at the level that serves you best.

Thursday evening **1/19/06**, 7 - 9pm: soil biology overview - \$ 25.00. The biology of the soil can dazzle, inspire, and assist any level of home gardener in "going organic".

Friday **1/20/06**, 8am - 5pm: all day intensive on the functioning of the soil biology, soil chemistry, and proper treatment for best results.

Saturday **1/21/06**, 8am - 5pm: all day landscape industry intensive on the details of managing a landscape without toxic pesticides or inorganic fertilizers; use of organic fertilizers and mineral supplements, compost tea and compost. Afternoon session will consist of open consultation and analysis of pre-selected landscape issues from seminar participants - submitted after registration.

Full day sessions are \$100.00, -OR- \$180.00 package for all 3 lectures. Hot lunch is available @ \$15.00/day. The registration form is online at [http://soilfoodweb.com/04\\_news/calendar.htm](http://soilfoodweb.com/04_news/calendar.htm).

If you cannot access the PDF to fill out the registration form, or require more information, please contact: Alane Weber @ (650)348-2094, [wormlady@sbcglobal.net](mailto:wormlady@sbcglobal.net) - OR - Terry Lyngso, Lyngso Garden Materials, Redwood City, (650)364-1730, [tlngso@lyngsogarden.com](mailto:tlngso@lyngsogarden.com)

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**ALSO - SOIL ASSOCIATION SEMINAR - LONDON ENGLAND**  
Please contact SFI Laverstoke Park for details

## **2. Notes from Elaine!**

- a. Scientific trials show tying up nitrate by adding bacterial foods suppresses weeds.

### **A SWEET END TO WEEDS**

by Margrit Beemster

Sugar has the potential to control annual weeds according to recent research trials conducted by researchers from Charles Sturt University.

The researchers, ecologists Dr Suzanne Prober, Dr Ian Lunt and Dr Kevin Thiele, have applied sugar to trial plots for a project funded by the NSW Environmental Trust on how to restore understorey species in endangered Grassy White Box Woodlands.

Trials on a private property "Windermere", and a travelling stock reserve "Green Gully" near Young in central NSW have provided dramatic results, with Paterson's Curse and Wild Oats flourishing in untreated plots whilst plots treated with sugar had far fewer annual weeds.

The researchers have found that sugar provides a good, short-term non-chemical and ecologically friendly method of weed control.

"It appears sugar is a tool we can use to help change a system back to one dominated by native species rather than weeds," says Dr Suzanne Prober who has been working to conserve and restore grassy white box woodlands for the past 15 years. Nearly all of the woodland belt, from southern Queensland to north-east Victoria is now used for agricultural purposes, principally wheat and sheep.

So why does the sugar work? Because it is one of the fastest ways of reducing soil nitrate levels.

Dr Prober's compared soil nutrients in undisturbed woodlands and disturbed, degraded sites. She found the most striking difference between the two was in nitrate levels, which were extremely low in undisturbed remnants and high in degraded remnants.

"It seems that many of our weed problems are due to high nutrient levels", says Dr Prober. "There is an enormous amount of information on how to increase soil nitrogen to improve crop growth, but very little on doing the reverse. However there has been some research done overseas where sugar was used to tie up nitrogen levels for a short time."

The researchers, who spread half a kilogram of refined white sugar to each square metre of soil every three months, found this inhibited weed growth of most annual weeds giving the native plants the opportunity to become well-established. However more research is required to work out the optimum rate of application.

"We realise that the sugar levels we used in our trials would not be economic to use over broad scales", said Dr Prober, "but at the moment we don't know if we would get similar results if we used less sugar or if we used cheaper alternatives such as molasses or sawdust".

So how does sugar reduce soil nutrients?

"When sugar is spread on the soil, it feeds soil micro-organisms, which then absorb lots of soil nutrients as they grow," explains Dr Ian Lunt from CSU's Institute for Land, Water and Society.

"The micro-organisms then hold these nutrients so the weeds can't gobble them up. In effect we are 'starving' the weed species that require lots of nutrients to grow."

The lack of nutrients stopped the weeds from growing large, allowing the native plants, which can grow well in low nutrient levels, to grow bigger and faster.

The trial plots are now in their fourth year and the researchers believe that as the native grasses they have sown grow large enough, they will be able to lock-up the nutrients in their roots which will keep the weeds in check in the long run. Early results have indicated that nitrate levels are starting to drop in the plots with well established kangaroo grass.

"We see what we have done so far as only part of the picture," says Dr Prober. "There are a number of directions we would like to go. One of our Honours students, Lisa Smallbone, is looking at whether sugar helps us to re-introduce native wildflowers into degraded sites. If the wildflowers establish well, we want to find out if they contribute to weed control and soil nitrogen cycling later on. Our long term goal is to get the native diversity back into the understorey by working out the best method to re-establish a native ecosystem that is self-sustaining and resistant to invasion by weed species."

Using sugar as an organic weed control, to help to restore endangered woodlands and native grasslands, is an innovative alternative to using herbicides.

"Herbicides are difficult to use in many remnants because they kill the native plants you are trying to save as well as the weeds," says Dr Lunt. "Sugar does not have this undesirable effect. Herbicides also don't reduce the soil nitrate as sugar does, which is the underlying reason for the flourishing weeds – they

control the symptoms, not the cause. Sugar may also be a useful way to control weeds that grow near other endangered native plants.”

While the researchers are primarily interested in using sugar as a tool to help restore the understorey species in grassy box woodlands, they are aware their research could be the basis for other more agriculturally driven research.

“Broad leaf weeds such as Patersons’ Curse are the bane of every farmer’s life. Once infestations get very bad, it gets very difficult to control them,” said Dr Lunt. “Sugar may help land managers to control broad-leaf weeds and to re-introduce perennial grasses in many places across the region. In particular, it could be a really helpful tool in organic farming or in places where herbicides are difficult to apply.”

### **Conservation Management Networks**

Dr Suzanne Prober’s passion to conserve Grassy Box Woodlands was the inspiration and driving force behind the establishment of the Grassy Box Woodlands Conservation Management Network in 1998.

The network, which now has 682 members including 355 private land managers, local governments and Rural Land Protection Boards, was the first in Australia. There are now seven such conservation networks helping to conserve fragmented ecosystems in NSW and Victoria. The Grassy Box Woodlands Conservation Management Network is now managed through the Department of Environment and Conservation (DEC) in NSW.

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When Suzanne, as a researcher with CSIRO, first began looking for woodland remnants 15 years ago, she found that there were no large, undisturbed areas that could adequately represent the woodlands in a National Park.

“What we have instead are little bits and pieces, scattered across three states, and each bit is important for different reasons,” says Suzanne who spent a year searching for remnants on private and public land. “There might be a travelling stock route that’s really important because of its big trees or a little cemetery that has got the best native understorey and is the only place where some native plants still grow.” One such cemetery is at Monteagle, in central NSW, where Suzanne is conducting the only long-term fire frequency experiment in the native grassland ecosystems in southern Australia.

The Network, now coordinated by Toni McLeish, has its own newsletter “Woodland Wanderings” and has a number of goals including protecting remnants and supporting best-practice management. Sites have been protected by various means including legal protection via covenants and listings on local environmental plans; purchase by the Australian Bush Heritage Fund; or as Suzanne says “some sites just have a really interested owner who wants to try and do the right thing.”

“We tried to create a network that brought together all these disparate sites into what we called a ‘conceptual reserve’ with many different tiers, but with a link between them all,” explains Suzanne.

“I still see it as early days and the concepts will evolve. Since we established the Network a lot of things have happened in the landscape, but at the time we felt we had to make something actually happen on the ground rather than just “monitoring the decline.

“Fundamentally, the conservation management network aims to help landholders and site managers, which is the most important step we can make. It provides great information to help us all to learn from everyone’s experiences, and it demonstrates to everyone how their individual actions are helping to save one of Australia’s most endangered ecosystems, grassy box woodlands.” - Margrit Beemster

### **Hints for Establishing Understorey**

The research being carried out by Dr Suzanne Prober and her colleagues may well provide answers for land holders and managers who find the management of weeds a problem in tree plantations and sites that have been fenced off to allow for natural regeneration.

“What we tend to do these days is fence off an area and plant trees in it,” says Suzanne “but that may make it difficult to restore understorey species in the long term because the treatments we might want to use to restore the understorey, such as repeated burning or even ploughing up a site to establish native grasses, are difficult if you have young trees planted.”

Suzanne says it is possible to restore understorey species in sites that are already wooded but options are more limited.

“It is something that is better thought about at an early stage,” she says. “One of the big problems with planting trees can be the invasion of weeds that you get when the country isn’t stocked. Making sure you

get the understorey species (such as kangaroo grass) in first may be a practical answer, and may also be better for natural tree regeneration. Simply fencing off a degraded system and letting it look after itself usually doesn't work for the understorey."

Suzanne says the key is a good, dense sward of the right native grasses that will suppress soil nitrate and control the weeds.

"To get there you need to first deal with the weeds, which you can do in a number of ways," she says. "One way that is particularly promising for controlling annual weeds [like Wild Oats and Patterson's Curse] is to use sugar to temporarily reduce soil nitrate. This dramatically reduces growth of these nitrogen-loving weeds, so you can get good establishment of native grasses. The native grasses then take over, and help to keep soil nitrate low. We suspect kangaroo grass is better than other native grasses for controlling soil nitrate in the longer term."

The researchers have also found that burning in mid-spring can lead to a dramatic reduction in annual grass weeds by the next spring. Many annual grasses have short-lived soil seed banks, so preventing seeding through spring burning leaves few seeds for next year's weed crop. However broad-leaf weeds can do very well after spring burning.

Suzanne and her colleagues have not focused on herbicides as a management tool for controlling weeds in their trials, because they aimed to address underlying processes that promote weed invasion. But it would be possible to incorporate agronomic techniques into the restoration "toolkit". "What you could do is plough up a paddock, sow kangaroo grass as you would a crop, say in August, burn the annual weeds that have come up in mid October –it may be difficult to burn at that time of the year so you could kill of the weeds first with steam or a herbicide before burning- then use sugar for post-establishment weed control," says Suzanne.

In the trials, the best establishment of kangaroo grass occurred when a burning treatment had been included. Kangaroo grass seed, like that of many native species, is stimulated to germinate by fire.

Suzanne says a lot more research is needed before firm recommendations can be made to landholders. However a number of people are already experimenting with using sugar to control weeds with good results in the short term. - Margrit Beemster

## **b. Methyl Bromide Escapes... again**

<<http://www.cnn.com/2005/TECH/science/11/28/pesticide.politics.ap/index.html>>

U.S. wins exemption from pesticide ban  
Monday, November 28, 2005; Posted: 1:32 p.m. EST (18:32 GMT)

Methyl bromide, a soil fumigant that an international treaty has banned as of this year for all but the most critical uses.

Methyl bromide continues in wide use because the Bush administration has convinced other treaty signatories that U.S. farmers can't do without it -- whether for California berries, Florida tomatoes, North Carolina Christmas trees or Michigan melons.

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The treaty, called the Montreal Protocol, has targeted methyl bromide because it is among chemicals that deplete the earth's protective ozone layer.

It also can cause neurological damage, but methyl bromide's tenacity demonstrates the difficulty of banishing a substance that is wildly successful at delivering what both farmers and consumers want: abundant, pest-free and affordable produce.

The administration, at the urging of agriculture and manufacturing interests, is pushing for continued treaty exemptions at least through 2008, and officials will not commit to an ending point.

## **c. Explanation and forms for a Management Program with SSI**

# Consulting Program with SFI and SSI

## Initial Consultation

- 1) This is a two year process. Please be prepared to work with us for two years to reach the desired endpoint of no need for pesticide use, and reduced, if not eliminated, inorganic fertilizer inputs.
- 2) This means diseases are dealt with using biological control systems. Any disturbance which destroys biology may result in a loss of the biological control mechanisms. There are multiple mechanisms that we will put in place, and which must be maintained.
- 3) Part of this program is training you, the grower, to recognize when a disturbance has occurred, and thus some of the important biology might have been lost. Once lost, that biology must be replaced.
- 4) On-going monitoring must be performed so that loss of the proper biology is recognized, and replaced.
- 5) Successful replacement must be monitored as well.

## Filling out the forms

- 1) Fill out the Grower Program Section 1 for each farm. (please obtain from SSI or SFI by calling 541-257-2614 and asking to speak with Joe Whaley.
- 2) Fill out information about each field in the program.
- 3) Draw a map of your farm. This map doesn't need to be super accurate, just a general outline of field boundaries.
- 4) Number the fields on the map.
- 5) Include information on:
  - a. what crops are planted on each field,
  - b. what are the problems being experienced in each field, and
  - c. what methods/treatments or previous practices were used in the fields
  - d. Attach soil chemistry tests for each field
- 6) Do you have a source of Local Compost and/or Compost Tea
  - a. Do you make your own compost? What method is used?
  - b. SFI or SSI can recommend a good source of compost if needed
  - c. Make sure you have DATA on the BIOLOGY (active and total bacterial biomass, active and total fungal biomass, protozoan numbers for all three groups, nematode numbers identified to genus.
  - d. If you do not have this data for your compost, it needs to be tested routinely so you know what you are adding, and how you might improve the compost being made or used.
- 7) Send in a soil sample for biological analysis.
  - a. Instructions are available through:
    - i. A local advisor
    - ii. Instructions on the SFI website
    - iii. A sampling kit from Earth Fortifications ([www.earthfortifications.com](http://www.earthfortifications.com)): instructions, apple corer, bags, pen, and submission forms
  - b. Three 1 inch diameter, 3 inch deep samples need to be taken from each area (field) and mixed gently. If roots are present, all of the roots easily removed should be placed in a sandwich size sealable plastic bag, and then 1/3 to 1/2 of the bag filled with the mixed soil.
  - c. Be sure to label the soil on the outside of the container with a non-water-soluble ink, with the field number (and problems) that corresponds to the map.
  - d. Fill out the submission form, and indicate that this is a program sample.
  - e. Clearly put Soil Foodweb Advisor you are working with on the submission form.
  - f. Send overnight mail to the closest Soil Foodweb lab.
  - g. If you do not have any soil chemistry tests, we will get that done for you as well.
  - h. SFI testing involves both a Quantitative and a Qualitative test. All records will be kept for reference during the program.

The following is an example program for potato.

**Fall:**

Sample soil for biology and chemistry.

On harvest date, 1 ton/ac compost (tested) OR 20gal/ac compost tea (CT) (tested) will be laid down to deal with residues, take care of diseases, pests and weeds.

The compost to be used may need to be adjusted so it will contain the right active biology and soil nutrients. The actual amount of compost used may be adjusted as well, based on what the soil needs and what is actually in the compost

The recipe for the tea to be used may need to be adjusted so it will contain the right active biology and available soil nutrients. The actual amount may be adjusted as well, based on what the soil needs and what is actually in the compost tea.

**2 Weeks after application of the compost or tea:**

Send in soil sample for Qualitative Assay (compare to initial QA to determine impact).

If no improvement in the soil biology is observed, the grower may need to repeat the application of compost and/or tea, because a lack of improvement means something in the soil is killing the organisms. A special recipe will need to be prepared to deal with this problem IF IT OCCURS. Most of the time, this is not the case, however.

**Spring:**

Based on the improvement in the biology determined from the fall applications, applications of compost and or compost tea will be recommended. A monitoring of the response of the biology to that application must be performed, so set the ground work for dealing with seed treatments.

Seed treatment:

CT as a seed treatment. If the roots assessed last fall lacked mycorrhizal colonization, mycorrhizal spores should be added to this seed treatment. The type of seed used, equipment the grower has, and the improvement in tillage will determine which method of application is the most effective.

**Summer:**

Foliar sprays of CT may be needed if foliar diseases or pests have been a problem in the past. Please realize that the first step in dealing with foliar diseases or pests is to reduce the inoculum load or the egg/over-wintering stages of those diseases and pests that are present in sick soil. Step one is really to deal with the source of the problem, and not just treat the foliar symptoms.

Assay leaves for coverage of the surfaces with the proper biology as soon as bud break occurs, or assess first true leaf for coverage in annual plants. After first tea application, another leaf assay needs to be performed. The tea itself should be assessed, and the coverage on the leaf surfaces should be done. Not only does this determine if coverage is adequate, it tells you about any problems with your sprayer.

**REPEAT THE WHOLE PROCESS IN YEAR 2.**

**Soil, compost and tea assessment are critical to getting you the full benefits in the shortest possible time. In the second year, we again alter the recipes for the compost tea and management of the compost itself before application in order to make certain the right biology is delivered each time.**

There are growers doing this program by-guess-an-by-gosh, but they rarely are successful within the first 6 to 12 months, as we usually are when proper monitoring is performed. Some are not successful at all, and they tend to be negative about their experiences, when really, they have only their own lack of monitoring to blame.

### Cost Analysis for a program for a single field

Reduce pesticides by 90% in year one  
Reduce inorganic fertilizer by 50% in year one  
Reduce water required for plants by 20 to 50%  
Reduce equipment wear and tear, salary for applying applications of pesticides and inorganic fertilizers

What are your dollar savings as compared to the cost of the program costs below:

Initial Program Consult	\$95
Soil Chemistry:	\$35
Soil Biology: Full Foodweb	\$200 (QA included)
Sampling Kit (optional)	\$20
QA (Fall):	\$35
QA (Spring):	\$35
Leaf Assay (Summer):	\$35
Recipe/compost management Consultations	\$125

### Potential Cost of compost and tea (exact prices will vary)

#### **Two applications of compost OR compost tea to soil**

**\$40 - 80/ac/yr for compost (likely only required in year 1)**

**\$12/ac/yr if on-farm production of compost tea**

**or \$120/ac/yr if compost tea is bought and applied by someone else**

#### **Application of compost tea to seed**

**\$3 for tea, \$12/ac for mycorrhizal spores, one time application**

**3 to 5 applications of compost tea to foliage (where scab, mildew, or other severe fungal problems are rampant, applications may be as many as 14 through the summer)**

**\$15/ac per application**

Typically we work with you to use the equipment you have so no cost of additional equipment is incurred. If you chose to start making your own compost on large scale, or making your own compost tea, then significant investment in equipment will be required.

### Disclaimer

Ultimately, your management will reduce to just one application of compost per year OR three applications of compost tea plus some organic fertilizer amendments. Typically achieving the proper biology in your soil will improve yield, reduce water use, decrease chemical use, and reduce machinery costs all at the same time. We can guarantee that a program developed with us will reduce your problems if our instructions are followed. You must follow the instructions given. If you do not follow our instructions, there can be no claim on us.

Improving the proper biology in your soil can:

- Improve plant health -
- Improve soil life -
- Reduce chemical use

BUT PLEASE NOTE, the materials used in this management program are:

- Not herbicides, although they will reduce weed populations
- Not biocides, but they can reduce pest populations
- Not fertilizers, but they can improve soil fertility

We just get soil life back into the proper balance. The biology just does what it is supposed to do, and has been doing, still is doing, in the natural world. We do not preclude the use of toxic chemicals in programs.

The prices suggested above are based on typical farm situations. Compost, compost tea, and nutrient amendments are NOT included in the price of the program agreement with SSI or SFI.

Please contact Joe Whaley, Sustainable Studies Institute to start working with us on a Program!

**NB: Soil samples for programs must be taken from the same area throughout the program for comparison sake.**

<b>Grower:-</b>
<b>Region/Area:-</b>
<b>Date</b>
<b>Current Crop:- Desired Crop (if different)</b>
<b>Map of Farm - please attach:</b> Include size of fields, contours, different soil types, waterways, dams, neighboring types of terrain (if that could have some effect) and natural areas. Pinpoint where samples were taken.

<b>Seasonality:</b> General guidelines for each season.	
<b>Past practices:</b> Management methods, Chemical use? Compost?	
<b>Soil Structure:</b> Puddles? Drainage? Erosion? Saline areas? How measured?	
<b>Weed Pressure:</b> Weed types, seasonality? Herbicides? Any bare areas?	
<b>Diseases:</b> Which diseases? Above ground? Below ground?	
<b>Insect/Pest Problems:</b> Which ones? Life history of the pests?	
<b>Litter Layer:</b> How long do residues stay un- decomposed? Is there thatch?	
<b>Root Depth:</b> How far do roots go down into soil? Do they flatten/go sideways?	
<b>Visual:</b> Earthworms, microarthropods, fungal strands (color, description, quantity)	
<b>Source of Good Compost?</b> Testing done? Local source? Cost?	
<b>Source of Compost Tea?</b> Buy from someone else or make themselves? Testing?	