



The Green Challenger

Willunga Hillsface Landcare Group

Working towards a healthy, vibrant and sustainable Willunga Basin

Official Newsletter
of the
Willunga Hillsface
Landcare Group

Spring 2016

Harnessing the Plant Microbiome for cleaner, pesticide-free Agriculture

To meet rising food demand, we need to do better than relying on toxic chemical products

We may need 70% more crop production by 2050 to keep up with food demand, and that's scary for several reasons. One, yield gains are flattening out among farmers in developed countries, despite high use of pesticides and artificial fertilizers. And, two, in places where yields are low—like on small farms in Africa—farmers are likely to turn to pesticides and artificial fertilizers, deepening environmental problems.

But some scientists believe we're on the cusp of developing viable alternatives to pesticides and heavy use of artificial fertilizers. They're investigating the plant microbiome: the billions of bacteria living in roots, leaves and soil that help plants absorb minerals and nutrients, fight disease, and resist drought and heat. The equivalent of the human microbiome—the bacteria and fungi in the gut that help us digest food and fend off infection—the plant microbiome could hold the key to generating more food without the side-effects associated with high-input farming, including damage to waterways and toxicity in food.

"The microbiome has a lot of potential for agriculture because we know that microbes have a lot of

influence on plants, how well they grow, how they resist pests and diseases, and how well seeds germinate," says Kelly Smith, director of microbial development at AgBiome, a startup in Durham, North Carolina.

"If we can understand how to harness microbes to do specific things, we'll have the ability to carry out a lot of the same functions that we currently depend on chemical pesticides and fungicides to do," Smith says. "Modern pesticides are a lot safer than the old ones, but the microbes have the potential to be safer still."

AgBiome is about to launch its first product, a broad-spectrum insecticide called Howler. Isolated from cotton roots in Texas, the microbes come in powder or spray form and are then grown in a laboratory (no genetic manipulation needed). They stay fresh enough for 18 months, the company says, and can survive at up to 90 degrees Fahrenheit.

Microbial solutions are not only less toxic, but also potentially more efficient for farmers. After spraying with pesticides, growers must wait several hours or even days before re-entering fields and greenhouses to tend or pick crops (up to seven days in the case of raspberries). With microbes, the re-entry period is non-existent.

AgBiome is also identifying microbes that can control weevils that attack sweet potato plants in Sub-Saharan Africa. The research is funded by the Bill & Melinda Gates Foundation, which wants to protect a vital source of vitamin A, a nutrient that prevents blindness and improves immune systems. Smith says AgBiome will look for microbes locally as well as scour its existing library of 26,000 microbial strains. "The weevil insect does a lot of damage to smallholder farmers who depend on sweet potatoes as a staple food crop, and there are no good products they can use now," she says.

Biological pesticides, like those derived from essential oils, have been available for several years. But, until recently, they've had a reputation for being either expensive, inadequate, or both. AgBiome claims Howler is 20 times more effective than other biological products and can completely replace traditional fungicides, not just limit their use. "There's usually a dichotomy between efficacy and economics and we're attempting to change all that," Smith says.

BEN SCHILLER

<https://www.fastcoexist.com/3063346/harnessing-the-plant-microbiome-for-cleaner-pesticide-free-agriculture>

Editorial

Where should I start, that's the question? Fantastic rain in this area has been great for many and, sadly, flooding for others. However, when this group first started its goal was to reduce erosion. Then, we used bundles of newspaper to create mini dams to slow the water down. Today there is a much different approach, but the problem is still the same.

Large erosion gullies on the hills-face we were unable to handle, so we planted trees where we could and this helped considerably. If you decide to join our bus trip on the 20th November, you will see for yourself the new erosion control structures and how well they have been working, especially considering the high rainfall this winter.

Some of the rain in the hills obviously ends up entering the Aldinga Washpool and can exacerbate problems there if the water is full of silt from the erosion, so the benefits of this work are far reaching. We will also look at some of the revegetation/biodiversity plantings that the group has achieved in recent years.

On the news this morning I heard that there are dairy farmers in Western Australia pouring perfectly good milk down the drain! This is scandalous. The blame is being put on the two giant supermarkets and their pricing wars! Australian governments should never have allowed this market domination to happen.

It is with some sadness that I have to report the retirement of two of our esteemed committee members. Kate Parkin has been involved with the group for many years and her ability to chair our meetings has been excellent.

Margaret Morris, our Treasurer since 2001, ably saw the group's finances through the difficult introduction of the GST. She has been a strong committee member, always prepared to express her views, whatever the topic and opposition.

They will both be sadly missed and are hoping that we will find replacements for them very soon.

Brian

To future-proof our crops from drought, look to the Australian deserts

It was in the mid-20th century when the American agricultural scientist Norman Borlaug showed us how to make wheat and rice stems shorter, to increase their yield. He's often referred to as the Father of the Green Revolution and his breakthrough meant food was suddenly more abundant across much of the world.

For example, Mexico had a 300% increase in wheat production attributed in part to Borlaug's work. Later, India and Pakistan had a 60% increase in their harvests, helping both countries to become agriculturally self-sufficient.

Thanks to other advances, such as vaccines, people started living longer and healthier lives.

The human population responded to this boon by catapulting from 2.6 billion to 7.3 billion in just 60 years. It continues to rise by about 80 million per year.

The heat is on

But things are warming up. Atmospheric carbon is at 400 parts per million, the highest it has been since the Pliocene era 5.3-million to 2.6-million years ago.

Despite the massive human population increase in the past 20 years, the amount of farmed land used to feed these people has not increased. In fact, it has decreased slightly to 1.4 billion hectares.

As towns, roads and factories take over established farming land, it is becoming increasingly difficult to find suitable land on which to develop new farms. Most of it has already been developed.

The rate of annual increase of the international cereal crop is falling, although the actual tonnage harvested is still rising...

Learn from the desert plants

What can we do to future-proof our crops? How can crop production be increased by another 44% to feed the 9.3 billion people expected to be

alive in 2050? How can it be done again by 2100 to feed 12 billion?

This must be done while using the same or even less farmland and under increasingly challenging climatic conditions. This is where a knowledge of desert plants may help.

Australia's desert plants are the Bear Grylls of abiotic stress tolerance. They live under extremes of drought, heat and inhospitable soils. They also cope with the surprisingly frequent frosts that occur under clear desert night skies.

The plants that thrive in Australia's ten named deserts today are those that have weathered every record-breaking drought and heatwave for the past 1.5 million years. Those that failed are dust or fossils.

Although quite a lot is known about how crop plants cope with periodic stress, far less is known about the suite of mechanisms that desert plants employ every day.

New research

Although the deserts would seem to be obvious places to look for novel strategies to protect crops living under hotter dryer conditions, this is not a well-researched area. This is because much of the Australian flora from those regions is not closely related to the exotic plant species we grow for food.

The best-case scenario is that stress-tolerance strategies that evolved in desert plants can be applied to crops; under climatic conditions that kill today's crops, the new traits will maintain or increase grain yields. This is not likely to be a straightforward task.

Heavily edited as it was a long article: Full story at: https://theconversation.com/to-future-proof-our-crops-from-drought-look-to-the-australian-deserts-63448?utm_medium=email&utm_campaign=Latest%20from%20The%20Conversation%20for%20August%2022%202016%20

Regreen the Range Report

The Landcare Group have just begun this year's program to control Arum Lily in the Wirra Creek for this season. Through funding provided by the Natural Resource Management AMLR the Landcare Group are endeavouring to remove this recently declared plant from a significant section of the Wirra Creek which flows next to Old Willunga Hill Rd.

This program will take many years' to complete due to the heavy infestation along the creek line but in order to rehabilitate the creek system, this pest plant, along with a number of other pest plants, need to be removed from the creek. Once these plants are removed from the creek channel and surrounds a revegetation program will be put in place to reinstate the indigenous vegetation that was previously present along the creek.

The Landcare group is very optimistic about the success of this year's revegetation due to the very good rainfall events we have experienced across the district this season. So long as the revegetation does not experience excessive kangaroo damage the amount of moisture being held in the soil for such an extended period of time should allow the revegetation to establish itself sufficiently before the summer dries out the soil.

The Landcare Group is currently in the last financial year of six years of funding provided by the Federal Govt. through the biodiversity fund. This six years of funding has been extremely beneficial for the Landcare Group to reinstate ground-cover and herbaceous species into the revegetation the Landcare Group planted nearly 20 years ago.

The Landcare Group have constructed over 40 enclosures across the hillsface to protect these groups of plants from the damage that rabbits and kangaroos can do. It is anticipated that the enclosures will provide a protected seed source for these plants to naturally recruit across the hillsface. It is hoped enough natural regeneration will occur that even though some of this natural regeneration will be lost to rabbits and kangaroos there will be enough plants surviving that they will be able to flower and set seed and for the process to repeat itself. Some of the species have already begun this process and over the coming years the Landcare Group will continue to monitor the progress of the natural regeneration and hopefully it will continue well into the future.

Wayne Lawrence

Willunga Hillsface Landcare Group Field Trip

You are invited to a free bus tour of recent 'state of the art' erosion control sites implemented by the Landcare Group (funded by the NRM). This trip will include a visit to reveg and biodiversity sites

on Sunday, 20th November from 11am

A brief AGM will be followed by the bus trip, which concludes with a light lunch at the Environment Centre,

18 High Street, Willunga. Tour transport will depart and return from this address

It is essential that you RSVP by November 13th for catering and transport arrangements to the Environment Centre: 8556 4188

Researchers discover a cell in spinach that uses sunlight to produce electricity and hydrogen

September 22, 2016

Using a simple membrane extract from spinach leaves, researchers from the Technion-Israel Institute of Technology have developed a bio-photo-electro-chemical (BPEC) cell that produces electricity and hydrogen from water using sunlight. The raw material of the device is water, and its products are electric current, hydrogen and oxygen. The findings were published in the August 23 online issue of *Nature Communications*.

The unique combination of a man-made BPEC cell and plant membranes, which absorb sunlight and convert it into a flow of electrons highly efficiently, paves the way for the development of new technologies for the creation of clean fuels from renewable sources: water and solar energy.

The BPEC cell developed by the researchers is based on the naturally occurring process of photosynthesis in plants, in which light drives electrons that produce storable chemical energetic molecules, that are the fuels of all cells in the animal and plant worlds.

In order to utilize photosynthesis for producing electric current, the researchers added an iron-based compound to the solution. This compound mediates the transfer of electrons from the biological membranes to the electrical circuit, enabling the creation of an electric current in the cell.

The electrical current can also be channeled to form hydrogen gas through the addition of electric power from a small photovoltaic cell that absorbs the excess light. This makes possible the conversion of solar energy into chemical energy that is stored as hydrogen gas formed in-

side the BPEC cell. This energy can be converted when necessary into heat and electricity by burning the hydrogen, in the same way hydrocarbon fuels are used.

However, unlike the combustion of hydrocarbon fuels – which emit greenhouse gases (carbon dioxide) into the atmosphere and pollute the environment – the product of hydrogen combustion is clean water. Therefore, this is a closed cycle that begins with water and ends with water, allowing the conversion and storage of solar energy in hydrogen gas, which could be a clean and sustainable substitute for hydrocarbon fuel.

The study was conducted by doctoral students Roy I. Pinhasi, Dan Kallmann and Gadiel Saper, under the guidance of Prof. Noam Adir of the Schulich Faculty of Chemistry, Prof. Gadi Schuster of the Faculty of Biology and Prof. Avner Rothschild of the Faculty of Material Science and Engineering.

“The study is unique in that it combines leading experts from three different faculties, namely three disciplines: biology, chemistry and materials engineering,” said Prof. Rothschild. “The combination of natural (leaves) and artificial (photovoltaic cell and electronic components), and the need to make these components communicate with each other, are complex engineering challenges that required us to join forces.”

EXPLORE FURTHER: Research sets new record for generation of fuels from sunlight. Journal reference: *Nature Communications*

Provided by: American Technion Society

Read more at: <http://phys.org/news/2016-09-cell-spinach-sunlight-electricity-hydrogen.html#jCp>

New weather app

The Bureau of Meteorology (BOM) has released a new weather app for smartphones, designed to keep up with the growing number of Australians accessing information on their smartphones.

Launched at the bureau's Melbourne headquarters on Friday, the app will simplify the information users can already get at BOM's smartphone-enabled website.

The BOM Weather app, which is available for Apple and Android users, is free to download, and gives users a brief look at the weather in their chosen location, with more detail provided at the tap of a finger.

It uses BOM's three-hourly forecasts to provide an hour-by-hour snapshot of the coming temperature and expected rainfall throughout the day.

An icon also takes users to the latest BOM-issued weather warnings.

While the app is free of advertising, BOM deputy director Rob Webb did not rule out having ads in future versions.

BOM began hosting advertising on its platforms in April 2013, after the 2012-13 federal budget.

“One of the keys for us with this app is usability. There is no point putting out an app if it's too cluttered,” Mr Webb said.

“So if there is advertising there in the future, it won't detract from the key weather service.”

There are already about 100 existing Australian weather apps available through Apple's iTunes store, many of which use BOM data.

“This app will have the latest bureau information,” Mr Webb said. “Our forecasters are typing and issuing warnings that will appear immediately on our app.” Costing about \$200,000 to develop and test, Mr Webb was confident users would see the value in choosing the BOM app over others in app stores.

<http://www.abc.net.au/news/2016-10-07/bureau-of-meteorology-launches-weather-app/7912924>

YACCA

Cape Otway Camp 1st-4th October

It's been another busy month for the YACCA crew, with our group just getting back from a three night camp at Cape Otway, Victoria.

While we were away YACCA members conducted vegetation surveys at sites that had been significantly impacted by fire in previous years. Due to the large koala population throughout the Otway Ranges much of the canopy regrowth is being eaten away, resulting in limited canopy cover.

YACCA members visited these sites, measured canopy cover, the species composition and prominent vegetation types. This data will be used by the Apollo Bay Landcare group to help them create action plans and management strategies for the region.



While away YACCA also visited the Cape Otway Conservation Centre for Ecology. While there we got to meet an endangered Tiger Quoll and also got to see a demonstration from one of the Quoll dogs. Quoll dogs are being specially trained throughout the Otway Ranges to help find

Quoll scats. These scats can then be used to see where the Quolls are living, but also to extract genetic information from it. While at the Conservation Centre for Ecology we also worked with a local ranger to help manage a local revegetation site.

Despite rainy weather we all had a great time, learnt a lot, and are looking forward to where next year's camp brings us.

SASKIA GERHARDY

We also had a great time exploring and playing hide-and-seek amongst the giant Californian Redwoods at Beech Forest.

Letters, emails or feed-back of any kind on anything in this Newsletter would be very welcome. If you have something you would like to see published, please contact me.



Tasmanian mushroom farm finds success in zero-waste business model

A speciality mushroom farm in Tasmania's Huon Valley is finding success in a zero-waste business model that ignores the usual mushroom aesthetic standards.

Two years into operations, the Cygnet Valley Mushroom Farm has gone from strength to strength, and is now on the brink of expansion.

"From day one, we haven't been able to keep up with demand," farm owner Bec Bovell said.

Ms Bovell, affectionately known by locals as The Mushroom Lady, started the Cygnet Mushroom Farm two years ago. She had no previous mushroom growing experience, but did have an eye for opportunity.

Huon Valley Mushrooms, run by parent company Costa, had closed its doors, leaving a gap in the market. "They transferred their growing of the brown and white mushrooms up to a Devonport site, but the growing of the speciality mushrooms they dropped," Ms Bovell said. "I just thought, 'I could do that, wouldn't that be exciting?'"

As Ms Bovell set about buying Costa's old machinery, and even hiring some of their old staff, she began reading up on mushroom standards and discovered a trend. "When I looked at all the models of other mushroom farms, they basically love to grow mushrooms that are perfect," she said.

Funny-looking mushrooms taste just as good

Mushrooms below a certain standard, known as seconds, are generally either discarded or fed to cattle, an idea that led Ms Bovell to the idea of running a zero-waste business. "Mushrooms don't know their standards. There are big ones and they grow however they want to, and some might be a bit crooked and some might have a funny-shaped cap," she said.

"We use every mushroom we grow and we either sell them as firsts, which are the beautiful artistic ones, or seconds, which are just as yummy." Ms Bovell sells the seconds, along with a selection of firsts, to consumers at the Hobart Farm Gate Markets, where her stall regularly attracts a crowd.

The majority of the firsts are sold to restaurants, with a few retailers also selling punnets to the public.

The varieties grown include oyster, shiitake and wood ear mushrooms, all of which are known as forest mushrooms.

"They are different to the general mushrooms you see in the supermarket in a key way," Ms Bovell said.

"And that is that they grow in the wild in timber, on rotting and decaying organic matter in the forest."

To keep up with demand, Cygnet Valley Mushrooms is in the midst of an expansion that will mean more growing rooms and more mushrooms.

"Those extra growing rooms ... will allow us to separate the mushrooms a little bit more and be really quite scientific and precise about the environment in which each mushroom is growing in," Ms Bovell said.

"That will make us better growers, which will mean we'll be able to grow more, not necessarily because we have more space, but because we're better at what we do."

The expansion will also bring more jobs to the region.

"There'll be more roles, there'll be more deliveries, and everything will expand that little bit more, so there will be more direct jobs, and also more indirect jobs," Ms Bovell said.

<http://www.abc.net.au/news/2016-10-06/cygnet-mushroom-farm-success-tasmania/7907960>

City trees removed

Looking out of the window on my morning bus journey from Kensington into Sydney's CBD, I saw more trees being cut down to make way for the new light rail. This time, it was the historical fig trees that line Anzac Parade.

Trees like these provide a host of important ecological, environmental and aesthetic benefits. I – like many Sydneysiders – am deeply saddened by their loss. It leaves me wondering, why can't we have a modern transport system but also enjoy a nice view along the way?

In meeting the needs of growing populations across our capital cities, it is vital that we have efficient, integrated public transport, with enough capacity to meet demand. The challenge of retrofitting transport systems into an established urban fabric means difficult decisions are inevitable. But what if building these new transport systems actually leaves parts of our cities more vulnerable to even bigger challenges, such as climate change?

Sydney and Canberra are forging ahead with light rail projects intended to reduce traffic congestion and improve accessibility. However, in both cities a significant number of mature trees will be impacted.

In Canberra, the ACT government is set to remove approximately 860 trees. In Sydney, about 1277 mature trees will either be removed or have their canopy or roots pruned.

Of the condemned trees, 871 are classified as trees of significant value. These trees, some of which were 160 years old, provide an array of benefits that make our cities liveable. These include clean air, amenity, biodiversity and cooling in hot temperatures.

The tree felling has caused outrage among Sydney residents who are frustrated by the way planning decisions were made. A controversial amendment to the route to accommodate private commercial interests meant many trees were removed at the end of 2015.

<https://theconversation.com/trees-versus-light-rail>

Internatinal Year of Pulses

Two events organized as part of the International Year of Pulses (IYP 2016) have called for increased efforts to scale up global production of pulses, such as beans, chickpeas, and lentils, due to their multiple benefits as nutrient-dense, soil improving and “climate-smart” crops. The International Conference on Pulses for Health, Nutrition and Sustainable Agriculture in Drylands (ICP 2016) took place from 18-20 April in Rabat, Morocco, while the Food and Agriculture Organization of the UN (FAO) hosted a seminar in Rome, Italy addressing the links between pulses and soils... on 19 April 2016.

Co-organized by FAO, Bioversity International of the CGIAR Consortium and the Permanent Representation of Italy to the UN, the Rome seminar titled ‘*Soils and pulses: symbiosis for life*,’ focused on the reciprocal relationship between soils and pulses, and their contribution to the 2030 Agenda for Sustainable Development.

With expert panelists and keynote speakers from intergovernmental agencies, research institutions and non-governmental organizations, the seminar specifically addressed how pulses can contribute to the second Sustainable Development Goal (SDG 2) (end hunger, achieve food security and improved nutrition, and promote sustainable agriculture) and SDG 15 (protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss). The discussions highlighted a variety of programmes working to improve the productivity of key pulse crops, enhance their contribution to sustainable intensification (producing more food with less natural resources), and expand pulses’ genetic diversity in order to boost plant resistance to diseases and pests. Other presentations highlighted the contribution of pulse production and consumption to sustainable rural development and livelihoods.

...One of the main objectives of the conference, which drew more than 300 participants from 36 countries, was to explore strategies to improve the nutritional situation of almost two billion people, while contributing to sustainable land management in dryland regions, where local communities are increasingly vulnerable to climate change. The conference also sought to reinforce global scientific collaboration and attract increased funding for pulses research and development.

... In his keynote address, Rattan Lal, distinguished Professor of Soil Science, Ohio State University, highlighted the need to increase food production for



WILLUNGA
Environment Centre INC

18 High St.

Terry Reardon from SA Museum will present **Bats** – what’s new in bats locally and beyond on **Tuesday 22nd November @ 7pm.**

An illustrated talk followed by a local walk to discover some bats. This is a joint initiative of the Willunga Environment Centre and the Friends of Aldinga Scrub and will be followed up with some Bat monitoring at the Aldinga Scrub, again with Terry sharing his wealth of knowledge and experience!

Free supper provided

Registration essential:

info@willungaenviro.org.au to register

Ryan and Phoebe’s Young Growers Group

“Our Young Growers’ Group is dedicated to those folks who are 18-35 and who grow (or have dreams of growing) their own food. Farmers, gardeners, backyard homesteaders and those striving for a more sustainable existence are all welcome. Join us as we network, collaborate, explore and discuss all things growing.

Meetings are on the first Thursday of every month. Bring your ideas, your friends and some snacks to share. 7pm - 8.30pm at the Willunga Environment Centre.”

the projected global population of almost 10 billion in 2050, noting “there are 2.4 billion guests coming to dinner, invited by us, and we have to make sure we provide food for them.” Presenting his “out of the box” vision for 2050, Lal proposed paying pulse farmers for their contribution to biological nitrogen fixation and carbon sequestration, noting that they account for 20-22 million MT of biological nitrogen fixation in the soil each year, which he estimated as being worth US\$50 billion. He also suggested investing in “smart farming” for a future in which “plants that talk to us through chemical messaging,” allowing farmers to intervene before a plant is damaged.

This article is heavily edited. Full article at: <http://nr.iisd.org/news/iyp-2016-events-promote-pulses-as-climate-smart-food-of-the-future/>

Frog Spotter app

A new citizen science project is aiming to increase our understanding of SA’s frog population. A new app will allow people to record frogs they find. There are 26 species in South Australia and eight are endangered. The app aims to assist with the protection of frog populations into the future.

The app was developed locally with the help of Zoos SA.

Visit the FrogWatch website, <http://www.frogwatchsa.com.au/>, for more information.



Willunga Hillsface Landcare Group

P.O. Box 215, WILLUNGA, S.A. 5172

Meeting dates vary, but are usually held on Mondays monthly at 5 p.m. in the Willunga Hub, cnr. St. Peters Terrace, Willunga.

All members are welcome to attend these meetings.

If you would like to receive your copy in PDF format (via email) please let me know as this saves the group postage. This is my address: 2garfy94@gmail.com.

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