BREMER CATCHMENT ASSOCIATION INC.

September 2021

Special points of interest:

The next Meeting will be our AGM held on

21st October 2021

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around the bremer

President's Corner by Bill Steentsma

This Newsletter includes a major Soil section. I felt, within the Bremer Catchment, we all have focussed our attention to this topic. It is related to the condition of the watercourses and total Catchment health. Very soon we will have the River Health Report cards published, which will give us a better inside of the condition within the catchment.

The monthly BCA meetings were honoured with great Guest speakers from many private, local and State Government entities. The information is in line with BCA's objectives for which it is established as one of these actions: to promote community, industry and government research and understanding of the interactions between these resources. Both Shire Councils have appointed Anna Shera, Catchment Management Officer, to deal with issues with the Catchment Action Plan (CAP) report.

BCA members have had much input at the initial community CAP meetings. At the recent monthly meetings, we were fortunate to have two Guest speakers, James Fewings (Dept. Environment &Sc) and Anna (Scenic Rim & ICC). Several Members have completed the freely offered Grant Writing Workshop provided by ICC. All were very grateful for this professional presentation.

Secretary Marianne and I would like to handover our Executive responsibilities at the October AGM. BCA, since its inception in 1995/1996 has dealt with many liaison environmental issues for the betterment of the Bremer Catchment. It is a Catchment important to agricultural/grazing, eco-tourism and urban landuse. In particular, we must not forget that BCA was created by both Shire Councils to form a link with the community.

Game-changing soil research set to drive new era of regenerative farming and carbon farming

The Regenerative Agriculture Alliance is pleased to announce eight ground-breaking research and extension projects that can be scaled for the greatest impact.
The $2.5 million Federal Government Department of Agriculture, Water and Environment research funding will deliver industry-led projects that will quantify the benefits of regenerative agricultural practices in restoring degraded soils across Australia over three years.

The University will be doing applied collaborative research in bio-regions around the country with groups of farmers, consultants, natural resource managers and researchers to address a wide range of challenges to help farms become more resilient in a changing climate. Currently, the focus is on soil research. Specifically, using regenerative practices to restore degraded soils and increase soil carbon. The following eight projects are now underway:

Multispecies cover crops in subtropical horticultural plantations, Professor Terry Rose, Australian Macadamia Society Limited, Australian Subtropical Coffee Growers' Association Incorporated Northern Rivers, NSW.

Macadamia growers in the Northern Rivers of NSW have been removing tree rows to enable ground covers to develop between rows to reduce erosion during heavy rainfall events. Changes in light, airflow and plant species have likely implications for pest and beneficial insect ecology as well as soil health. This project, in partnership with the Australian Macadamia Society, the Australian Subtropical Coffee Growers' Association and local avocado grower networks, will measure changes in soil health and insect ecology in macadamia, coffee and avocado plantations with either permanent groundcover or annual mixed species cover crops between rows, re-sown continuously following termination with a roller crimper.

Multispecies summer cover crops for Western Australian cropping systems, Professor Terry Rose, Facey Group Inc, South-Western WA

Western Australian cropping systems typically involve a summer fallow kept free of weeds using herbicides due to concerns that the use of stored soil moisture by weeds over summer may impact on growth and yields of winter cash crops. The aim of this project is to investigate summer moisture and soil properties, and winter crop yields then multi-species cover crops are grown during the fallow. The trial established by the Facey Group near Wickepin in South West Western Australia will include single and multi-species summer cover crops compared to a typical chemical fallow. Both economic and environmental measurements, particularly soil health, will be taken throughout the trial.

Investigating the benefits of multispecies cover crops in low rainfall mixed farming systems, Professor Terry Rose, Birchip Cropping Group, Wimmera Mallee, VIC.

This project will validate the benefits and shortcomings of using multispecies cover-crops to replace long fallows in a low rainfall broad acre mixed farming system in the Victorian southern Mallee. The project partnership with Birchip Cropping Group will focus on providing outcomes to benefit mixed farming practices where livestock supplement a winter cash-crop operation. A replicated trial will be designed to evaluate the effects of cover crops and include practices for improved soil health, cover crop establishment, management and termination, biomass production and groundcover.

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Soil Carbon Research Program 2.0 -A 20-year data set to understand the effect of farm management on soil organic carbon. Professor Terry Rose, Birchip Cropping Group, Wimmera, Mallee VIC.

This project in partnership with Birchip Cropping Group will identify potential farm management practices in the Wimmera Mallee that have a positive influence on Soil Organic Carbon (SOC) and build drought resilience in agricultural soils. The project builds on the Soil Carbon Research Program (SCaRP) 2009-2012, the largest soil sampling and analysis program undertaken in Australia to measure stocks of soil carbon and record associated management practices. SCaRP found that management practices of the last 10 years were not significantly related to SOC levels. This project will revisit, retest and resurvey 15 sites to measure potential changes in SOC and collect management data to collate over 20 years of management data, providing a longer timeframe from which to draw better conclusions on if and how farming practices are influencing soil carbon.

Effects of pesticides on soil microbial diversity and bioreactors to attenuate run-off on blueberry farms. Professor Kirsten Benkendorff, NC Local Land Services, Coffs Harbour City Council, Coffs Harbour Regional Landcare, Mid North Coast, NSW.

A wide range of pesticides are used by intensive agricultural industries on the Mid North Coast of NSW, with potential for build-up of chemical residue in the soils. On blueberry farms, methods for reducing pesticide use include weed matts and/or mulch and growing winter crops under plastic tunnels. Little is known about the retention of pesticide residues using these different farming methods or how they impact soil microbial health in this region. During major rain events, pesticides in the soil, as well as spray residues from hothouses can also be mobilised and leach into adjacent land and water ways. North Coast Local Land Services, Coffs Harbour City Council and Coffs Harbour Regional Landcare project have partnered with us to test the effectiveness of a bioreactor for facilitating biodegradation of these chemical residues. We will apply a replicated sampling design to investigate the relationship between pesticides, soil health and microbial communities on blueberry farms and in a hothouse run-off bioreactor .

Integrate biochar in to regenerative agriculture practices using biochar supplemented animal feed and dung beetles, Dr. Shane McIntosh, ANZ Biochar Initiative Incorporated, Soft Agriculture Pty Ltd, Northern Rivers, NSW

This project in partnership with ANZ Biochar Initiative Inc and Soft Agriculture Pty Ltd aims to develop an economically and biologically efficient method to restore compacted and depleted soils in Northern NSW. Regenerative agricultural practices such as biochar supplemented feed, dung beetles, rotational grazing, foliar sprays and biopesticides containing biochar and wood vinegar will be used to increase and improve pasture and other cover crops. Changes to soil carbon, other trace elements, water holding capacity and the release of nitrous oxide will be measured and assessed as well as the health and weight gain of the cows.

The last two projects will be in the December newsletter

Central Victorian Regenerative Farmers (CVRF) Multi Species Cover Cropping & Regenerative Pasture Management Project ('Beckworth RegenAg Project' and Measurement of changes in soil organic carbon levels in response to new regenerative farm management practices by graziers in the Northern Tablelands, North West Slopes and Plains and the Northern Rivers of NSW

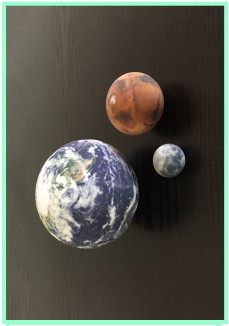
Secrets of the Soil

Bernie Powell, M. Rur.Sc., B. Ag. Sc., QDA, CPSS (Chair SSA Training Committee)

As a scientist who has the privilege to work with soils for more than four decades, I continue to be amazed about the value, diversity and nature of this forever changing natural resource. So here are a few soil secrets I hope you will find fascinating and revealing.

Earth v. Moon v. Mars

To put soils in a global context, the earth sciences include the study of rocks (geology), water (hydrology), soil and the atmosphere. Rocks on the moon and Mars are the same as those on earth. Water is known to exist on Mars and elsewhere in the form of ice and may have been liquid in the past. The atmospheres of the moon and Mars are nothing like that on earth. Soil with its essential decomposed organic matter in the topsoil only exists on earth. There are many types of soil, but they all have a dark topsoil layer enriched with organic matter built up by plant decomposition.



Earth has soil, the Moon & Mars have dust. Source: Gioann on Shapeway

The dust and loose material found on the moon and Mars does not have an organic rich top-soil and is not soil. So, soil science is the only true earth science.

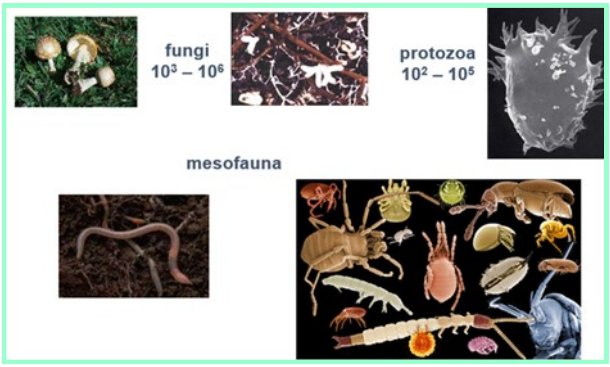
Soils are a living thing

Soil is a mix of minerals, water, air and organic material. Some of the organic matter is alive. It can be in the form of microbes, worms, insects, plant roots and burrowing animals (even mice). In climates like the Bremer catchment with contrasting wet and dry seasons, the amount of microbial activity ebbs and flows with the seasons.

In droughts and extended dry periods, the microbes shut down and hibernate, only to bounce back with the first rains. In fact, the first rains rapidly reactivate the microbes leading to a sudden release of nitrogen from the soil organic matter. This produces that first green flush of plant growth after a long dry, a feature called “The Birch Effect”, after the scientist who first described it.

There are many e types of microbes such as:

bacteria (single cell organism),
algae (simple plant, many have single cells),
viruses (very small and need a host to survive),
protozoa (single cell animals),
nematodes (microscopic worms), and
fungi (produce spores).



For microbes the soil is like a jungle, with many eating other microbes and some attacking plant roots causing root and crown rots, root knots and cankers. However, some microbes help each other, and some help plant roots access nutrients, a process called symbiosis. Rhizobia bacteria colonise legume roots but also provide the plant with additional nitrogen from the atmosphere. Mycorrhizal fungi colonise plant roots but help the plant to extract difficult to access nutrients like phosphorus.

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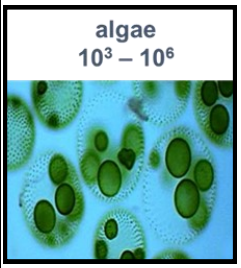
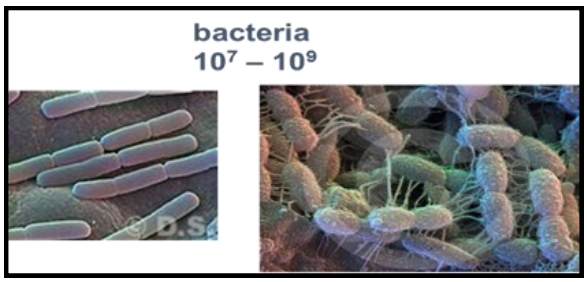
Some bacteria and algae can fix nitrogen from the atmosphere on the own. These nitrogen fixing bacteria are responsible for the initial fertility commonly seen on land that has never been cropped before. This initial fertility runs down over time and further nitrogen inputs are required to maintain production.

Other important soil nutrients such as phosphorus and potassium are only found in the soil and not able to be extracted by microbes from elsewhere. Their removal through cropping or grazing can only be replaced by the addition of some form of organic or inorganic fertilizer.

There is still a lot to learn about soil microbes. Although we know broadly the types of microbes present, the many species present, and their behaviour create a huge challenge for soil microbiologists. Just one gram of soil may contain a thousand species and millions of individuals. At this stage only 1% can be cultured and identified. We do know however that more biologically diverse microbial communities tend to be in the healthiest soils. Disturbance by cultivation and the addition of inorganic fertiliser are known to reduce biodiversity, but not necessarily crop or pasture growth.





Decomposition, Charcoal and Humus

Some soil organic matter is dead or cannot be easily broken down by microbial decomposition. The most stable form of this is charcoal. Australia has some of the highest levels of soil charcoal in the world. This is probably the result of aboriginal burning practices over tens of thousands of years. Charcoal is the most stable form of soil organic matter and takes hundreds of years to break down. It is a natural form of residual carbon sequestration in the soil, but this is not the case for the plants that are burnt. The process of burning releases carbon dioxide into the atmosphere.

Soil organic matter is measured by testing for the amount of organic carbon present in the soil. Soil organic carbon levels are primarily determined by the mass of root and litter generated by the plants above.

Decomposition of biomass by soil microbes results in carbon loss as CO_2 from the soil due to microbial respiration, while a smaller proportion of the original carbon is retained in the soil through the formation of humus. Humus is the end-product of decomposition and gives carbon-rich topsoils their characteristic dark colour. Humus is also resistant to further decomposition and has a long residence time in soil.

The benefits of soil organic matter and humus are well understood. It improves water infiltration into the soil, improves soil structure and water retention, supplies and retains plant nutrients and reduces sheet erosion. It acts like a buffer to stresses like drought, acidification, compaction and nutrient decline.

A Historical article published in Sunbird (Birds Queensland Journal) September 1970. Submitted by Jocelyn Clarkson, Member of BCA.

SOME SOUTH-EAST QUEENSLAND SIGHTINGS OF THE BLUE-WINGED KOOKABURRA *DACELO LEACHI* by J.S. Robertson

In the "Courier-Mail" of **August 3, 1970,** David Fleay of West Burleigh Fauna Sanctuary gives some details of a Blue-winged Kookaburra Dacelo leachi, which was brought to him following its collision with a car somewhere between Toowoomba and the Gold Coast. He then raises the question of the status of this bird in south-east Queensland.

During the period 1948 to 1958 my duties involved spending perhaps a third of my time in routine country inspections by road. In the evening it was usual to make a written record of any birds of special interest seen during that day's travel. Reviewing these notes recently has disclosed the following sightings of the Blue- ringed Kookaburra. It is clear that although these are large and distinctive birds, seeing one of them was an unusual event.

Sightings

Male Blue-winged Kookaburra

13/9/48 near Milbong.
18/8/49 on Purga Creek, near Loamside; also, at Churchbank

31/8/49 near Radford, one male and two females. 2/6/50 about 5 miles south of Rosewood.
27/9/50 near Toogoolawah.
20/8/53 near Mutdapilly, also in Wivenhoe Pocket near Coominya.

12/11/58 near Kagaru, also at Teviot Creek near Undulla.

These inspections involved covering the whole area from the east Darling Downs to the Coast and south to the N.S.W. border, at all times of the year; opportunities to notice birds were no better or worse in one area or another. Thus, the time of year and location of the sighting is considered as fairly representing the pattern of the birds' occurrence. Though some development has occurred, areas are probably much the same now as then.

It will be noted that all sightings were between June and November, and along the flatter country near the waterways, within an area from 50 miles north to 20 miles south of Ipswich, and never near the Coast or west of the Dividing Range.

To the above records can be added a sighting by Mr. Russell White of Ormond, Victoria, who recorded a male bird at Purga, 7 miles south of Ipswich on August 21, 1970.
Two other records of interest from the Editor and Mrs. Kathleen McArthur concern a pair during the months July- September 1965 at the Coolum Swamp, and a single bird near Gatton on June 6, 1965. It is worth noting that the Coolum Swamp birds would have been no more than 5 miles from the coast as the Blue-winged Kookaburra flies.

Vegetation -The Bremer Catchment Story

The Vegetation of some of the Scenic Rim Shire has been extensively cleared. The communities most severely affected are those of the valley flats and low foothills. The bulk of the native vegetation remaining is to be found on the Great Dividing and McPherson Ranges and on the mountain peaks. Most of these areas are not readily accessible.

The vegetation is divisible into two main classes:-

(a) on the flats, low hills, and the lower slopes of the ranges and mountains, the main forests are Queensland blue gum *(Eucalyptus Tereticornis)* open-forest; gum – topped box *(Eucalyptus moluccana),* open-forest; ironbark open-forest; spotted gum *(Eucalyptus maculata)* - ironbark open-forest; and brigalow *(Acacia harpophylla)*, softwood open-forest.

(b) On the mountain peaks, and the mid and high slopes of the ranges, the main forests are ironbark-stringybark open-forests; stringybark open-forest; grey gum-stringybark open-forests; flooded gum *(Eucalyptus grandis)* open-forest; Sydney blue gum (*Eucalyptus saligna)* stringybark open-forest; brush box *(Tristania conferta)* open-forest; and mixed open-forest. Closed-forests (rainforests and scrubs) are common and Antarctic beech *(Nothofagus moorei)* closed forest, bell-fruited ash *(Eucalyptus codonocarpus)* open-scrub, and Queensland peppermint *(Eucalyptus expert)* open-scrub also occur. The cliff faces and rocky slopes of the mountain peaks carry a specialised flora.

Fringing forests line the streams and watercourses throughout thr district.

Eucalyptus grandis

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