metagen AUSTRALIA
THE SOIL HEALTH COMPANY

METAGEN LAB SERVICES

Welcome to The Metagen Lab, where we pioneer advancements in Australian agriculture through a deep understanding of soil and plant microbiomes.

As a premier provider of microbiology and molecular biology analytical solutions, we offer an extensive suite of services for growers, agronomists and researchers, including:

- DNA Based Soil Health Testing that includes Bacterial and Eukaryotic microbial profiling, pH, active carbon, B glucosidase and Phosphatase measurements.
- DNA Extraction and Metabarcoding for Researchers
- Pathogen Isolation and Identification
- Plant-Parasitic and Free-Living Nematode Analysis
- Ratoon Stunting Disease Testing (LSB-qPCR)
- Biological Product Analysis.
- Biological Analysis of Composts and Organic Amendments
- Contract R & D

Soil Health DNA Testing

Soil health is the product of physical, chemical and biological soil factors. Good soil health produces a multitude of benefits including better nutrient use efficiency, soilborne disease suppression and soil water holding capacity. Historically, physical and chemical properties have received the most attention for soil health. With cost effective DNA sequencing we can gain unprecedented insight into soil micro-organisms, aka the soil microbiome, with data generated by DNA sequencing showing the pivotal role of microbes in soil health, including building soil structure, making plant nutrients available and keeping pathogens in check.

Given the breadth of testing already available for chemistry and physics, our testing has a strong emphasis on the soil microbiome in relation to soil health, although we do assess some chemical and biochemical measures. We are looking to support physical measures down the line. We use a technique called DNA metabarcoding to profile the diversity of bacteria, fungi, protists and nematodes (amongst others). For a given soil we profile thousands of microbes. To make sense of it we translate this profile in a suite of interpretable, actionable metrics.

You can use the test to baseline the health of your soil, understand differences in productivity between paddocks, confirm that products or management practices are improving your soil microbiome and track the soil microbiome over time.

Test results are typically ready in 4-6 weeks from the beginning of a batch. Batches start at the beginning or middle of the month. December is the exception – where only a run beginning in the last week of November.

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DNA Extraction and Metabarcoding for Researchers

Metabarcoding, a powerful tool for microbiome research. It allows researchers to rapidly identify and quantify multiple microbial species from environmental samples by amplifying and sequencing DNA from a mixed community. This method enables comprehensive community profiling, revealing microbial composition, abundance, and potential interactions.

Metagen offers a commercial DNA extraction and metabarcoding service for researchers. We have validated primer sets for assaying the diversity of bacterial (16S), fungal (ITS), whole eukaryotic (18S), and nematode (18S) communities and will soon offer an assay to assess the diversity of micro-invertebrate communities. We are also happy to consider the use of alternative primer sets in cases where researchers have specific requirements.

Soil DNA extraction can be an expensive and technical – with results strongly dependent on soil type. Our technique, which is open source and peer-reviewed extracts DNA from 5g of soil (as opposed to 0.25g in standard kits) giving a better assessment of eukaryotic communities. We can assist researchers in performing their own DNA extractions or offer advice on how to extract DNA in-house to reduce per-sample costs.

Test results are typically ready in 4-6 weeks from the beginning of a batch. Batches start at the beginning or middle of the month. December is the exception – where only a run beginning in the last week of November. Results for this service are typically provided in form of raw sequencing data (fastq files) and tabulated microbial diversity data (ASV tables).

Pathogen Isolation and Identification

Plant diseases are often diagnosed based on the symptoms seen in-field, but many different plant pathogens can cause the same disease symptoms. Basing a disease diagnosis on in field symptoms alone can result in incorrect diagnosis and the implementation of incorrect management practices that do not help combat the disease. Ultimately, this leads to wasted time, money, and no progress on fighting the plant disease. Further testing is usually required to ensure a correct disease diagnosis is made. The Metagen pathogen isolation and identification test is designed to identify common bacterial and fungal plant pathogens. Using this test will help ensure a correct diagnosis is made and give you the best chance of effectively managing plant diseases. The test works by using classical microbiology techniques to isolate fungi and bacteria from diseased plant tissue. We then use DNA sequencing technology and our in-house expertise and experience with plant diseases to identify the plant pathogens. Results of the test are presented as a comprehensive report with detailed information on each different fungi and bacteria detected and their ability to cause plant disease.

Fungi and bacteria are isolated and identified from the plant tissue and written into a comprehensive report that is ready in 2-3 weeks from the date the samples arrive. This test cannot be used to detect viral plant pathogens.

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Plant Parasitic and Free-Living Nematode Analysis

Plant parasitic nematodes are a major problem for many growers, particularly in horticultural crops grown on sandier soils. Accurate quantification of nematode populations enables targeted and effective management strategies, ensuring optimal crop yields. With a commitment to sustainable farming practices, this service allows growers to make informed decisions on management practices, reducing the impact of nematodes on plant health.

We recover nematodes from 200 g samples of soil using a whitehead tray extraction method and then determine the abundance of all plant parasitic nematodes through microscopic analysis. Results of the test are presented in a detailed report with a typical turnaround time of one week.

We can also perform analysis free-living nematode communities. Contact us for more details on this service.

Ratoon Stunting Disease Testing (LSB-qPCR)

Ratoon stunting disease is a serious and often overlooked disease that can significantly impact sugarcane yields. It is present in all sugarcane growing regions in Australia and is under-diagnosed in most regions. This is due both to a perception that the prevalence of this disease is low and to a lack of sensitivity in the methods that have historically been used to detect the disease.

The leaf sheath sampling method allows sugarcane of any age to be tested and samples can be taken at time of day. The relative ease of collecting samples means that more plants can be tested at a lower labour cost relative to other sampling methods such as sap sampling. The use of qPCR offers unparalleled sensitivity allowing detection of the RSD pathogen in all sugarcane varieties.

Results of testing are typically delivered within a week of receiving samples.

Please contact us if you wish to submit samples for RSD-testing as a custom-made sampling tool is required to take leaf sheath biopsy samples.

Analysing / Validating Biological Products

Commercial biological products often report the concentration of microbes in a product as the number of colony forming units (CFU) per ml or gram. As there are no regulations on these products in Australia, there are frequently disparities between what is in a product and the active constituents listed on the label. Furthermore, many complex products such as composts, ferments, teas, worm extracts may contain diverse and complex microbial communities that may vary between batches or manufacturing methods. Analysing the biological component of these products can be very useful to better understand the microbial constituents of these products and to serve as a quality control measure to ensure they contain what is written on the label. The information obtained from this type of analysis can also be used to value-add to these products, providing information that can be used in marketing materials.

We can determine the CFU per ml or g of most simple microbial inoculants provided they contain no more than 5 species of microbes. For more complex microbial products we can analyse the microbial

content using DNA sequencing to profile the microbes in a product. The diversity of microorganisms in a product is determined through DNA analysis, using the same method that we use for assessing soil health. This method can also be used to determine the level of contamination in the product. There are three options for biological product analysis:

CFU counting: Includes pH measurement and CFU counting to confirm the expected species and the concentration of viable microbes in the product.

DNA analysis of biological products: Includes DNA metabarcoding to profile all the microbes in the product.

Detailed: Includes both CFU counting and DNA metabarcoding.

Results of testing are typically delivered within 2-3 weeks for CFU counting testing or 4-5 from the start of every month for DNA analysis.

Contract R&D

Metagen has done private research for a variety of organisations including Universities, Government departments, Multinational Agriculture companies, large corporate farms and other research institutions. If you are interested in collaborating on a research project please get in touch.

Contact us

If you have any questions or require more details on the services, we offer please contact the Metagen Lab directly:

lab@metagen.com.au