LABS

Beneficial Bacteria

Collecting, selecting for and storing Lactobacillus bacteria for use in the garden farm and at home.

NEVILLE PORTAS - NATIVE BIOTA

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LAB

Lactobacillus is a genus of gram-positive, facultative, rod-shaped, non-spore-forming bacteria.

The genus comprises of hundreds of species that are extremely diverse in phenotypic, ecological, and genotypic characteristics.

Used here as a serum with both Lactic acid and millions of live Lactobacillus bacteria of various strains.

LABS has so many benefits, many of which I am sure we know nothing of yet. The usefulness to the natural grower cannot be overstated. If there is one thing you have in your toolkit, let it be LABS.

Ecological animal stewardship and plant cultivation is a funny old game. It flies in the face of our need for metrics and prescribed additions of “fertilisers & foods”. The misunderstanding can be demystified if:

We look at the growing environment as a set of very complicated scales. We can simplify them for this discussion and look at them as the ‘good microorganisms’ on one side and the ‘bad’ on the other. We need them all; good and bad, they all have different jobs keeping each other in check to avoid things getting out of balance.

But as always, things do. We can use LABS as a first point of call to tip the balance back to the ‘Good’. This is very simplistic, and they do so much more, but as a starting point, this will help us work out how we use them.

261 species

That we know of to date (2025) Lactobacillus is the largest genus within the group of lactic acid bacteria (114).

Lactic Acid

Is made by breaking down carbohydrates. This is mainly done by breaking down the sugar lactose in milk. Lactobacilli grow well in milk and foods made from milk. They're responsible for the "souring" of milk, also known as cheese.

Soil Microbiome

The use of Lactobacillus in farming is a promising approach to enhancing soil health, promoting plant growth, and controlling plant pathogens naturally. Its multifaceted benefits range from nutrient solubilisation to biocontrol.

Facultative Microbes

Can thrive in environments both with and without oxygen. As a result, they can be used in nearly all circumstances, including fermentation.

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for more info check - Korean Natural Farming: recipes, solutions, applications. - David O'Carroll

USE'S

Lactobacillus, offer a range of benefits across various domains, including plant growth, soil health, fermentation, cleaning, and animal care.

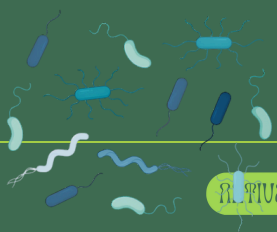
Soil Health & Composting

Soil Structure Enhancement: Bacteria contribute to the soil food web, helping the formation of stable soil aggregates, improving aeration and water retention, which are crucial for root development and disease suppression, amongst other vital services.

Composting Acceleration: LAB accelerates the decomposition of organic matter during composting, resulting in nutrient-rich compost that enriches the soil. LABs are present in the air all around us and on many surfaces. Sometimes, when composting in city centres or contaminated areas that have caused the depletion of beneficial microorganisms, it is essential to replace these to allow both compost and soil to function properly.

Plant growth & Health

Nutrient Availability: LAB enhances nutrient uptake by breaking down organic matter into simpler forms that plants can readily absorb, leading to improved growth.



A LAB application can improve soil enzyme production and activity, promoting the growth and development of plants.

Microbial activity fosters resilience to swings in environmental and nutrient availability. Extremes in heat, water, and food can all be managed better by the plant.

Pest & disease control

Disease Suppression: Certain LAB strains produce antimicrobial compounds that suppress harmful soil pathogens, reducing the incidence of soil-borne diseases, most noticeably fungal blights (Oomycete) and powdery mildew (Ascomycete).

Fermentation

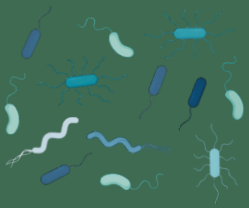
Using LABs we can ferment waste streams by composting them quickly and safely. This is a 'pre-composting' technique and has many unique benefits for waste reduction, inoculation, time saving, and cost reduction.

Animal Stewardship

LABs is an excellent microbial inoculant to add to deep litter carbonaceous animal coops and pens. It is used widely to neutralise smells and improve health in livestock. It's also fed directly as a probiotic.

Collection of Microbes

Rice wash



For your solution, use recently collected rainwater or let tap water rest for 24 hours in an open-top vessel to allow fluoride to off-gas and to rise to room temperature.

Placement can be on a shelf, a works surface, or in a pantry.

Somewhere clean but not sterile, making sure the area has airflow.

For wild collections, place them in the most established part of the garden or field if you have appropriate means of keeping them bug and rodent proof. If not, a shed will do. Keep away from pollution or concentrated chemicals.

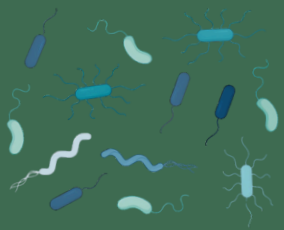
Here we are creating a starch-rich solution to collect microbes that are carried by the air.

- Wash out a cup full of rice in 0.5L of water. Use whatever rice you eat (or want to make IMO1 with). Ensure the water is cloudy.
- Cover with a breathable lid and place in a dark, warm place.
- Check daily. Depending on warmth and microbial load, it can take between 2-4 days to collect microbes; any longer can promote mould growth.

Signs of success are a thin film on the top and an odd sweet smell with a cloudy centre and a layer of sediment at the bottom.

Selecting Microbes

Adding Lactose



Your IMO collection will contain a huge array of microbes of all kinds. To select LAB, we feed them a food source which will allow them to outcompete all others.

Using the ratio of 1:10, we understand that we need 1 part IMO collection to 10 parts milk.

Using this ratio you can make as much or as little as you need.

- Add your milk and IMO collection and stir with a spoon or wooden stick.
- Cover with a breathable lid and place back in your dark, warm place.
- Check daily for separation of the curds (cheese) and whey (your LABs). Depending on warmth and microbial load, it can take between 2-4 days to collect microbes, sometimes longer depending on temperatures (see next page).

Note: As with any ferment or microbial reaction, we do not want any dirt to allow competition or to make the LABs go bad. Clean all vessels well and ensure no soap residues remain. Use rested waters and always use wooden utensils and glass/ceramic/plastic bowls, as metals can be antimicrobial.

Selecting Microbes

What Milk?

Any milk will do is the answer.

But as always, there's your context to consider.

Will you eat the cheese? What budget do you have to complete this project?

Look for out-of-date milk, even UHT long-life milks that have been at the back of the cupboard.

In the demonstration cited here, we used raw milk and found this makes a great cheese and robust, long-living LABs.

You can make LAB without milk; search for 'Vegan LAB'. The process is longer and takes more infrastructure, but it is possible at home and avoids animal products.

Do you need to make LAB?

Do you have a Dairy close or a cheese maker that have LAB as a waste resource? These relationships and circular economic options nearly always trump making your own.

Separating the Curds & Whey

Harvesting Serum

Separate the curds and whey by sieving out the solids with a cheesecloth or tea towel. Mesh bags are better for larger batches.

Allow curds to stand and drip until all the whey is extracted.

LABs can be used and are most active when fresh. However, the shelf life is limited as the microbes will consume any remaining food source and will slowly decline.

To extend the shelf life, you can add sugar. This is called supersaturation. Adding sugar depletes the available water for the microbes and puts them into hibernation.

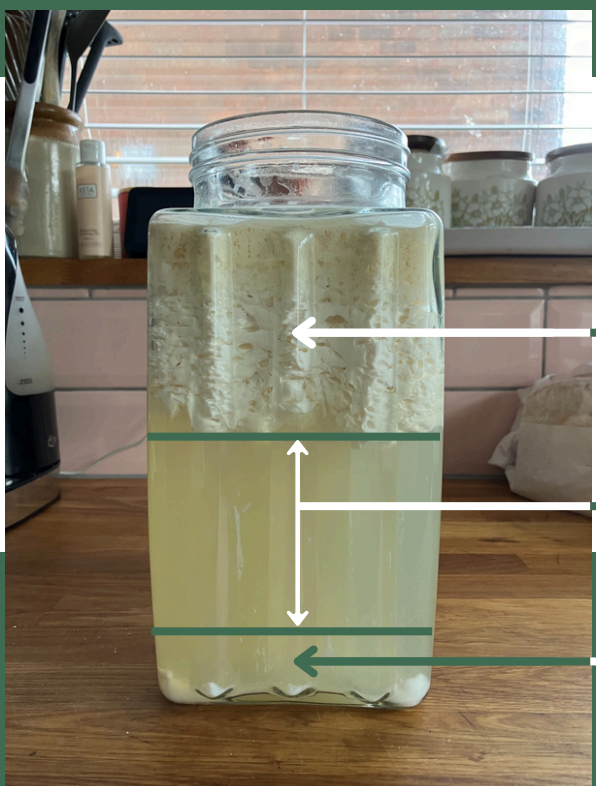
- Before refrigeration, whilst still at room temperature, stir in Unrefined Cane Sugar (brown sugars).
- Keep stirring until the sugars dissolve—keep adding sugars until some are still visible at the bottom. Store refrigerated for up to 6 months and at ambient temperature for up to 3 months.

Stabilised LAB

Note: The resulting 'Cheese' is fresh, soft and is great with salt and herbs. Lactobacillus is a known probiotic for humans, generating a global billion-dollar industry. But taken fresh and local as these IMOs are, you will see far greater benefit than from store-bought versions. If you do not eat cheese, feed it to livestock. Failing that, use it as a microbial input to your latest compost pile.

Separating the Curds & Whey cont:

Harvesting Serum



When removing the curds, spoon out as much as possible from the surface. Then strain out LABs, leaving the last part of the solution (bottom 25mm or so) in the jar to be composted.

The middle horizon contains the largest numbers of active lactobacillus bacteria. Allowing too high a percentage of protein, fat, and carbohydrates to remain in your serum will affect the shelf life. Strain with a cheese or muslin cloth to get a high-quality end product.

USAGE

Working out how much you may want to culture will happen over time when you understand better what applications make sense for your context.

Make small amounts and use before the microbes expire.

- One week - fresh / refrigerated
- Three months - sugar / ambient
- Six months - sugar / refrigerated

Ratio 1:1000

1:1000 is a standard ratio for most uses both as a foliar / drench in the garden and for human and cleaning uses.

1:500 is a ratio used for deep litter bedding and other animal husbandry applications.

1:1000 would be used as pre-biotic in waters and for fermenting feed stocks.

1:100 Can be used for toxic & bioremediation situations.

1:1000 - For a 7L (7000ml) watering can you would add 7ml of LABs.

1:500 - For a 7L (7000l) watering can you would add 14ml or LABs.

1:100 - For a 7L (7000l) watering can you would add 70ml or LABs.

The Foundations

LABs can be a basis for symbiotic relationships with many other microbes, with plant life, the fungal web, and all the micro/macro beasts that inhabit the soil food web.

Once our ecosystems are functional, we can move up to more diverse ferments, compost teas, and extractions. But LABs will always have uses as a way of replacing missing microbes, probiotics, and as a catalyst for fermentation.

Fermentation

By simply excluding oxygen from LABs we can ferment lots of different organics. For ratios of LABs and Molasses (food source) see BOKASHI / FPE / POULTRY FEED chapters.

Livestock Feed 1:1000

- Fermentation increases beneficial probiotics, enhancing gut health.
- It reduces anti-nutrients like phytic acid, improving nutrient absorption.
- Fermented feed can lead to better egg quality and overall poultry health.

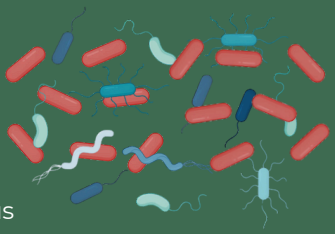
Waste streams 1:500

- Bokashi Fermenting
- Farm scale crop residue and animal waste.
- Treating slurry and liquid faeces.

FPE - Fermented plant extracts General purpose and specific amendments for plant growth and inoculation of soil based agriculture.

Lactobacillus

Field Notes & Findings



Other microbial solutions that contain Lactobacillus

Worms / Wormcastings & Extracts

Worm guts are lined with various species of Lactobacillus (LAB). All organic matter that passes through the gut of a worm emerges pathogen-free.

In addition to LAB, worms and their castings (poo) contain nitrogen-fixing bacteria (e.g., Azotobacter, Rhizobium) and photosynthetic bacteria.

While not always dominant, photosynthetic bacteria can naturally occur in environments where worm castings are produced. Yeasts and other fermentative microbes are also common in both worm castings (as a by-product of organic decomposition) and EM1, where they play a vital role in breaking down organic matter.

Worm castings are also a rare source of humic substances, including humic and fulvic acids. These, combined with the microbial life mentioned above, make worm products highly effective as LAB-rich inoculants.

EM - Products

Effective Microbes (EM) is a microbial inoculant made up of beneficial, naturally occurring microorganisms cultured in a laboratory, bottled, and shipped.

While these microbes are not naturally sourced, EM offers the advantage of technical data, which can be essential when working with public bodies or corporate clients—something home-cultured alternatives lack.

EM products contain high concentrations of lactic acid bacteria, photosynthetic bacteria, and yeasts. I have used this product many times and found it reliable and effective. However, one downside is that it is produced outside your locality.

This raises two concerns. First, the resource and transportation costs involved, which are avoided when culturing microbes at home. Second, microbes from your local environment tend to be more resilient, better adapted to temperature swings, and more capable of withstanding water scarcity or excess.

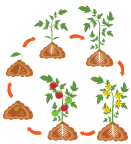
Lactobacillus

Field Notes & Findings

LAB's is great heres why that is true but not always...

PH Lowering capabilities

Plant growth stages



Bacterial activity is linked to acidification. Their metabolic processes and life cycles gradually lower pH in small amounts. In addition, terrestrial plant photosynthesis also contributes to acidification.

This is not as drastic as it sounds—it's simply the chemistry of nature. Many other factors tip the scales in the opposite direction, maintaining balance.

Problems arise when soil is already acidic or naturally trending towards lower pH. When this is compounded by high bacterial activity, it can temporarily cause mineral lock-up and lead to poor plant development.

That being said, microbial acidification can be used as a tool to lower high-pH soils or to counteract amendments that make soils alkaline.

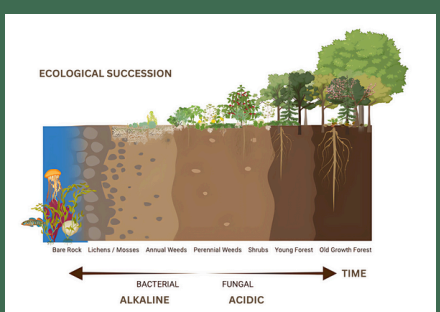
As mentioned earlier, Lactic Acid Bacteria (LAB) are often the first microbes we use to rescue soils. Build your soil microbiome on this foundation, rather than overusing LABs—except when using them as fermenting agents or cleaning products.

An Ecological succession chart like this one helps us understand both PH changes and Plant growth stages that occur naturally.

Using LABs on leafy greens is always great for producing larger, tasty leaves, but using it on fruit can deplete taste, and therefore we assume it's depleting sugars and minerals.

This can be avoided by observing the plant growth cycle. Young plants require nitrogen, and this nutrient is made available to the plant by LAB. However, as the plant cycles through its different stages, it requires varying combinations of micro and trace elements.

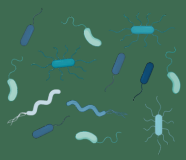
In natural environments, we see bacteria decrease and higher fungal counts as things go through 'succession'. This succession involves the transition from every microbe to the environment and the planet itself (search Ecological succession).



PICTURES

Old LABs

This was a jar of serum that had been in the fridge without sugar for over 2 months. It was active and did the job beautifully. This proves there is no real benchmark for how long microbes can persist.



Rice water collection

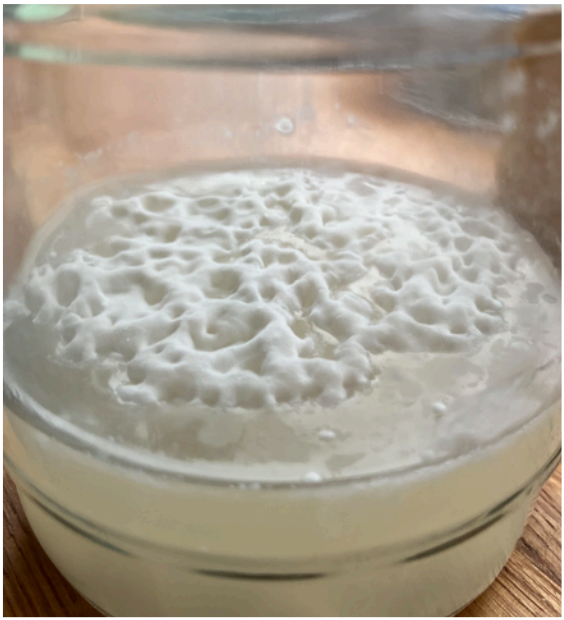
Here's another photo of how the film on top of your IMO collection may look. This is good, but any longer and I may have had green mould appear; this is not good and can result in your whey sinking instead of floating. The LABs still seem to work in this case but have a highly reduced shelf life. Not ideal.

Success

A good sign is a solid whey that has a creamy appearance.

Left out

This is a small drip that had been left out at room temperature. The white furry film is a barrier the bacteria form to exclude air from the solution surface.



Bokashi ferment

This is a bucket of kitchen waste fermented using LABs ready for adding to the soil or composting.

Chicken coop maintenance

Above shows a batch of Labs ready to be watered into the deep litter bedding.

LAB Cream cheese

Yogurt, Kefir, Cheese, Sauerkraut, Kimchi, Kombucha, Kvass, Sourdough Bread, Dosa and Idli Batter, Miso, Tempeh, Soy Sauce, Fermented Fish, and Natto are all lacto-fermented foods that have been incorporated into every culture for millennia. This cheese was made from a recent LAB collection.


L . A . B
20-04-24

References

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