

# BIODYNAMIC COMPOST PREPARATIONS

## *Preparation 502: Yarrow*

by Rachel Pomeroy

In this new series, we explore each of the compost preparations in turn. These preparations are collectively added into biodynamic compost and other ferments in order to bring cosmic influences into the farm.

Receiving and passing on. Facilitating process and flow. Keeping things moving. This is the overriding quality of the biodynamic yarrow preparation. It stimulates sulphur processes to work in the right way. Biochemistry reveals that the active portion of many enzyme molecules is a sulphate ion. This aligns with Rudolf Steiner's description of the role of sulphur: not to build up the framework of physical existence, but rather infusing it with unceasing life and movement. The surging, weaving, vibrating life forces, with the assistance of sulphur, move into physical life processes.

For many natural healing practitioners, yarrow is the workhorse among herbal remedies, able to take on a chronically stuck condition and free the pathway for the condition to move on, to 'get over the hump'.

### **The big picture**

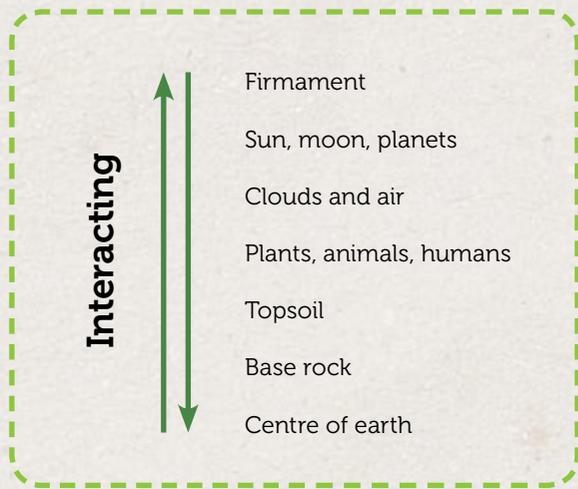
In this first article of this series, let's take a step back and look at the wider picture of the biodynamic preparations.

The Earth resides within the solar system, and within the greater universe beyond. The whole is a unified body, with every part influencing every other part.

Left: Preparation 502. From the bottom: fresh yarrow flowers, deer antler, mature 502, a stag's bladder (and a small visitor to Rachel Pomeroy's garden).



Photo by Rachel Pomeroy



The Greeks used the word 'cosmos' for the order of the heavens, which governed the order of life on earth – the macrocosm and the microcosm. The people experienced the heavens as the source of the ordering forces within life. For them, the essence of being or life originated from the outer cosmos, the fixed stars, where 'beingness' exists in timeless eternity. In this view, the role of the planets was to bring that fixed essence into process, allowing it to unfold in the realm of time, through growth, death and rebirth. At the point of death in each cycle, freed from its material manifestation, the essence can then 'revisit,' if it's a cabbage for instance, 'the giant cabbage in the sky'. The essence itself may slowly change as a result of accumulated physical manifestation experiences.

However, the earth's connectedness to the ordering forces of the cosmos has become less strong, resulting in loss of plant health, loss of good taste, and loss of seed viability, which were the questions with which farmers approached Rudolf Steiner for answers. This resulted in his giving the Agriculture Course in 1924.

In introducing Lecture 5 of the course, in which he described making the compost preparations, Rudolf Steiner said:

"We have to enliven the soil directly by means of organic material that has been conditioned to organise and enliven the solid earth itself. To indicate how this stimulus can be imparted to manure or liquid manure or any other sort of organic matter, is the task of spiritual science with respect to agriculture. Spiritual science always looks to the large-scale activities of life, and ignores the microscopic realm and the conclusions drawn from this realm, because this is of less importance. The task of spiritual science is to observe the macrocosm, the broadest dimensions of the workings of nature, and to understand these workings."

Steiner then described the making of yarrow preparation, though he didn't speak of a particular planetary connection.



Photo: bit.ly/2sqKhkH



Photo by Rachel Rose

Top: Yarrow

Bottom: Preparation 502: yarrow, ready to use.

The year 1951 saw the publication of Dr Bernard Lievegoed's *The Working of the Planets and the Life Processes in Man and Earth*. The book is based on his research on Steiner's work, as well as the experimental work of Lili Kolisko. Lievegoed elucidates planetary processes and connects them with each of the biodynamic preparations. He directly relates the yarrow preparation to Venus.

It is not a simple task trying to come to a deeper understanding of the preparations and planetary processes, but, in my own life, my interest has led me into making all the preparations every year for the last 20 years, including growing plants and sourcing animal parts. Also, over this time, I have continuously followed the movements of sun, moon, planets and constellations as a naked-eye observer. In both activities, I try to notice what qualities I directly experience for myself, living in the hope of experiencing some small part of the inherent wisdom and qualities in each. This is the wisdom which Rudolf Steiner could see, and out of which he gave the indications for making the biodynamic preparations.



**My interest has led me into making all the preparations every year for the last 20 years, including growing plants and sourcing animal parts.**

## Yarrow behaves like Venus

Venus, in its 19-month cycle, moves into the morning sky as a clear, calm, totally open, receptive body of light. It remains as a prominent presence for five months, before gradually fading into the glow of morning light and disappearing from view over the following six months. Then slowly it becomes visible above the western horizon after sunset, becoming the beautifully bright 'evening star' for the next seven months. Then Venus rapidly 'drops to the earth' before its rebirth into the morning sky only two weeks later.

Receiving and passing on. This is the overriding quality of the yarrow preparation, a quality present in macrocosmic form in the relationship between the movements of earth and the planet Venus.

The yarrow preparation, in its influence on soil, plant and animal life on the farm, behaves like Venus: openly

## How is PREPARATION 502 made?

- In spring, stuff yarrow flowers into a bladder from a male deer, a stag.
- Tie or stitch the filled bladder to close it.
- Hang it in a tree where it receives a good amount of sunlight.
- In autumn, remove the bladder from the tree and bury it in soil.
- The following spring, lift it from the soil and store the now-composted material ready for use.

## What does Rudolf Steiner say about it?

- Enlivens compost so it can absorb and retain the fine doses of silicic acid, lead, mercury and other micronutrients which rain in from the cosmos.
- Yarrow can radiate its effects through large masses of manure because its own highly dilute sulphur content is combined with potassium in such an ideal way.
- By putting yarrow into a deer bladder, we enhance its inherent ability to combine sulphur with other substances.
- The deer is intimately related to the cosmic aspect of the earth's surroundings.
- In terms of its forces, a deer bladder is almost a replica of the cosmos.

receiving the situation as it is, and wisely moulding the solution which will allow the maximum dynamic of interactions possible for that situation. The stag, with its antlers open and sensitive to the ordering forces of the cosmos, and it hooves lightly flowing on the earth, also exemplifies this quality.

Through bringing our hearts, heads and hands to the task of making and using the biodynamic preparations, we can call the ordering forces of the cosmos to, once again, work strongly in the material manifestation of life on earth. ■

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*Rachel Pomeroy is a highly experienced biodynamic home gardener, watcher of stars and planets and maker of preparations. She was long involved at Taruna College and has a M.Sc from Massey University. Rachel has also travelled extensively in India with her partner Peter Proctor, teaching biodynamics.*

**Each biodynamic compost preparation is based on a single plant; some are created using specific animal body parts as vessels. Each preparation is associated with a particular celestial body.**

502	Yarrow Bladder	Venus
503	Chamomile Intestine	Mercury
504	Stinging nettle	Mars
505	Oak bark Skull	Moon
506	Dandelion Mesentery	Jupiter
507	Valerian	Saturn



# BIODYNAMIC COMPOST PREPARATIONS

## *Preparation 503: Chamomile*



Photo by Rachel Pomeroy

Preparation 503 ready to use

Rachel Pomeroy continues her series of articles here, exploring each of the 'compost preps' which bring cosmic influences into biodynamic compost heaps and other ferments.

Calming, ordering and soothing, while retaining the dynamic vitality of living interactions. This is the picture for the biodynamic chamomile preparation. This preparation promotes vitality and flow of life processes.

Chamomile is a self-seeding annual of the daisy family. It readily spreads throughout the garden.

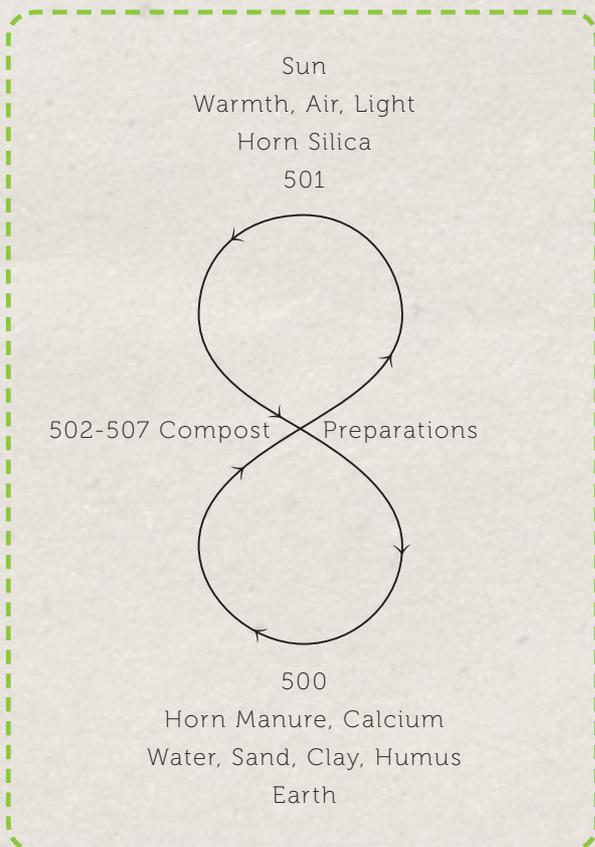
I leave seedlings to grow in positions with easy access for regular flower harvest. Chamomile seems especially happy when growing intermingled with other plants and gaining support from them. It branches directly from the base, and every shoot then has endless lateral branching, forming an ever-expanding globe of little daisies. The leaves are finely divided. It is certainly a light and sprightly plant.

On warm sunny days, the flowers have a light crisp snap on picking, and they are easily spread on the drying rack. My fingers feel very smooth, awake and sensitive with the pollen on them from picking. In a few days the flowers are dry, and especially if stored in a jar, they retain a beautiful aroma. On a cool or damp day, the petals are drawn down, and the flowers don't invite you to pick.

Medicinal uses of the flowers include soothing and ordering upset digestion, calming and healing irritation or inflammation of the skin or eyes, and relaxing before sleep, when taken as a tea.

To make the biodynamic preparation, lightly moisten the dried flowers before putting them into a length of small intestine from a cow. Any smelly intestines quickly become pleasant once the flowers are inside them. The intestine itself becomes transparent and, indeed, the sausages are very beautiful. (Before refrigeration was available, meat was kept fresh by rubbing with chamomile flowers or dipping in a cooled chamomile tea. Chamomile facilitates the meat holding its life forces for longer.) The sausages are buried in good soil for the winter months, and an active, living breakdown, under the influence of the earth's winter forces, takes place.

The compost preps are always used together as a set, with their individual qualities complementing each other and facilitating the breathing between the polar opposites of horn silica (501) and horn manure (500) field sprays. The preps are used in small amounts. It is not their physical substance that is nutritive, but rather the way they infuse the total field situation with living forces.



Chamomile 503 particularly regulates movement of nitrogen and calcium within the living realm. It works more closely with the Earth end of the polarity. Its effect is to help the parts of the whole living system to be aware, interactive and responsive.

## *How is* **PREPARATION 503** *made?*

- Harvest chamomile flowers in spring, dry and store them until autumn
- Fill lengths of cow intestine with flowers to make chamomile sausages
- Bury the sausages in soil and lift in early spring
- Store the composted material ready for use

### What does Rudolf Steiner say about it?

Chamomile works on calcium in addition to potash, and thereby develops what can help to ward off the harmful effects of fructification and keep the plant healthy.

You will find your manure not only has a more stable nitrogen content than other manures, but that it also has the ability to enliven the soil so that plant growth is extraordinarily stimulated.

Put the sausages in good humus-rich soil where they will be worked on by a vitality that is as closely related to the earthy element as possible, plus cosmic astral influences from above.



Photo: Takashi Hososhima (CC BY-SA 2.0) bit.ly/C-C2

### Chamomile and Mercury

Bernard Lievegoed associated the effects of preparation 503 with the qualities of the planet Mercury. Hermes, the fleet-footed messenger to the Greeks, who later became the god Mercury of the Romans, was the master communicator. He was the god of business and enterprise and also the god of tricksters and thieves; in these realms, there is a need for alertness, quick wit, negotiating power and the ability to spot an opportunity and take it.

Observing the starry skies over the years, I experience something of this quality in relation to Mercury. It is the planet closest to the sun, so Mercury mostly remains unnoticed by us as it traverses the daytime sky close to the sun. For this reason I don't watch out for Mercury, so I have, many times, been taken by surprise when seeing a bright star which 'shouldn't be there'. I experience it like an awakening which pulls me to attention, like the crack of a whip calling to order. As quickly as Mercury appears, it is again gone.

As a child of the 1950s, I had the joy of coming home from the dental nurse with a globule of mercury to play with. You could roll it round in your hands until it elusively slipped between your fingers and fell to the floor, breaking and scattering into many little droplets which could be pushed together again into a bigger drop, mercurial in its movement, until it eventually came to rest, out of reach, in the cracks between the floor boards. Interestingly, the other planetary metals, apart from tin, will dissolve in mercury. Mercury penetrates into them and breaks them apart. In a similar way, the juices in the intestine penetrate into the food and break it apart.



Photo: Rachel Pomeroy

**“ The influence of the chamomile prep penetrates through the compost heap and gets all parts communicating with each other in a most lively way. ”**

The chamomile plant likes to grow between the stems and leaves of other plants. It finds its way around all parts of the garden, and into the neighbour's garden too. The influence of the chamomile prep penetrates through the compost heap and gets all parts communicating with each other in a most lively way.



## Chamomile in the compost heap

We build the compost in thin layers to encourage maximum interaction between all the diverse materials in the heap. The temperature often rises to 60° C within a couple of days. Changes in appearance and smell of the constituents of the heap are evidence that a lot of transformation is taking place. The chamomile preparation brings an orderly succession of processes within the heap.

After the hard work of collecting materials and layering the materials with optimum moisture and air included, we don't want to see our valuable potential humus leaving the heap in the form of nitrogen-rich ammonia gas or sulphur in a rotten egg smell; or leaving in the form of fruit flies, blow flies, well-fed rodents, or even an excessive spaghetti of compost worms.

Techniques of building the heap are important, but the chamomile preparation helps to regulate the processes to maximise the production of stable humus whose nitrogen content is available for plant growth in the best possible way. In cases where nitrogen is too freely available to plants, such as when smelly compost or raw animal manure is added to soil, then the "harmful effects of fructification" mentioned by Rudolf Steiner will result – that is, soft, watery growth, vulnerable to fungal attack.

## Soil is alive

The manure must be treated in such a way that etheric vitality is retained within the realm of the living, not 'free-floating', dissolved in the soil water. That's why it is so important for us to recognise that the soil surrounding the growing plant's roots is a living entity with a vegetative life of its own, a kind of extension of plant growth into the earth.

The 'extraordinarily stimulated' growth that Rudolf Steiner spoke of in 1924, in regard to the chamomile preparation, may be related to the fact that, since the 1960s, soil scientists have concluded from experiments that a number of soil fungi and bacteria produce hormones that regulate plant growth. These microbes often live in a close symbiotic connection with plant roots. Indeed, the testing of the biodynamic preparation CPP (cow pat pit) by Perumal et al revealed exceptionally high levels of auxin and gibberellins hormones. This correlates with evidence from field usage of CPP, where growers have noticed a burst of growth, synchronicity of harvest-readiness in coffee, earlier bud burst in tea crops when applied following major pruning of the bushes, and stimulated root formation on cuttings.

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Photo: Rachel Pomeroy



Photo: Rachel Pomeroy

Opposite page, top: German chamomile (*Matricaria chamomilla*).

Opposite page, bottom: Cow intestine inflated to dry before filling with chamomile flowers.

This page, top: Many hands make light work; the author (second from right) with friends, making Preparation 503.

This page, bottom: The chamomile-filled 'sausages' are coiled inside a pot before burial.



# BIODYNAMIC COMPOST PREPARATIONS

## Preparation 504: Stinging Nettle



Photos: Rachel Pomeroy

Top: The sharp hairs on nettle foliage are just visible in this image. If brushed, these inject chemicals into the skin that cause painful swelling.

Bottom: A pot full of Preparation 504, just harvested, garnished with a sprig of *U. dioica*.

Rachel Pomeroy continues her series exploring each of the biodynamic compost preparations.

Alert, awake to the needs of what's growing in the soil, and intelligently finding how to provide it. This is the picture of the stinging nettle preparation and the properties it imparts to the soil. Quick response, intelligent problem resolution – that's 504.

Stinging nettle often grows in edge situations, like the edge of the forest, or where soil is slightly disturbed, around runoffs from human or animal activity and waste. For making the preparation, we use the perennial, slightly bushy European stinging nettle, *Urtica dioica*, rather than the much smaller annual nettle, *U. urens*, which typically grows under pine trees where sheep camp. We have made a very nice preparation using the New Zealand nettle, *U. ferox*, which is indeed ferocious in its sting, and much harder to collect in volume. In India, biodynamic preppers collect the naturally occurring (especially in the lower Himalayas) *U. parviflora*, whose vigorous growth allows volumes of material to be easily collected. All have the unmistakable stinging nettle quality about them.

Over 20 years ago, I transplanted a few pieces of *U. dioica* to a seldom-visited area under trees. Occasionally mown by weed eater, but receiving no further attention, it

persists in that area to this day, visually unnoticed by most. However, brushing past it unsuspectingly, one sting will have you suddenly awakened to strong presence in the moment. Sharp translucent spikes cover the stem and the under-surface of the leaves. The precise leaf arrangement of pairs of opposite, jagged-edged leaves adds to the sharpness of its appearance.

It was close to stinging nettle where one day, I wondered if I was actually seeing elemental beings. I experienced these little puffs of yellow in the air around the plant, coming and then fading, then others coming and fading. Only later I learned that nettle disperses its pollen into the air with little jack-in-the-box springs, producing these puffs of pollen.

Rudolf Steiner gave the following insights about stinging nettle:

*Where yarrow and chamomile could be replaced by other plants, stinging nettle's beneficial influence on the manure is such that it would be next to impossible to substitute for it. It is the greatest benefactor of plant growth and it can hardly be replaced by any other plant.*



*Its mere presence can be of significance for the plant growth in its surroundings.*

Stinging nettle is the jack-of-all-trades; it can do many different things. It too contains sulphur, which plays an important role in assimilating and incorporating the spiritual. Stinging nettle also carries the radiations and currents of potash and calcium, but in addition, it has a kind of iron radiation that is really as beneficial for the whole course of nature as the iron radiations in our blood are for us.

## How is PREPARATION 504 made?

- Harvest stinging nettle in the spring, dry and store until autumn
- Fill unglazed tiles with dried nettle
- Bury the tiles in soil and lift in the following autumn
- Store the composted material ready for use

## What does Rudolf Steiner say about it?

It makes the manure inwardly sensitive and receptive, so that it acts as if it were intelligent and does not allow decomposition to take place in the wrong way or let nitrogen escape.

It makes the soil more intelligent, so that it individualises itself and conforms to the particular plants that you grow in it.

*Urtica dioica*, prepared in this way, is like an infusion of intelligence for the soil.



Rudolf Steiner said that because it is such a good influence, stinging nettle should actually be growing all around our hearts, since the role it plays is very similar to that of the heart in the human organism.



Photos: Rachel Pomeroy

Top: Dried nettle being packed into tiles before burying.

Bottom: "It is just so black": Rachel Pomeroy's stored 504.

Stinging nettle is consumed as a health-promoting tea or soup, beneficial in cases of anaemia or rheumatism, and also as a general 'blood cleanser' and a milk-stimulating tea. Rudolf Steiner said that because it is such a good influence, stinging nettle should actually be growing all around our hearts, since the role it plays is very similar to that of the heart in the human organism. It is interesting to live into the imagination of this phenomenon, and experience the tingling vitality of life one feels.

### Making the nettle preparation

I usually harvest the nettle for the preparation while the stems are still young, before they have become too fibrous. The leaves are still beautifully strong and green before the attentions of the red admiral butterfly come later in the season. Suitably clad, I harvest armfuls of the nettle, cutting swiftly at the base with my curved pruning saw. The quickly collected fadge-ful is then emptied onto the elevated wooden deck of my house (untreated timber) and spread to dry in an airy, semi-shaded position. I turn it about once every three hours, that day and the next. By then it is usually dry, retaining its beautiful green colour and sweet aroma, and is then lightly compressed into a large paper rubbish bag and stored in the airy cool shed until prep-making time in autumn.

To make the biodynamic preparation, the dried herb is compacted into unglazed field drainage tiles (available from plumbers' supplier) and buried in the soil. (Any time I buy new tiles or flower pots for prep-making, I always soak them in a large tub of stirred cow pat pit for at least three days, to take away the newness and bring them to life.)

I like to bury this preparation in a deeper hole than the others, about 50 cm down, because it remains in the ground for a whole year, and at that depth, it is more likely to maintain even moisture and temperature through the whole time. Whilst buried, an active, living breakdown of the nettle takes place within the influence of the earth's winter and then summer forces.

On lifting, the contents have reduced to about one quarter of the volume of the nettle that was packed into them. The preparation comes out very dark black and silky smooth, with a few bits of fibrous stalk still noticeable. The intensity of the blackness brings back a memory for me of us children swimming in the sea near Whanganui, then rolling in the fine black iron sand of the beach to make ourselves black all over. It is just so black.

### Nettle and Mars

The qualities of the nettle preparation were associated by Lievegoed with those of the planet Mars. Ares (later

named Mars by the Romans) was the God of War to the Greeks, having the forces to lead the charge through revolution and change. From my own observation of the starry skies over the years, I experience something of this quality in the way Mars moves in relation to the zodiac constellations behind it (as viewed from our earthly standpoint).

Every two and a bit years, Mars slows, halts, then moves retrograde for nearly three months before it slowly turns, gathers speed and launches forward through the zodiac constellations at its usual speed of approximately one constellation per six weeks. Two years later, the planet slows and halts again, and this cycle endlessly repeats itself. For six months, from May through November this year, 2018, Mars lingers in Capricorn, as if digesting its experience of the last two years, gestating a new idea, and gathering strength before launching forth directly in pursuit of its next goal, dashing to dust any obstacles in its path.

Mars parallels the character of the nettle preparation, 504; here is a biodynamic preparation which won't settle for obstacles limiting the growth of plants, but will battle through to find or create a solution from amid the boundless possibilities within the dynamics of life. ■

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## WORKING BETWEEN 500 - 501

The compost preps are used together as a set, with their individual qualities complementing each other and facilitating the breathing between the polar opposites of horn silica (501) and horn manure (500) field sprays. The preps are used in small amounts. They do not augment with substance, but infuse first the compost heap, then the total field situation, with living forces and succession of processes, unfolding in time, facilitating the dynamics of life.

The notion of the seven planetary processes unfolding cyclically in time is deeply ingrained in human culture in the seven days of the week, each named for one of the planets. Life unfolds in a repeating pattern through these seven planetary processes. Earlier peoples still directly experienced the different qualities of each day.

Remnants I remember from childhood are the watery work of the week's laundry being done on Monday (Moon), and my grandmother heating the irons on the wood-fired stovetop to iron the clothes on Tuesday (Mars). Every Sunday, after church, my grandmother would open the door of the grandfather clock and lift each of the bronze weights, on their chains, back up to the top. I loved that moment, and in hindsight I see it as that sensitive chaos moment into which the essence of the experiences of the previous week return and begin to unfold in a metamorphosed form through the seven days of another week. A timeless instant when the old week dies and the new week begins.

Seven planets, seven days, seven processes, seven biodynamic preparations: an ever-repeating, seven-fold dynamic conferring stability on the whole.

This page: Close-up of *U. dioica* - stinging nettle.



# BIODYNAMIC COMPOST PREPARATIONS

## *Preparation 505: Oak bark*



Photos: Rachel Pomeroy

Preparation 505, the oak bark preparation.

Rachel Pomeroy continues her series exploring each of the biodynamic compost preparations.

The mighty oak tree has a trunk of great girth and a thick layer of strong protective bark.

Holding, ordering and containing the exuberant growth forces of Spring. Ensuring that plant growth is formed and brought to solidity, that growth unfolds harmoniously, in accord with the timeless archetype of the plant being. You might say, "that the growth of the cabbage leaves doesn't race away, not heeding the voice of the giant-cabbage-in-the-sky". These are the qualities encouraged by biodynamic preparation 505, the oak bark preparation.

### **Picking, drying, making, lifting**

In the autumn, without disturbing the delicate cambium layer, chip off chunks of thick outer bark from a very mature tree, *Quercus robur*, the English Oak. Rub bark chunks firmly on a cheese grater to reduce the bark to sawdust, wearing strong gloves to protect your knuckles.

Prepare the skull of a freshly dead animal. Remove the lower jaw and as much skin and flesh as you can manage. Then, through the aperture where the spine and skull meet, remove the contents of the brain cavity, replace the brain with the freshly grated oak bark and plug the hole.

Place the skull into a water barrel positioned below a down pipe, so that rain water flows into the barrel with each rain shower. Add to the barrel a good quantity of fresh green plant material, plus some autumn leaves, so that a smelly plant muck forms around the skull.

In the spring, lift the skull and split it along the central fissure line. Often the preparation is still neatly enclosed within the strong dura mater membrane lining the cavity. Scoop the wet preparation into a bucket and stir it around several times in the next day to allow the preparation to dry out a little and lose the strong smell. Store the preparation in a jar or glazed pot, or an unglazed pot kept in moist peat.

### How the preparation works

Soft, watery growth of plants, bud burst, delicate, burgeoning life! These are hallmarks of Spring. But... it's high alert time for fungal diseases. In the Agriculture lectures, Rudolf Steiner describes such a scenario in the following way: "When the etheric forces are working so strongly that the astral forces can't influence the plant growth." He continued, "then calcium is required to create order. Calcium in any form will kill off or dampen the etheric body and thereby free up the influence of the astral body, but, when we want a rampant etheric development to contract in a beautiful and regular manner, without any shocks, then we need to use calcium in the particular form in which it is found in oak bark. A large number of plant diseases can be alleviated just by means of a rational method of manuring. The manuring must add calcium to the soil, but for the calcium to have a healing effect, it has to be calcium from something living; we cannot evade the living realm." Rudolf Steiner then describes how to make the oak bark preparation. The oak bark preparation brings calcium in the right way to rein in excessive etheric growth.

Although calcium is a metal, it never exists in nature in its hard shiny form, as it has such a powerful need to suck other substances to itself. It occurs very commonly as calcium carbonate in limestone, calcium phosphate in bones, and, in other processed forms, in cement, concrete and roads. It sucks other substances to itself to firmly bind material substance. How might this property of calcium work to "dampen the etheric body"?

Spring growth is characterised by rapid cell division at the growing tip in the centre of every bud, as well as rapid cell expansion of embryo leaves already formed within a bud or a seed. Other sites of cell division and cell expansion are in the soft cambium layer under the bark of trees and shrubs, and underground, at the tips of growing roots. The cells of the microscopic regions of tissue undergoing cell

## How is PREPARATION 505 made?

Grated bark of the oak tree is placed into the emptied brain cavity of a goat, sheep or other grazing animal. The skull is submerged in decaying plant material in water, or in a swamp, for the winter months. When the skull is lifted, oak bark contents are removed, aired for a day, and then stored.

## What did Rudolf Steiner say about 505?

"Oak bark preparation is a universal remedy for plant diseases."

"We should manure in a way that adds to the soil, calcium from the living realm. In this form, calcium brings order into rampant plant growth."

division in plants are of the nature of all so-called 'stem cells', also found in certain animal tissues. All stem cells – regardless of their source – have three general properties: they are capable of dividing and renewing themselves for long periods; they are unspecialised; and they can give rise to specialised cell types.

The sites of cell division and expansion in plant tissue are where I experience that the etheric forces are working into the physical. These are the places of generative, ever-repeating, self-replicating, unspecialised, watery, ever-flowing, pulsating movement – characteristic of etheric forces working.

So what puts the brakes on this process? Is it calcium sucking carbon down into solidity?

Carbon, in its most mobile form, literally blows around in the breeze, as the gas carbon dioxide. Also, it passively dissolves in the waters of the world. Within the leaves



**My overall picture for the oak bark preparation, with its emphasis on the role of calcium, is of the etheric, flowing, growing activity being sucked down into the task of forming material structures whose form is like a reflected physical image of the flowing energy which preceded it.**



Photos: Rachel Pomeroy

Above: The mighty oak tree.

of plants, through photosynthesis, carbon is 'captured' from the air into water-soluble sugar molecules, still mobile within the plant. When sugars are formed into carbohydrate, carbon becomes a little less mobile. It is often stored, for instance, in seeds or potato tubers, but it is able to be remobilised within the plant at the time of seed germination or sprouting of the potato.

As soon as each plant cell starts to expand, the cell wall begins to be laid down outside the cell membrane. Adjacent cells become bound to one another. Such cells can no longer divide. Indeed, especially in the case of wood and bark, the living contents die.

Cell walls are formed from long chains of sugars forming non-water-soluble cellulose fibres. Cellulose cannot be digested by humans and constitutes the 'roughage' in our diet. Herbivores have the gut flora to break cellulose down to soluble sugars. The cellulose fibres are in a matrix of pectin (such as the pectin that forms the gel in your marmalade). But the pectin – itself, a long-chain sugar molecule – is pulled into solidity by calcium ions, binding the cellulose fibres and cementing adjacent cells together. Rigid cell walls, bound to each other – this is the basis of solidity in the whole plant world. So carbon is brought to form and solidity; movement of carbon is arrested, through calcium. In the formation of wood and bark, carbon is even further set in rigidity, in an almost lifeless form. Indigestible to animals, only certain wood-rotting fungi are able to digest wood and bark to remobilise carbon. So calcium virtually sucks carbon out of its etheric, moving, flowing life, so that it can serve as the solid, form-holding building blocks of the plant world.

### **505 in the compost heap**

In compost making, we put 'captured carbon' into the heap in the form of straw, dead leaves, sawdust and chipped prunings, as well as the fresh greens with their cellulose, carbohydrates and sugars. We want to retain the carbon in the heap and, ultimately, in the soil to which it is added, in the form of stable humus, another non-water-soluble carbon compound. We don't want a complete digestion and oxidation process taking the carbon back into the air as carbon dioxide. The extreme form of this is, for instance, burning the wheat stubble in the field and releasing the carbon straight back into the air, directly exiting the living realm. So, perhaps the helpful functioning of calcium in the compost heap is, again, to suck the carbon into immobility within the non-water-soluble carbon-rich structure of humus.

I read in a recent study that soluble humic acids, produced in the early build-up stage of humus formation, are protected from leaching out of the heap when they

become bonded with calcium. And, further, calcium cations, along with silt and clay, play an important role in the aggregation and association of soil microbial products in the latter stage of stabilisation of soil organic matter.

My overall picture for the oak bark preparation, with its emphasis on the role of calcium, is of the etheric, flowing, growing activity being sucked down into the task of forming material structures whose form is like a reflected physical image of the flowing energy which preceded it. This occurs in much the same way that the human brain forms relatively dead 'reflected thoughts' from the living cosmic thoughts which preceded them. Hence the placing of the ground oak bark within the emptied brain cavity of a recently dead animal, to emphasise the ability of calcium to pull the etheric into a relatively dead physical reflection.

### Relation to planetary qualities

The qualities of the oak bark preparation relate it to the planetary qualities of the moon. The phases of the moon influence the flow of tides, ocean currents, air currents and weather. Many marine animals and protozoa have steps of their reproductive cycle which coincide with the timing of the full and new moon cycle. The traditional Māori Maramataka (moon calendars) detail synchronicity between phases of the moon and fishing conditions, shellfish harvesting, weather, mood of the ocean, favourable seed sowing, kumara planting, crop harvesting and cultivation periods. Some local Maramataka, based on observations along a particular coastline, prominence or reef, still exist.

The energy of the waxing moon promotes exuberance of pulsating generative growth. During the waning moon, there is consolidation of growth into specific form and function, transitioning the carbon from CO<sub>2</sub> to simple soluble sugars to digestible carbohydrates to solid cellulose – bringing characteristic forms into solidity, as detailed above. ■

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*Rachel Pomeroy is a highly experienced biodynamic home gardener, watcher of stars and planets and maker of preparations. She was long involved at Taruna College and has a M.Sc from Massey. Rachel travelled extensively in India with her partner Peter Proctor, teaching biodynamics.*

## PREVENTING FUNGAL DISEASES

The biodynamic preparations work together to help produce strong, healthy, disease-resistant plants, but don't neglect the many practical ways you can reduce the likelihood of fungal attack on your plants.

Ensure adequate sunlight, particularly from the morning sun, to lift the dew early in the day. A good level of photosynthesis raises nutrient density and brix levels, making plants unattractive to fungi and insect pests.

Optimise air movement around the plants by practicing good plant spacing and weed control, and by providing wind shelter which still allows good air circulation and doesn't overly shade the plants.

Use a method of irrigation suitable for the crop and conditions. If leaves get wetted, irrigate early in the day so leaves don't stay wet overnight. If crops are at a vulnerable stage, avoid irrigating on the few days before full moon, and take all anti-fungal measures on a perigee full moon.



This page: Oak bark provides the basis for preparation 505, helping to rein in exuberant growth forces in plant growth and retaining carbon in the compost heap.



# BIODYNAMIC COMPOST PREPARATIONS

## *Preparation 506: Dandelion*



Photos: Rachel Pomeroy

Top: Drying dandelion flowers to make preparation 506.

Above: Dandelion flowers sit on top of finished preparation 506.

Rachel Pomeroy continues her series exploring each of the biodynamic compost preparations.

### **Overview of the preparation**

Holding the overview of the whole surroundings, earthly and cosmic. Self-adapting and balancing for the good of the whole. Sensitive to and interactive with the wider surroundings.

### **Observation of the plant**

The dandelion remains in a rosette form all its life, not expanding its internodes or branching. Its yellow daisy flowers grow on long, unbranched, hollow stalks from within the rosette. Parachuted seeds are released from the well-loved spherical dandelion seed heads that develop from the flower. The plant survives as a flat weed in lawns or cracks in paths, but in rich, moist soil, its leaves are big and upright. Dandelion has a long, strong taproot, well anchored in the earth. Used in teas, tonics or salads, dandelion stimulates healthy liver function.

### **Picking, drying, making, lifting**

Picking the flowers for the preparation is best done early in the day once the dew has lifted, while the inner florets of the daisy remain closed in a central cluster. If picked when fully open, the flowers, on drying, may look more like a

puff of fluff than a daisy. Individual flowers are quite heavy and leave sticky brown stains on the fingers from the milky latex in the plant. They must be spread out to dry before storing for autumn prep-making time.

Flowers are wrapped inside a piece of cow mesentery which is tied or stitched to make a package, flatter rather than ball-shaped. It is buried in the soil, away from tree roots, well marked, 30 cm deep, where it remains until lifting in the spring. The mesentery often remains partly intact, and the lovely preparation is removed, lightly aerated and well stored for use.

### How the preparation works

The particular quality of dandelion that's important for this preparation is its capacity to mediate between the fine homeopathic distribution of silica in the cosmos and the silica on Earth. Of the dandelion preparation itself, Rudolf Steiner says, "It will give the soil the ability to attract just as much silicic acid from the atmosphere and from the cosmos as is needed by the plants. In this way the plants will become sensitive to everything that is at work in their environment and then be able, themselves, to draw in whatever else they need."

So what is the role of silica, and how is its quality enhanced by the mesentery in which the flowers are wrapped?

The mesentery is the membrane lining the abdominal cavity. Like other skin and membranes, it contains silica. It also has a network of nerves which, in our own body, we become aware of as 'butterflies in the stomach'. When we have a 'gut feeling', it's as if we become aware of something communicated from another realm, not consciously observed or thought out by ourselves. So the mesentery enhances dandelion's ability to be the 'messenger from heaven', as Rudolf Steiner describes it.

In the world I currently live with, for each plant or animal type, there is an external, timeless 'beingness', related to the stars of the firmament, which becomes imprinted into DNA while DNA is in a plastic 'putty' state. The DNA is moulded as needed, at an atomic/molecular level, as a step towards forming the physical plant or animal. In this picture, the DNA serves a higher ordering force. The DNA is not itself the initial ordering force. And the silica process, activated through making and using the dandelion preparation as described, mediates the connection. Such a plant grows in its true, heavenly form. It also gains the capacities to perceive what it needs and, if it can't easily get it, to make what it needs. This occurs not using recognised pathways familiar to current science, but using the infinite formative possibilities present in a vibrantly living plant thoroughly saturated with cosmic

influence. At this point in the lecture, Rudolf Steiner refers to the alchemical transformation of potash into nitrogen as an example of the organic processes possible in a fully functioning plant.

Googling for any comment that may lend support to the ideas, I found the following in a report on genome sequencing work: "The authors are surprised to find how easily, in their experiments, they can mutate gene sequence, but, in nature, how consistently the genome has been maintained over eons of evolution, even in physically separated locations". The influence of an outer ordering force would make this finding less of a surprise. Elsewhere, on the subject of silica's affinity to DNA, I found a reference to silica being used as a glue to hold onto DNA while DNA is washed clean of other cell debris.

## How is PREPARATION 506 made?

Dandelion flowers are wrapped in a piece of bovine mesentery in the autumn, buried in the soil over the winter, then lifted in the spring. The preparation is lightly crumbled and aerated, then stored. It is placed, a teaspoon at a time, along with the other five compost preps, into the newly made compost heap, cowpat pit or liquid manure.

### What did Rudolf Steiner say about 506?

The dandelion's own silicic acid/potassium relationship enables it to impart to the manure this same power. This helps plants draw the cosmic factor right into their physical functioning.

The dandelion is really a kind of messenger from heaven.



Of the dandelion preparation itself, Rudolf Steiner says, "It will give the soil the ability to attract just as much silicic acid from the atmosphere and from the cosmos as is needed by the plants. In this way the plants will become sensitive to everything that is at work in their environment and then be able, themselves, to draw in whatever else they need."



Above: Sewing up the mesentery package enclosing the dandelions

The Greek word 'cosmos' means ordering power. The Hindu picture of life has gods living in every plant and animal. Both are examples of the picture, commonly held by earlier peoples, of a heavenly force ordering life on earth. The loss of this world picture is synchronous with the loss of plant and animal vigour, natural health, and inherent good flavour of food, the very problems with which farmers approached Rudolf Steiner for answers. He responded with the Agriculture Course, given in 1924, which is basically a recipe for us to invite the beneficence of the heavens to once again be active in the earth realm.

### Its role in the heap

In the compost heap, there is a whole sequence of active and ever-changing organisms growing, feeding, excreting and dying, taking their part in the formation of humus. The presence of the dandelion preparation can facilitate a whole array of alchemical interaction to take place which may not otherwise be possible in the heap. The preparation is thoroughly saturated with cosmic influence. Even in its process of breakdown and humus formation, the heap is already sensitive to everything at work in its environment and can draw in or manufacture whatever else is needed. When the compost is used, the soil to which it is added also becomes endowed with these properties. Then, subsequently, the plants growing in the soil benefit too.

### Relation to planet and qualities of the planet

In its quality of all-knowingness, holding a broad overview, enabling the capacity to self-balance, the dandelion preparation carries the Jupiter processes strongly. Jupiter takes 12 years to complete a circuit of the zodiac, residing about a year in each constellation. And in each constellation, Jupiter makes a small loop before moving to the next constellation – as if stepping back for a good look around before advancing to view the world from the next of the 12 houses of the heavens. Considered from all sides in this way, action for the common good overrides personal concerns.

Jupiter, the wise guru; silicic acid, ubiquitous homeopathic presence facilitating the flow of wisdom and active response within the world wiSe web. By contrast, what emanates from Silicon Valley, using silica outside the living realm, now a ubiquitous presence in the world, facilitates the flow of knowledge, data, fake news and more within the world wiDe web.

Some current farming practices so alienate the external ordering forces, that plants have to fall back on what can be done by the physical genetic makeup alone, resulting in weak plants, susceptible to the ravages of insects and pathogens, and bearing only a shadow of their true taste and aroma.

But, to quote the late Peter Proctor: "The answer is so simple; just do it!"



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# BIODYNAMIC COMPOST PREPARATIONS

## *Preparation 507: Valerian*

Rachel Pomeroy completes her series exploring each of the biodynamic compost preparations.

Valerian is a liquid preparation. It helps the phosphate processes in photosynthesis and helps mobilise phosphate in soil and roots. It supports warmth and light processes.

### **Picking, drying, making, lifting, growing**

The valerian plant is perennial, its branched roots surviving in the ground while the tops die down each winter. Spring growth comes with an initial rosette of leaves, followed by rapid expansion and branching of the central stem to produce a full head of 'swoonily' fragrant tiny pink-white flowers in November and December. The plant grows up to about 1.5 meters tall. Valerian plants can be grown from seed, sown in a seed tray protected from frost in early spring, or can be propagated by lifting and dividing the root of a plant which has died down in winter.

I pick flowers on an ascending air/light day (moon in Gemini or Libra) for the sake of good keeping quality of the final preparation, choosing flower heads which have about half the florets open and half yet to open. Fresh flowers are crushed with a mortar and pestle and placed in a jar. To one part of crushed flowers, add three to four parts untreated clean water. Place in the light with cloth cover on the jar and allow to ferment for about a week, stirring daily.

Then strain the solid material out and pour the liquid into bottles. Fill to overflowing, then place the lid on tightly. An unopened bottle of this flower vinegar seems to keep well for several years.

Stir a teaspoon of the preparation in about five litres of water for five minutes before sprinkling over the compost heap.



Top: This valerian plant, with half its florets still unopen, is at the perfect stage to harvest for preparation 507.

Above left: Grinding valerian flowers for preparation 507.

Above right: Valerian flowers ferment in water on a windowsill. The strained water will constitute biodynamic preparation 507.

## How it works

Rudolf Steiner spoke only briefly about the valerian preparation, saying, "And, if you have time for one more thing..." He then described squeezing fresh valerian flowers, diluting the juice and adding to the manure. "This will help the right working of phosphorus," he added. So what is the right working of phosphorus?

Phosphorus, in its elemental form, ignites immediately on exposure to air, burning with intense white light. As such, pure phosphorus is not found naturally occurring; but phosphate is a mineral component of rocks and soil. Organic phosphate compounds are important energy carriers in life processes. During photosynthesis, light activates the chlorophyll molecule. The energy is transferred to a phosphate bond within a complex molecule. This is surely the single most amazing reaction in the world. This is where the energy of the sun is captured and brought into the service of physical life on earth. It is the power source for every living thing on earth.

Once the sun's energy is caught by phosphorus and brought into the living realm, this energy powers the movement of carbon, from carbon dioxide in the air into water-soluble glucose. The calcium process, as described in my article on oak bark preparation 505 (*Harvests 70-2*), pulls the carbon further into solidity in starch, cellulose and wood. So a series of polarities – phosphorus/calcium, valerian 507/oak bark 505, Saturn/moon and outermost planet/innermost planet – drive carbon's role in physically manifesting the cosmic essence of plants that rays in from the constellations of the firmament.

In a reverse way, phosphate compounds are also important in metabolism and heat production from starch and sugars in animals and humans, releasing carbon dioxide back to the air in the process. Phosphate's relationship to warmth gives it warming qualities, and valerian is used for frost protection, and medicinally for calming nervous conditions. So, in helping "the right working of phosphorus," valerian preparation has an important role.

## Its role in the compost heap

The stirred valerian is sprinkled over the completed compost heap. The experience of actually doing this is like laying an all-containing skin over the heap. It is a skin sensitive to the processes unfolding within, while sensing the surrounding and cosmic environment without, and also controlling what flows between inner and outer.

## Relation to Saturn

Saturn is the outermost of the visible planets. The other planets lie within the orbit of Saturn. Saturn is like a

## How is PREPARATION 507 made?

Pick fresh valerian flowers, crush, allow to ferment in water, then strain out solid material and bottle the liquid..

## What did Rudolf Steiner say about 507?

"This valerian will help the right working of phosphorus."

sensitive 'skin' between the inner solar system and the outer galaxy or fixed stars beyond.

The solar system within the sphere of Saturn is ever-unfolding, ever-changing through the course of time. This solar system is the source of the astral planetary forces which move the plant through its stages of germination, growth, flowering and seed formation. Outside Saturn's sphere lies the unchanging pristine purity of the fixed stars of the firmament, timeless in their being; this is the source of the ego quality or being of the plants. Valerian's role is in regulating and balancing the interaction between these two. As a result, the plant 'essence' is not overly influenced by the astral influences – forces which may produce poisons in plants, or can lead to loss of precision in floral form.

The compost preparations are used together in making compost, cow pat pit and liquid manures, which are all applied to field or plants. In conclusion, here are Rudolf Steiner's words as he began speaking about the compost preparations: "We have to enliven the soil directly by means of organic material that has been conditioned to organise and enliven the solid earth itself. The task of spiritual science is to observe the macrocosm, the broadest dimensions of the workings of nature, and to understand these workings. Then, out of this understanding, to indicate how to stimulate the organising and enlivening of the solid earth itself." ■



Photos: Rachel Pomeroy - [www.growbiodynamics.co.nz](http://www.growbiodynamics.co.nz)

# The wanderers of COW PAT PIT

**Biodynamic tutor Rachel Pomeroy explains how to use cow pat pit, and the science behind why it works.**

CPP (Cow Pat Pit) is composted cow manure. It is strong, living humus, rich in beneficial soil microorganisms and plant growth-promoting hormones. It can be applied directly to soil, or used as a foliar spray on crops.

Developed by Maria Thun in Germany in the 1960s, CPP – or Barrel Manure, as she called it – was originally made in a wooden barrel with the bottom cut off, with the barrel lining the sides of a pit dug in the soil. A number of people in New Zealand use a half wine barrel in the same way. With Peter Proctor, in India, we developed the use of a brick-lined pit, because any wood in the soil there would be quickly consumed by termites.

## Making CPP

To produce a good CPP through aerobic process within three months, factors much more important than pit lining or shape are the consistency of the cow dung and the drainage of the soil around the pit. A set of pits under a roofed structure, perhaps with some sunshine warming the area, works reliably well. Runny cow manure in a cold, water-logged situation simply doesn't turn to CPP.

To make CPP, mix a wheelbarrow-load of manure with a handful each of ground eggshells and basalt dust, for the calcium and silica qualities that each gives. Place the well-aerated mixture in a pit, exposed directly to the earth on the bottom. Add a set of biodynamic compost preparations to it, then leave it to undergo aerobic decomposition for about three months to become CPP.

## Applying CPP

As a general guide, CPP can be used at the rate of 1kg of CPP in 40 litres of water per acre of crop. Rub the CPP to a paste between the hands while adding it to the water. Using vortex stirring, aerate and activate for 15 minutes.

Apply directly by brush, or strain through appropriate mesh before applying with spray equipment.

Its many uses include the following:

- Pour onto freshly transplanted seedlings, trees, roses, or perennials for rapid root recovery, and to establish strong mycorrhizal activity on roots.

- Apply fortnightly as nutrient-rich liquid manure during the rapid growth phase of crops.
- Soak cuttings for rapid root initiation.
- Water onto pea and bean seedlings to help establish nodulation on roots.
- Apply as foliar mist spray to any crops, including fruit trees, berries, and vines, to strengthen leaves against fungal and insect attack.
- Apply to pruning cuts for healthy wound healing.
- Apply CPP directly, or in a tree paste, to tree trunks, to stimulate health of the cambium and strong initiation of new buds.
- Sprinkle onto layers when making compost, if the biodynamic compost preparations are not being used.
- Apply when turning a green manure crop into the soil, for rapid conversion of plant material to stable humus.
- Water onto pot plants fortnightly for green lustre.



To produce a good CPP through aerobic process within three months, factors much more important than pit lining or shape are the consistency of the cow dung and the drainage of the soil around the pit.

Opposite page: Large-scale CPP production for large areas.

Below: Rachel Pomeroy's garden flourishes with CPP.

## SCIENTIFIC EVIDENCE OF BENEFITS

Scientists in India studied components of CPP in research carried out at MCRC, Chennai. Findings were reported at the World Congress of Soil Science, USA, 2006. This report can be seen at <https://bit.ly/31YCqZH>. Two findings in CPP were particularly interesting.

### 1. *Bacillus subtilis*

The Indian researchers found that the bacterium *Bacillus subtilis* was especially predominant in the cow pat pit manure. The water extract of cow pat pit manure contained the substance subtilin, which suppressed the growth of different pathogenic bacteria such as *Staphylococcus aureus*, *Escherichia coli*, *Micrococcus luteus*, and *Erwinia carotovora*. Among the organic manures tested for subtilin, the CPP manure contained the highest amount of subtilin.

The researchers periodically analysed CPP manure maturation, beginning at the time of initial mixing, for a period of 120 days. The cell count of *Bacillus subtilis* and the production of subtilin during cow pat pit maturation both increased until 90 days.

My own Google search revealed that *Bacillus subtilis* is supplied in a commercial product in New Zealand, Fulzyme Plus, and the product advertising expounds the many benefits of *Bacillus subtilis*. All these benefits and more are available through CPP.

It is interesting to note that CPP is most effective for disease resistance when it is just freshly matured, at about 90 days from mixing. Cow pat pit manure grown for 75 to 90 days is most suitable for plant disease resistance, whereas the 120-day-old manure is more suitable for soil nutrient supplementation.

It is good to make a new pit of CPP at regular intervals to ensure that a fresh batch is usually available. Or you can make a new batch timed to mature when your predicted disease pressure is greatest. Fresh is best, but in my own experience, the disease suppression effect is still strong for several months.



## 2. Gibberellic acid

The Indian study also found that cow pat pit manure contained three plant growth regulating hormones: indole-3-acetic acid, kinetin and gibberellic acid. Of all the composts tested, no other contained gibberellic acid.

The effects of gibberellic acid on seed germination, stem elongation, root initiation on cuttings, transition to flowering and many other effects have been found since gibberellic acid was first isolated from a fungus in the 1950s.

Research into microbial production of plant hormones for commercial use in agriculture is currently an active area for scientific exploration; for example see the article "Microbial production of plant hormones: Opportunities and challenges" at <https://bit.ly/3242LFZ>.

I recently noticed work from the New Zealand Agricultural Greenhouse Gas Research Centre in Palmerston North, promoting the application of gibberellic acid to pasture as a means of achieving dry matter production of fodder without adding more nitrogen fertiliser. The intention

Below: Former Taruna student Toh Yeng adds the compost preps to Rachel Pomeroy's CPP.



The water extract of cow pat pit manure contained the substance subtilin, which suppressed the growth of different pathogenic bacteria.

of this research is to feed cows well without increasing nitrogen in the cows' urine, as high-nitrogen urine results in the release of nitrous oxide, a greenhouse gas, from the soil. The researchers write: "Farmers use nitrogen fertiliser to stimulate herbage growth. If gibberellins can do the job without adding nitrogen, that could enable farmers to reduce nitrous oxide emissions as well as reduce nitrate leaching while still maintaining the productivity of their pasture."<sup>1</sup>

Biodynamic farmers and growers who use CPP regularly have long noticed and reported all these above-mentioned benefits from the use of CPP. So it is good to now see that researchers have found components of CPP which promote these benefits.

### Other benefits

Besides the *Bacillus subtilis* and the gibberellic acid, there are many other beneficial components of the CPP. These include:

- Supplies plants with available nutrients when applied as liquid manure to roots or as foliar spray to leaves.
- Inoculates soil and plants with a wide spectrum of microorganisms to promote appropriate symbiotic plant-microbe relationships – for instance, introducing appropriate rhizobia for beans and peas.
- Enhances disease resistance by inoculating root or leaf surfaces with beneficial organisms, leaving no room for pathogenic microbes.

When CPP is used regularly, along with the cow horn manure and cow horn silica sprays, this facilitates the whole ecology of the soil, crops and total environment of the farm to achieve the best outcomes possible within the locally prevailing conditions of base rock, soil type, climate and topography. Biodiversity with dynamic interaction is the basis for maximum stability and rapid adaptation to change within the farm organism. ■

<sup>1</sup> New Zealand Agricultural Greenhouse Gas Research Centre and Pastoral Greenhouse Gas Research Consortium, 2015. *Reducing New Zealand's Agricultural Greenhouse Gases: Gibberellins*. <https://www.pggrc.co.nz/files/1500851523471.pdf>