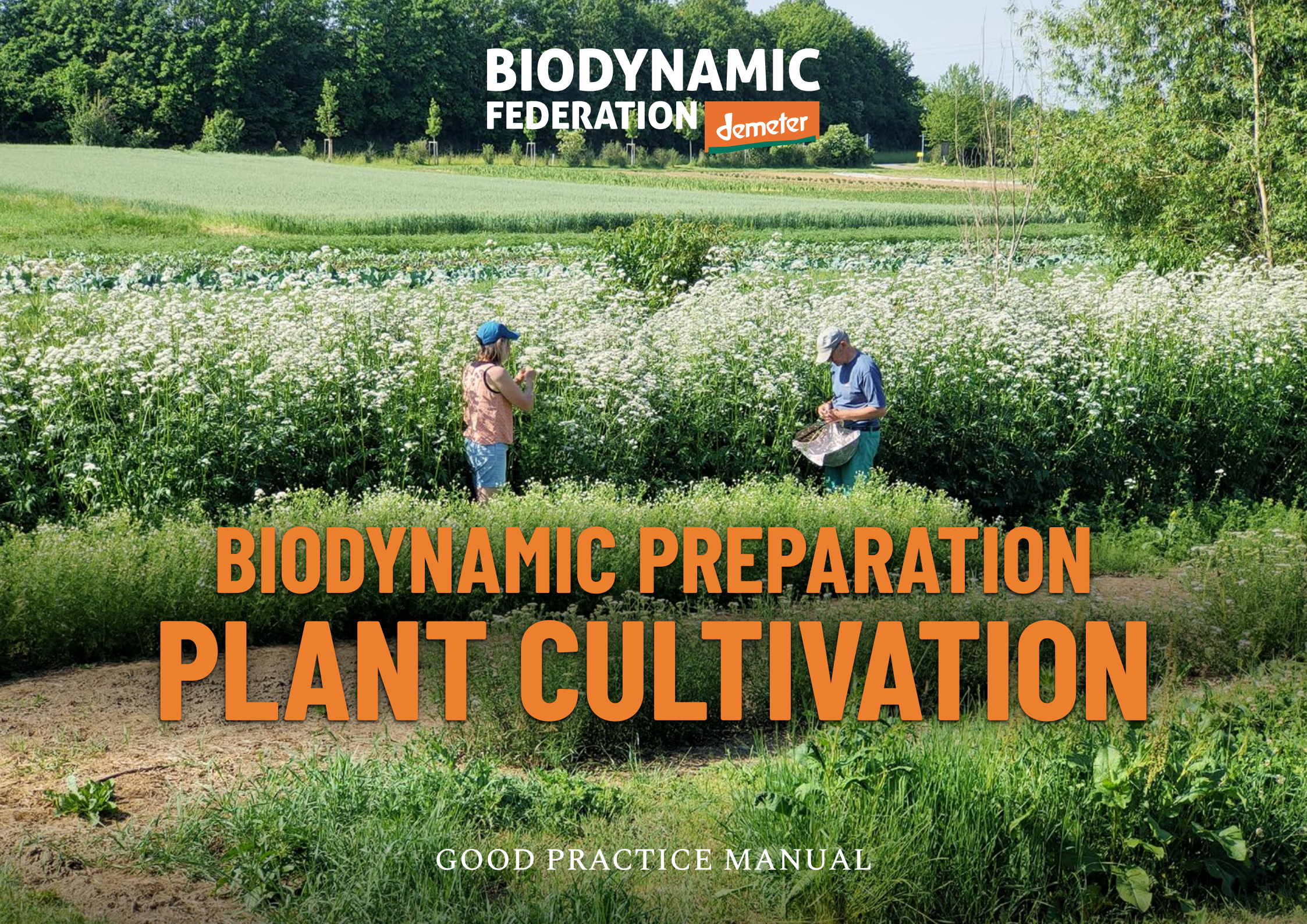
BIODYNAMIC FEDERATION demeter



BIODYNAMIC PREPARATION PLANT CULTIVATION

GOOD PRACTICE MANUAL

CONTENTS

ACKNOWLEDGEMENT

We would like to thank all people involved in the realisation of this project. Our special thanks go to the authors Anne and Rolf Bucher, Markus Sommer, Andrea D'Angelo, Jakes Jayakaran, Jean-Michel Florin, Georg Soldner and our proofreaders Hannelore Bucher and Jessie Marcham. Our thanks go to Ian Henderson for translation and to Paz Bernaschina for chapter integration. Without their valuable expertise and conscientious work this manual would not have been possible.

DR. PETRA DERKZEN
Coordinator Advisory, Research and Training

Plants are bound to their location; they mirror the conditions they face, as they cannot migrate to find better conditions. We say that the use of the biodynamic preparations can help our crops and cultivated land to deal with the given conditions better – that the intelligence added by the preparations helps plants to balance out conditions that are suboptimal and to keep their sovereign vitality. One can say, there is an emancipating force at work.

There is also an emancipating gesture in this second manual of the Biodynamic Federation – Demeter International. With a loving eye for detail, this manual inspires to do it yourself, to take up the cultivation of the plants used for the biodynamic compost preparations as indicated in the Agricultural Course.

I hope that, over time, the worldwide experience of many people cultivating these plants will create a basis for collective intelligence on how to develop and adapt towards local conditions outside of the Middle European realm.

Petra Derkzen

Dr. Petra Derkzen

GEORG SOLDNER
Paediatrician, Co-Leader of the Medical Section
Dornach / Switzerland

Dear Reader,

This manual for the cultivation of the biodynamic preparation plants is the ripened fruit of the working biography of two extraordinary gardeners. Anne and Rolf Bucher have been responsible, for about half of their lives, for the medicinal herb garden of WALA / Dr. Hauschka. They transformed this garden – I visited it quite frequently – into a life-bearing paradise. After this period of their life Anne and Rolf became global experts in biodynamic farming and gardening, engaged in many biodynamic projects in Asia, Africa, and South America. They are familiar with very different climates, soil qualities and a great variety of farms, nurseries, school-gardens and so on.

In this manual, the authors describe how to cultivate biodynamic preparation plants. Supported by excellent photographs, all aspects of these seven plants (including horsetail) are covered: the plant and its main characteristics; propagation and planting; plant health and ecology; harvesting; post-harvest treatment and storage; seed harvest; and last, but not least, further use.

All the plants included here are important and powerful healing plants, used in traditional medicine as well as in modern phytotherapy and Anthroposophic Medicine. As an anthroposophic physician with 35 years professional experience, I can say that the strong healing potential of these plants covers a wide range of disorders and diseases. For example the yarrow plant we use as a liver compress not only in treating acute and chronic liver diseases, but also in patients with toxic cancer therapy, with sleep disorders, or depression. Andin pneumonia, in particular in the elderly, a yarrow lung compress facilitates breathing and circulation in the lungs. Everybody may take a cup of yarrow tea daily to strengthen liver function. Chamomile tea is well known for disorders and inflammation of the gastrointestinal tract; anthroposophic chamomile remedies are effective in treating cramping pains and colic in infants. A warm chamomile compress may also provide relief in umbilical colics of pupils or for menstrual pain in young women. Oak bark can be used in a footbath to facilitate relaxation and sleep. A more concentrated tea or plant extract may be helpful in external use for treatment of eczema and haemorrhoids. Warm compresses with horsetail are helpful in kidney diseases, and more concentrated horsetail extracts can be used, for example, in eczema ointments.

In cultivating these plants your motivation may not only be to use them for making the biodynamic preparations. They may become part of your kitchen – you will find a lot of suggestions in this manual – and a reliable basis for your medical cabinet, as shown so eloquently by Markus Sommer. As you experience growing and using the plants, you will become more and more familiar with their unique characteristics and healing forces for the benefit of soil, plants, animals and human beings. This manual is a real door-opener not only for cultivating these plants, but also for developing a trusting inner relationship with their vital forces.

Georg Soldner

ANNE AND ROLF BUCHER
Demeter advisors

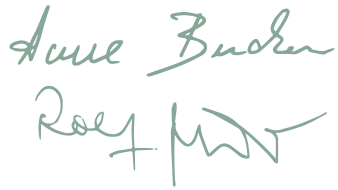
In his agricultural lectures "Spiritual Foundations for the Renewal of Agriculture", Rudolf Steiner repeatedly stresses the importance of a farmer's relationship with his or her farm, in particular with its manure. He points out that these personal relationships are eminently beneficial. Cultivating the preparation plants, and making and applying the biodynamic preparations are excellent opportunities for building such relationships.

All plants employed for the biodynamic preparations are medicinal plants which have traditionally been used as important remedies in many countries. Cultivating them is one way of creating a personal relationship with the biodynamic preparations. Perhaps it is possible to grow these plants in a special area on your farm and pay them particular attention. Observing, studying and drawing them are other ways to connect and to gain a personal relationship with the preparation plants.

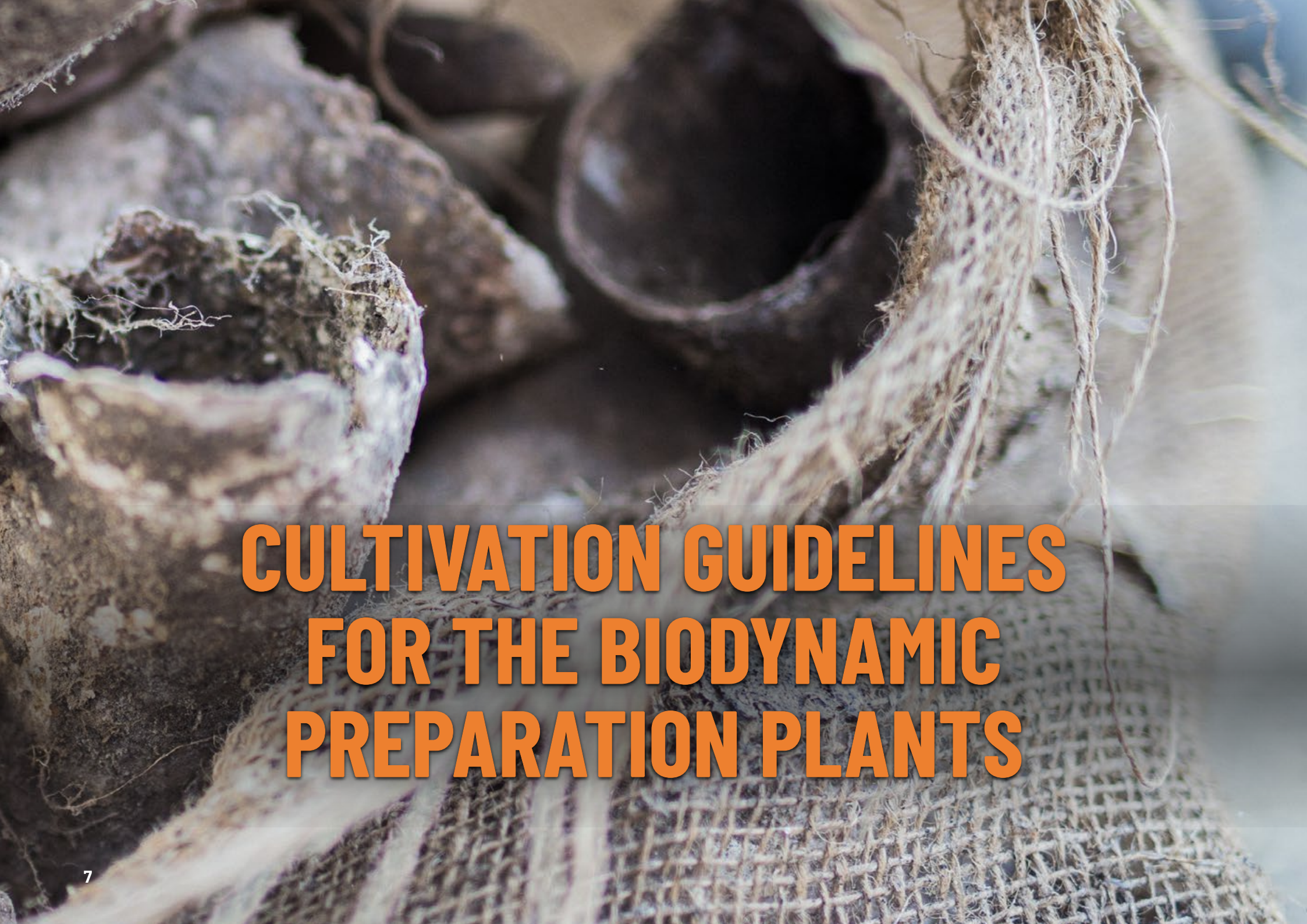
In the biodynamic preparations we have important and modern tools to improve the quality of soil and plants. There are many possibilities to influence or enhance quality through use of the preparations in combination with attention to the environment the plants inhabits, from the microscopic life around its roots, to the cosmic rhythms of the universe. When sowing, we can stimulate the germination of the plants with a seed-bath. To promote root development, cuttings, rhizomes and young plants can be dipped in a CPP slurry (Cow Pat Pit or fladen preparation) before planting. Working with the "Planting Calendar" is another excellent way to add quality. High levels of biodiversity on your farm makes another important contribution to soil and plant health. This also applies to a diverse and stable microbiota in the rhizosphere of soils. Last, but not the least, by harvesting your own seeds you can develop your individual strain of preparation plants that is especially well adapted to the soil and climate conditions of your farm.

The biodynamic preparation plants yarrow, chamomile, stinging nettle and dandelion belong to the most adaptable and vital representatives of the plant world, and display a wide ecological amplitude with regards to temperature, altitude, latitude, climatic conditions, and they thrive in habitats around the world. Their regenerative capacity makes them suitable for many locations worldwide. Cultivation of the preparation plants is relatively simple if you know their specific growing conditions. The preparation plants are Weltenbürger, true "cosmopolitan citizens of the world".

In this manual we aim to offer detailed technical information as well as useful advice and interesting background to each plant. Above all, this manual is an invitation to study these plants and to discover their qualities and beauty.



Anne and Rolf Bucher, September 2021



CULTIVATION GUIDELINES FOR THE BIODYNAMIC PREPARATION PLANTS

YARROW

Achillea millefolium | Biodynamic Preparation 502

"Yarrow is actually a miracle of creation.
So is any other plant, of course, but if you compare yarrow to any other plant, you will be deeply touched by the particular wonders of yarrow …
Like some sympathetic people in human society who exert an influence just by their presence, and not by what they say, yarrow's mere presence in areas where it grows abundantly is extremely beneficial."

RUDOLF STEINER, 1924 – "Spiritual Foundations for the Renewal of Agriculture"

THE PLANT

Achillea, in the family *Asteraceae*, contains about 115 species and is native in the temperate Northern hemisphere of Asia, Europe and North America. The common yarrow *Achillea millefolium* is naturalised all over the world today and can be found in North and Central America, China, India and parts of Africa. It has been introduced as feed for livestock in Australia and New Zealand.

Yarrow (*Achillea millefolium*) is highly variable and displays a wide ecological amplitude. It does well in a broad range of climates, and in a variety of different habitats. The plants can be found in meadows, pastures, dry grassland and farmland and can grow from sea level to 3,500 metres (11,500 ft) in elevation. In the tropics, yarrow is mostly grown at higher elevations and in temperate and cooler highland areas. High humidity and dampness can have a negative impact on the growth of the plants.

Yarrow is an erect, perennial, herbaceous, frost-tolerant plant that produces one to several stems 60 cm (2 ft) in height; the stems are hard and fibrous. The feathery, fern-like leaves are approx. 5 – 20 cm (2 – 8 in) long and arranged spirally on the stems. The leaves have varying degrees of hairiness. The tiny, long-lasting daisy-like flowers contain ray and disc flowers which are white, sometimes pink.

The plant commonly flowers in Europe from May to August, in the Southern hemisphere from December to March. The plant has a strong, aromatic scent. The individual plants are usually linked by rhizomes. The fast-spreading horizontal rhizomes can be up to 30 cm (1 ft) long and grow just below the surface.

The family *Asteraceae*, also known as the Compositae, is one of the largest family of flowering plants, with more than 1,620 genera and 23,600 species, distributed throughout the world.

A. millefolium has a complex taxonomy. There are several varieties and subspecies of *Achillea millefolium*.

SITE

Yarrow is highly adaptable and tolerates a wide range of soil conditions and environments, and is considered to be drought-tolerant. It is not particular as to soil pH, but grows best in medium to light loamy, well-drained soil. Yarrow prefers a position in full sun and can tolerate both hot and humid conditions.

Due to the plant's resistance to drought and its fast-spreading rhizomes *Achillea* is well suited as a soil stabilizer and it can combat erosion.

Optimum pH: between 5.5 – 7.0.

GROWING YARROW IN INDIA

Experiences from Jakes Jayakaran

I started cultivating yarrow in our garden in the town of Kodaikanal, which is located at 2,000 meters altitude and around 10° north of the Equator, in the tropical regions of India. We initially started propagating by division a pink variety that is widely available in many local gardens. This variety is likely a remnant of the European colonial times, dating back to the 1800s. More recently, we have introduced white yarrow plants from seeds we brought from Germany. Although it took them almost a year to establish, they now seem to be well adapted to the local conditions. After a year, a few flowers have appeared, but they haven´t flowered profusely like the local pink variety yet.

In the tropical regions of India, yarrow flowers throughout the year but concentrates its flowering in the warmer and drier season, which is from March/April, until the end of September when the heavy monsoon period starts. After harvesting we do not normally cut the plants.

For drying, we have the option of quick drying in one day in a solar dryer, which is an excellent approach in the high humidity monsoon period. Alternatively we use drying racks in the shade, which can take about 3 to 4 days. The best and most affordable option for storage is zip lock plastic bags, or stainless steel containers.

PROPAGATION

Yarrow is easy to grow from seed, by division or from cuttings. Plants propagated by seed and by division generally bloom in the first year; the main harvests can be expected in the second and third year after planting. Yarrow plants propagated by basal cuttings may not flower in the first year. In the Northern hemisphere sowing and division should take place April – May, while in the Southern hemisphere sowing is best September-October.

SOWING

Propagation from seeds is possible. Seeds can be sown in pots, seed boxes, multi-cell trays or directly into a seed bed. The seeds germinate readily; they need sunlight for germination. Sprinkle with a little bit of soil, but do not cover the seeds completely. Germination rate is usually very high, however, when covered with too much soil this rate is reduced to 10 – 12 %. Place the pot or seed tray in a warm, sheltered and sunny spot.

Optimum germination temperature:
18 – 24 °C (64 – 75 °F). Germination time: 7 – 12 days.

PROPAGATION BY DIVISION AND CUTTINGS

The easiest way to propagate is from rootstock division. It is best to use 5–10 cm (2–4 in) long rhizomes from healthy plants. Each segment should have at least three to five shoots. Rhizomes can either be potted on first, or planted directly into the bed.

Alternatively, you can take basal cuttings. Use a sharp knife to remove the cutting around ground level. Basal propagation requires planting the cuttings in good potting soil so that the roots can develop.

While division needs to be done before the start of the growing season, stem cuttings are best taken in June.

PLANTING

CPP (Cow Pat Pit) or fladen preparation can be used in many ways before sowing, and as a seed treatment. It can be finely scattered in the furrows of nurseries or directly on the land. CPP is also very useful when planting. The young plants, cuttings or rhizomes can be dipped into stirred CPP for 20 – 30 minutes. As well as benefitting from the effect of the CPP, the roots are simultaneously saturated with water.

The seedlings can be planted out in small clusters of 4 – 5 plants. The rhizomes are planted in rows and covered with 2 – 3 cm (1 in) of soil. Distance between rows: 20 – 30 cm (8-12 in). Distance between plants in rows: 20 – 30 cm, 2-3 rhizomes per spot.

The fast-spreading rhizomes of yarrow can grow rapidly and form a green carpet. Divide every three to five years, as needed, and transplant healthy rhizomes into fresh ground to maintain the vitality of the plants. As well as planting into beds, the rhizomes can also be planted into meadows. Cows love yarrow, so herbal pasture mixtures often contain yarrow seeds. Once established, the plants require little attention. They only need to be watered during times of severe drought. An annual side-dressing with compost before the growing season is recommended.

GROWING YARROW IN BRAZIL

Experiences from Andrea D`Angelo

In Brazil, yarrow plants start to flower in the first year of cultivation. Seeds and seedlings are established in early autumn, in April. They develop good roots and green leaves during the winter, and start flowering in the first year, around the end of August or beginning of September.

The harvest period starts in September and lasts through the summer, until February. In February and March, we harvest seeds. A few plants continue to flower into autumn and winter, in June and July.

Special attention is needed for drying and storing. It can often happen that the dry flowers go mouldy. We find that the best option in tropical and subtropical conditions is to use vacuum seal bags for storage, after drying the flowers thoroughly. Paper bags are not recommended, because of the high levels of humidity in some seasons.

It is important to pay close attention to leaf cutter ants (*Atta* and *Acromyrmex*) at all stages of plant development, as they can badly damage the plants.

In the south of Brazil, yarrow is quite a common garden plant, grown for its medicinal properties as well as for use as a herbal tea.

PLANT HEALTH AND ECOLOGY

During their long flowering period, yarrow flowers are a food source for all kinds of pollinating insects. Bees, solitary bees and wild sting-less bees collect both nectar and pollen from yarrow. Ladybirds, moths, wasps, butterflies, green lacewings, hoverflies and beetles also feed on the flowers.

Yarrow is susceptible to grey mould (*Botrytis cinerea*), rust (*Puccinia millefolii*) and powdery mildew (*Erysiphe cichoracearum*), and can be affected by spittlebugs (*Cercopidae spumarius*) and aphids (*Aphis fabae, Macrosiphoniella millefolii*). Most aphid species are polyphagus and feed on a wide range of herbaceous plants. The young fresh shoots are often eaten by slugs.

Spotted Longhorn beetle (*Rutpela maculata*).

Spittlebugs (*Cercopidae spumarius*).

Black bean aphids (*Aphis fabae*).

HARVESTING

Compared to chamomile and dandelion, harvesting yarrow is possible over a long period of time. Flowers are harvested in the morning on sunny days. A flower head often consists of 100 or more tiny individual flowers and reaches a diameter of 6–10 cm (2–4 in). Yarrow should be harvested when in full flower. Stalks and leaves have to be removed. After harvesting, the plants should be cut back just above the ground.

There are several ways to harvest the flowers. Some farmers prefer to harvest the individual flowers with a small pair of scissors, by cutting the flowers directly at the base so no stem is included. Another method is to first harvest the whole head of blossoms, and later cut the individual flowers carefully off the stems.

POST-HARVEST TREATMENT

Mow or cut the yarrow stubble close to the ground after harvest. Cutting back after initial flowering will promote re-bloom after six weeks.

Pruning or dead-heading flower stalks keep the plants in check by avoiding self-sowing.

DRYING

Yarrow dries very easily. Drying should be carried out immediately after harvesting without any delay. As direct sunlight will fade the colours, the plant parts should be spread out in thin layers in a clean and protected shady place without direct sunlight, or on drying screens in a drying shed. Another option is using a solar dryer or a dehydrator with several drying trays. Drying temperatures should not exceed 35 °C (95 °F). Drying ratio: 4:1.

STORAGE

Maintaining the quality of the dried flowers is of great importance. There should be no moisture left in the dried plant material. Dried plants need to be kept away from direct sunlight. Cool storage temperatures are recommended. The dried flowers can be stored in a glass container or a paper bag until needed. With the help of a vacuum packing system, the dried flowers can be preserved in sealed bags with very good results, especially in places with high humidity. No matter which storage container is chosen, the flowers must be protected against animals and mould. Containers should always be labelled carefully.

SEED HARVEST

Choose and select the healthiest and best yarrow plants at an early stage and mark them in time. When the flower and the entire stalk have turned brown, the seeds are mature and ready to harvest. Yarrow seeds can be easily collected by holding a container below the brown flower-head and tapping on the flower. The tiny seeds will simply fall out into the container. Alternatively, you can also use pruning shears to cut the stalks a few centimetres below the flower heads.

Seeds should be kept dry and stored in closed, labelled glass jars or traditional clay pots, away from light. Make sure that the stored seeds are out of reach of insects and rodents. No matter which storage container is chosen, the seeds should be checked once in a while. Yarrow seeds can be stored for up to two to three years.

Yarrow seeds differ from many other seeds in the *Asteraceae* family, because they do not have a pappus, or tuft of hairs, protruding out of the top. It is estimated that yarrow plants produce approx. 2,000 – 3,000 seeds per plant annually. The light green-grey or silver-grey hairless seeds are 1.5 – 2 mm (0.06 in) in length, 0.8 mm in width and 0.3 mm thick. The seeds are dispersed by the wind. They can survive in the soil for a number of years. Thousand Grain Weight (TGW) = 0.15 g (0.5 oz).

FURTHER USES

Yarrow has a prominent place in herbal medicine and ethnobotanic use in Europe, India, China (yáng shī cáo) and North America. It is one of the oldest known plants used by humans. Yarrow plays an important role in the medicine of Native American tribes today. Yarrow is also a remedy in veterinary medicine. Flowers and leaves are used as tea, and the young fresh leaves for salad or in a smoothie. Yarrow is a highly recommended natural dye. The leaves and flowers of the common yarrow are consumed by foraging animals, e.g. cows, goats, and sheep. Yarrow can also be fed to rabbits.

BE AWARE

In very rare cases, yarrow can cause allergic skin rashes. Due to the fast spreading rhizomes and vigorous growth, the site for yarrow planting should be carefully selected.

YARROW

By Markus Sommer

The yarrow doesn't impress us with a particularly colourful flower, but on closer inspection, its highly differentiated shape becomes apparent. Hardly any other leaf is as finely formed as that of this plant and if we look closely, we can see that its white flower "umbrella" is made up of many small individual flowers. Only if we look even more closely, we notice that this apparently individual flower is also made up of tiny flowers consisting of a small flower basket surrounded by a ring of white petals. The many individual flowers thus form a community, which has the common task of attracting insects, feeding them and finally forming seeds. The scent of the plant is not delicate like a rose blossom, but rather somewhat coarse, powerful and delicately bitter. This alone indicates that the plant develops healing effects in the abdomen, in the metabolic region that is characterised by „sulphur forces".

The botanical name of this plant is Achillea millefolium and it contains two important messages: Millefolium means „thousand-leaved". In reality, the number of its leaves will seldom exceed 20, but these are so finely constructed, bear so many leaflets and small teeth, that one really gets the impression of an immense abundance. At the same time, the strongly structured leaves are remarkably similar to each other; nothing seems to be random, everywhere one feels that a strong ordering force characterises the design.

The plant takes its family name „Achillea" from Achilles, the main hero of the almost 3,000-year-old Greek tale, The Iliad. According to the myth, Achilles was raised by Chiron, a wise being with the body of a horse and the head of a man, who knew all the healing powers of nature. He told Achilles that yarrow can stop bleeding and heal wounds, and that it's a remedy for many other illnesses. In fact, it is still one of the most important medicinal herbs.

Yarrow tastes bitter and that shows us that it can relieve digestive problems. In fact, it has been shown to stimulate the production of bile, which helps us digest fatty foods. In some countries yarrow is called „stomach-ache herb" and a tea made from the dried herb can often relieve acute stomach complaints and intestinal catarrh. Menstrual cramps can also be eased with yarrow. If you dry the plant, pour boiling water over a teaspoonful of the crushed herb and let it steep for 5 minutes, you will get a delicately aromatic and slightly bitter-smelling, yellowish tea that you can drink. You can also soak a cloth with the tea, squeeze it out a little and place it on the liver area around the right ribcage. Spread a dry cloth over it and put a hot water bottle on the cloth to keep the poultice warm. Such a liver wrap strengthens the liver function, often leads to better sleep and a deeper recovery at night. The restorative night forces in the metabolic area are supported by such a poultice.

Such compresses are also prescribed for chronic liver inflammations (hepatitis), and for depression when also presenting with a weak liver. The fact that yarrow extracts protect the liver has been proven in numerous laboratory tests. Some of the active constituents of yarrow are similar to those of chamomile; they have an anti-inflammatory effect, can soothe irritated mucous membranes and be helpful for minor inflammations on the skin (e.g., after minor injuries). One study even showed a remarkably good effect on multiple sclerosis, a nerve disease in which inflammation occurs in the brain and spinal cord. Water extracts of the plant were used, similar to those used in the preparation of the tea. In this study, all patients received the usual treatment, but those who also took yarrow extracts had a milder course of the disease and felt better overall. Modern research has shown that processes in the intestine also play a major role in this disease of the nervous system, which may explain the good effects of yarrow, since it is one of the very important medicinal plants for creating order in our metabolic area.

"Handling yarrow in the way I have indicated is thus a fundamental means for improving manure – and one that always stays within the living realm."

RUDOLF STEINER, 1924 –
"Spiritual Foundations for the Renewal of Agriculture"

CHAMOMILE

Matricaria chamomilla syn. Chamomilla recutita | Biodynamic Preparation 503

> This plant may not arouse our enthusiasm
> as readily as yarrow,
> but it too contains homeopathic sulfur,
> which enables it to attract other
> substances it needs and incorporate them
> into an organic process.
> This plant is chamomile."

RUDOLF STEINER, 1924 – "Spiritual Foundations for the Renewal of Agriculture"

THE PLANT

Chamomile (*Matricaria chamomilla syn. Chamomilla recutita*) in the family of the *Asteraceae*, contains about 30 species in the temperate Northern hemisphere. *Matricaria chamomilla* originates from the Middle East and has now spread worldwide, even to hot and tropical regions. Chamomile can be found on all continents today and is often cultivated as a medicinal plant. The major producing countries for chamomile are, amongst others, Argentina, Egypt and Mexico.

True chamomile is an annual plant with thin spindle-shaped shallow roots, and upright and highly branched stems, which grow to a height of 60 cm (2 ft). The long and finely cut leaves are pinnate or tripinnate. In the Northern hemisphere the flowers bloom in midsummer. The yellow flower heads are surrounded by white coronas and emit a strong aromatic scent. The flowers contain an essential oil which gives them their characteristic smell and medicinal properties.

Chamomile grows well from the temperate zones to the sub-tropical climate of South Africa and Australia. However, the best climatic conditions are those with long sunshine hours and cool nights.

CHARACTERISTICS OF CHAMOMILE

The true chamomile (*Matricaria chamomilla*) differs from other chamomile species by its hollow flower base, whereas other chamomile species such as the Roman chamomile (*Chamaemelum nobile*) and the scentless false mayweed (*Tripleurospermum inodorum*) have a completely filled base.

True chamomile (*Chamomilla recutita*) with hollow flower base.

Scentless false mayweed (*Tripleurospermum inodorum*) with completely filled flower base.

SITE

The plants have fine, ramified shallow roots. As an undemanding pioneer plant, chamomile does not have any special soil requirements. It thrives equally well in light and heavy soils; in fact, compacted soils are even preferred. Chamomile does not tolerate prolonged waterlogging. Optimum pH level: between 5.0 – 7.5.

High nitrogen content will cause strong vegetative growth and reduce flower formation. Unless your soil condition is very poor, it is best not to put much compost onto chamomile, as it will stimulate excessive leaf growth. Just sprinkle a bit of compost on the ground so that soil and plants can benefit from the compost preparations. Chamomile grows best in full sun; shady locations are not tolerated. Chamomile is known as a self-compatible crop.

For optimum flower production, growth must be maintained by sufficient moisture. However, care should be taken to avoid waterlogging by excessive watering, as this can cause serious damage to the plants.

CHAMOMILE IN INDIA

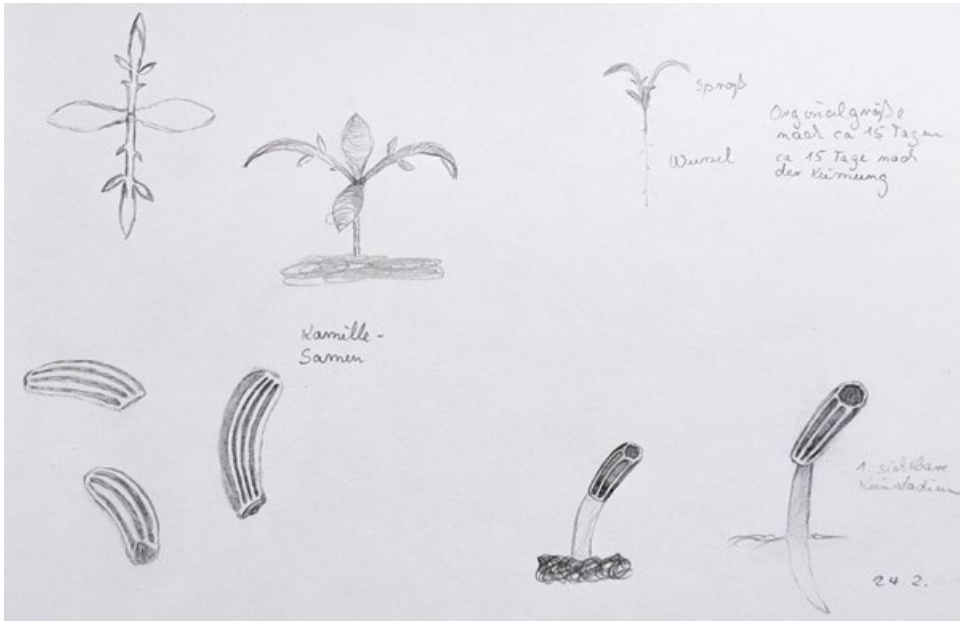
Experiences from Jakes Jayakaran

I started cultivating chamomile in my garden by propagating plants that we found growing locally, as well as from seeds brought from New Zealand. We are always experimenting with new seeds from different countries. My current chamomile plants came from European seeds, and although they seem to be smaller and less aromatic, the plant grows big and bushy, and flowers a lot.

In the tropics, chamomile grows well throughout the year. Every month we raise seedlings and transplant new chamomile plants into the garden. This allows us to harvest flowers throughout the year.

We have tried several different ways of germinating the chamomile seeds. Now we prefer to put the seeds in small trays and cover them with some compost; the germination is quite good and they transplant quite well.

To retain the quality of the flowers, we dry them quickly in a small solar dryer, which dries them in one day, and we store them in zip lock plastic bags or in stainless steel drums protected from humidity.



PROPAGATION

Chamomile is easy to grow. It can be grown by two methods; either direct sowing into a bed, or sowing in pots, seed boxes or multi-cell trays.

Chamomile seeds must not be covered, as the seeds require light for germination. The seedbed has to be compressed after sowing; the seeds need to be in contact with the soil. At temperatures of 15 – 20 °C (59 – 68 °F), germination will take place after 4 – 6 days. Make sure that the fine roots do not dry out in the first days after germination. Care must also be taken that the fine seeds are not washed into the soil by excessive watering or heavy rain. About five to six weeks after sowing, the young plants can be planted out directly from seed trays or multi-cell trays.

When large quantities of flowers are required, direct sowing in flat, weed-free beds is recommended. Promotion of self-seeding is a third cultivation technique. Plants from self-seeding can be transplanted to a new spot if necessary. Leaves and roots must be cut back before planting.

In the Northern hemisphere, sowing can be done in August, or September at the latest, for biennial cultivation, or in spring, around April, for annual cultivation. It is said that biennial chamomile plants will generate higher yields.

CHAMOMILE IN BRAZIL

Experiences from Andrea D`Angelo

Chamomile is widely used as a medicinal plant and as a tea in Brazil. It is found as a common plant in small gardens and it is also cultivated on a large scale, mostly in the south of Brazil.

Chamomile is a winter plant in Brazilian conditions. It is sown in autumn, at the end of April or in May, because it needs lower temperatures for good germination. At this stage, watering is important, as the autumn and winter is the dry season in these regions. With irrigation, chamomile can germinate before the common native plants appear. The best time for the harvest of the flowers is in August and September, at the end of winter and before the rainy season. Flowers can be harvested over a period of four to six weeks. Harvest before the rainy season enables a higher quality drying process for the flowers, and more successful storage.

As with yarrow, leaf cutter ants can also cut whole chamomile plants.

PLANTING

Recommendation for planting: in rows, with approx. 10 – 15 cm (4 – 6 in) distance between plants, and 25 cm (10 in) distance between the rows: 40 plants/m². Wide plant spacing reduces flowering.

It is best to transplant the well-rooted seedlings when they are approx. 5 – 7 cm (1.9 – 2.7 in) high. Sorting out individual seedlings from a dense stand may cause excessive damage to the roots. Instead, small clumps of seedlings (4 – 5 plants) can be planted out with less harmful shock. Depending on plant development and temperatures, it may be necessary to prune the upper parts of the plant.

Any following crop on the same spot will have to cope with the massive germination of chamomile. A chamomile plant can produce up to 10,000 and more seeds. If you let the chamomile go to seed, you can save yourself the next sowing thanks to this massive self-seeding.

Once chamomile is established, it requires very little care. It only needs to be watered in times of prolonged drought.

Flowering chamomile plants collapse easily, especially after heavy rain or strong wind. This makes harvesting the flowers more difficult. Staking the plants, based on the final plant height, with twigs or whatever material you have at hand before the start of the flowering season, will help during the period of harvesting.

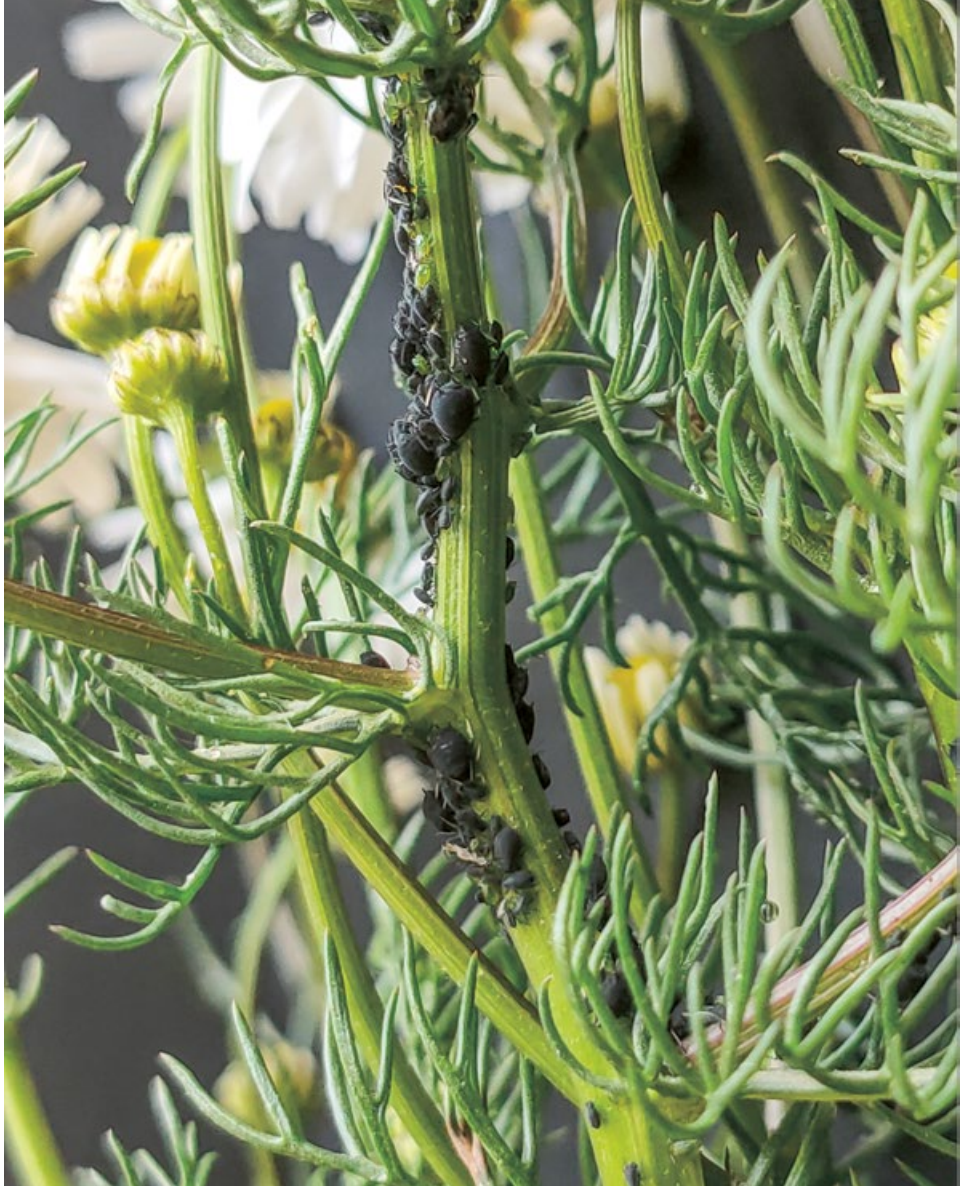
PLANT HEALTH AND ECOLOGY

The flowers will attract bees and solitary bees collecting the orange pollen; other pollinating insects are hoverflies, ladybirds, green lacewings, butterflies and different beetle species, e.g. the rose chafer (*Cetonia aurata*). If grown in good conditions, chamomile is not prone to suffer from pests and diseases. With unfavourable soil or climatic conditions, infestation with powdery mildew (*Erysiphe cichoracearum*), downy mildew (*Peronospora radii*) and white rust (*Pustula tragopogonis*) may occur. The flowerheads can be infested by the larvae of the Chamomile smooth beetle (*Olibrus aeneus*), while the chamomile moth (*Cucullia chamomillae*) may defoliate the plant. In African countries cutworms can be a problem. In India false chinch bugs (*Nysius minor*) can cause the shedding of flowers.

Unfortunately, especially at the time of the flower harvest, black bean aphids (*Aphis fabae*) or green plum aphids (*Brachycaudus helichrysi*) can complicate the harvest to a considerable extent. However, providing plants for their entire life cycles with beneficial insects and their larvae can reduce aphid infestation to a tolerable extent. Beneficial insects include praying mantis, green lacewings, ladybird, hoverflies, spiders and many others insects. Beneficial insects fall into three types: pollinators, pest-predators and pest-parasites. Biodiverse ecosystems provide habitats for these important insects.

Honey bee (*Apis mellifera*) collecting orange chamomile pollen.

Rose chafer (*Centonia aurata*).



Black bean aphids (*Aphis fabae*).

HARVESTING

The plants flower over a period of about 4 – 6 weeks. As the older flowers mature, the plants constantly produce new flowers. Because of the continuous flowering habit, multiple harvests are recommended rather than a single harvest. After the first harvest three follow-up harvests are repeated at intervals of 10 – 20 days.

The flowers can be harvested as soon as the petals are fully extended. This should be done on sunny days in the morning. It is essential to find the optimal harvest time. If the flowers are harvested too early, the yields will be very low; if they are harvested too late, the flower heads may fall apart. Flowers should be harvested without stems as far as possible. If the percentage of stems is too high, they must be removed.

POST-HARVEST TREATMENT

Chamomile tends to self-seed vigorously. Soon after the final harvest plants should be removed as fast as possible to avoid too much unwanted self-seeding.

DRYING

If flowers are not used when fresh, they can be dried. Drying is easy, yet inadequate drying conditions will result in poor quality. The process of drying should not start more than two hours after harvesting, due to the risk of fermentation of the flowers. Optimum temperatures are around 35 °C (95 °F). The drying ratio is 6 : 1.

STORAGE

There should be no moisture left in the dried plant. The dried flowers can be stored in a glass container or a paper bag until needed. Containers should always be labelled carefully. It is advisable to check the condition and quality of the harvested material occasionally. No matter which storage container is chosen, the plants must be protected against animals and mould.

In India insects such as the copper red Indian meal moth (Plodia interpunctella), the dark brown thief beetle (*Ptinus latro*) and the smooth spider beetle (*Gibbium psylloides*) cause damage to dried flowers. Even with careful storage, the flowers will lose a lot of quality after about a year. It is therefore recommended to grow and harvest chamomile every year.

SEED HARVEST

Choosing the right moment to harvest chamomile seeds is very important. Seeds must be fully developed and can be harvested as soon as the flower heads turn completely brown. If the seeds are too ripe the flower head can fall apart. Chamomile seeds are very minute in size. After drying, the seeds need to be cleaned and flower petals removed. It is not easy to separate the seeds from chaff. Different methods can come into action, depending on the required level of cleanliness. Chamomile seeds are usually cleaned through winnowing. Once the seeds are cleaned, store them carefully in a labelled container. Seeds can be stored up to two years. The brown-yellow to dark-grey rod-shaped, often somewhat curved seeds are 0.7 – 1.2 mm (0.3 in) in length and 0.2 – 0.4 mm in width. One plant can produce about 5,000 – 10,000 seeds. The seeds are dispersed by the wind. TGW = 0.05 g.

FURTHER USES

Chamomile has been used in herbal medicine for thousands of years, and was well-known in ancient Egypt, Persia, Greece and Rome. Chamomile still has a prominent place today in herbal medicine. The flowers provide a natural dye, dried flowers are used as herbal infusion, and the essential oil extracted from the flowers is needed in perfumes. Chamomile is also a remedy in veterinary medicine.

The young, fresh leaves are edible and well-suited for salad, risotto or other dishes. You can flavour biscuits, pastries or jams with chamomile. The leaves may have a somewhat bitter flavour, while the fragrance of dried or fresh flowers has a honey-like sweetness with a hint of apple. The whole plant of chamomile has been traditionally used in beer. Together with other botanicals, chamomile can flavour white vermouth or gin.

Chamomile plants are eaten by donkeys, horses, rabbits and sheep.

BE AWARE

People are more likely to experience allergic reactions to chamomile if they are allergic to related plants such as ragweed, chrysanthemum, arnica, marigold or other plants of the *Asteraceae* family.

Chamomile is a vigorous self-seeder with massive seed distribution.

CHAMOMILE

By Markus Sommer

Many herbaceous plants, like the chamomile, produce yellow flower heads surrounded by a ring of white ray florets. And yet it is hard to confuse chamomile with any other. Unlike almost all similar flowering plants, this plant, which reaches about to our knees, is surrounded by a strong and characteristic fragrance that's not easy to describe. It is pleasant and warm, but besides a certain sweetness, there's a scent in the background reminiscent of apples. This must have been the feeling of the Greeks 3,000 years ago, when they gave the plant the name "chamomilla", which contains the Greek word "melon" meaning "apple". No one will be able to imagine a scent from the mere description, but anyone who has once smelled chamomile will never forget the fragrance with which it fills its surroundings, and which rises from every cup of tea made from the flowers.

The flowers are not very big, barely the size of a thumbnail, but there are many on each plant and the yellow interior of the inflorescence is formed, as with yarrow, by many tiny individual flowers that form a community. The yellow part of the flower is strongly convex and if cut open, an internal air-filled cavity comes to view. This is what distinguishes medicinal chamomile from other chamomile species. Air also characterises the leaves of chamomile as they are formed by fine, needle-like pinnules with a lot of air between them. Because the leaves are so fine, they are hardly noticeable at first glance compared to the dominant yellow-white flowers capturing our attention.

Usually only the flowers are used as a remedy. After harvesting, they are dried quickly in partial shade so that as much of their fragrant essential oil as possible is preserved. If it is extracted by boiling the dried blossoms with water in a glass flask, collecting the rising steam, and allowing it to cool, the oil separates in dark blue drops. This blue is created by the heat treatment and is a stunning contrast to the light yellow of the flowers. Above all it's the fragrant oil components that give chamomile its healing power. Chamomile helps with many complaints caused by inflammation of the stomach and intestinal mucous membranes. It alleviates abdominal pain that occurs after emotional stress or in the case of mild infections.

The relaxing effect on the soul certainly also plays a role here, contributing, among other things, to the fact that we fall asleep more easily after drinking a cup of chamomile tea. Inflammations of the skin can also be alleviated by compresses with chamomile tea. Chamomile vapour can be inhaled when we pour boiling water over a handful of chamomile flowers, which has proved very effective when we suffer from a cold or inflammation of the sinuses. Women's bladder infections are also improved, and inflammations prevented, if a small bowl with chamomile flowers and hot water is placed in the toilet so that the steam can surround the abdomen, which is best wrapped in a blanket for this purpose. Chamomile always has an analgesic, relaxing and anti-inflammatory effect, and so in the countries where it grows it's one of the most reliable home remedies, to be found in almost every household.

"Then, when spring comes, dig up the sausages and store them or add their contents to your manure, just as you did with yarrow. You will find that 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 the plant growth is extraordinarily stimulated."

RUDOLF STEINER, 1924 –
"Spiritual Foundations for the Renewal of Agriculture"

STINGING NETTLE

Urtica dioica | Biodynamic Preparation 504

// Because it is such a good influence, the stinging nettle we find growing wild really does not deserve our customary scorn. It should actually be growing around our hearts, since the role it plays in nature by virtue of its marvellous inner structure and way of working is very similar to that of the heart in the human organism."

RUDOLF STEINER, 1924 – "Spiritual Foundations for the Renewal of Agriculture"

THE PLANT

The nettle family (*Urticaceae*), includes about 2,625 species, grouped into 53 genera of herbs, shrubs, small trees and a few vines, mostly from the tropics, but with a few important temperate representatives, e.g. Urtica dioica. The stinging nettle or greater nettle (*Urtica dioica*) is a perennial herb native to Europe, North America and Asia. Urtica dioica has been introduced in cooler and temperate parts of the world and can be found in South Africa and Australia. It occurs from sea level to subalpine elevations.

Nettles are fast growing herbaceous, perennial plants 1.5 – 2 m (5 – 6 ft) tall. *Urtica* is dioecious, which means that female and male flowers occur on separate plants. The white-green flowers are small and inconspicuous. Pollination is by wind. The soft leaves are approx. 3 – 15 cm (1 – 6 in) long and grow decussate in opposite pairs up an erect four-angled hollow stem. The leaves and stems bear many stinging hairs which can cause painful skin irritations. The itching and burning may last up to 12 hours or even longer. Because of its widely spreading rhizomes, the plant can be found in large colonies. Young rhizomes and stolons are reddish in colour. Older rhizomes are of bright yellow colour.

Plants spread vegetatively by means of rhizomes and form dense colonies that exclude other species. They can advance more than 50 – 60 cm (2 ft) in a year. During winter, the plants die back to the ground, sending up new fresh shoots with the beginning of the growing season.

Urtica dioica can tolerate hot temperatures if the soil has sufficient moisture. Nettles bloom well in the tropics; however, their growth and height is significantly lower compared to nettle plants of the Northern hemisphere.

Male Flowers

Female Flowers

The stinging nettle hairs contain formic acid, histamine and other chemicals.

Nettle plants often have more greenish or reddish coloured leaves and stems. They tend to grow in large colonies close to each other.

SITE

Stinging nettle can be grown in a wide range of soils and habitats. Nettles can be present in meadows, pastures, orchards, neglected farmland, roadsides and along streams. As a nitrogen-loving plant, it thrives on heavy, moist, fertile and nutrient-rich soil, preferably in full light but also in semi-shade. Nettle plants are excellent indicators for phosphate-rich soils, which is why it has flourished in the wake of human and agricultural colonisation. It needs good drainage and will not thrive in waterlogged soils. However, during the growing season the plants respond very well to generous watering.

In cultivation, *Urtica dioica* plants must be fertilized once a year with a generous amount of compost, best done before the beginning of the growing season. If possible the compost should be worked in. With adequate compost nettles can be grown for 3 to 4 years on one spot. Once established, the plant strongly dominates the area given to it. It can be very hard to eradicate the plants because of the large root system. Optimum pH level: between 5.5 – 7.

GROWING STINGING NETTLE IN BRAZIL

Experiences from Andrea D`Angelo

To cultivate the stinging nettle, a fertile soil with enough nitrogen and moisture, and plenty of manure, is recommended. Ideally, we provide a place for nettle in semi shade. With good soil and semi-shade, the plants live longer, and the harvest time can be extended. If possible, it is good to have enough space for both male plants (which produce pollen) and female plants (which produce the seeds). As the name dioica indicates, both male and female plants are needed for successful seed production. Being able to produce nettle seed enables the expansion and renewal of the nettle colony, and is essential for establishing local autonomy in cultivating and making the preparations.

It is common to see lots of caterpillars and butterflies and many other insects on the nettle plants, but they are not harmful!

Normally, the delicate flowers appear in November and December, at the end of springtime. This is when we collect the whole plant and make the preparations; around Christmas time. Five to seven weeks later, in January or February, it is possible to take another harvest, with the plant in flower once more. So, depending on the soil, and how you manage the plants, it is possible to harvest twice a year; at the end of spring, and in the summer.

PROPAGATION

Due to its worldwide distribution, cultivation is not necessary in many parts of the world. In areas where stinging nettles are not found, cultivation may be advisable. If stinging nettle needs to be cultivated, it can be propagated easily from rhizomes approx. 10 – 15 cm (4 – 6 in), or from fresh green stem tip cuttings (approx. 10 cm). Propagation from seeds is also possible.

SOWING

The seeds are sown in seed pots or multi-cell trays. Sprinkle with a little bit of soil, but do not cover the seeds. Germination occurs after 5 – 12 days. The germination rate is very low, averaging just over 50 – 60 %.

PLANTING

Transplanting of seedlings is done in small bunches. When propagating from rhizomes, rhizome pieces from healthy plants can be cut into 10 – 15 cm (4 – 6 in) long pieces. The rhizomes are planted in rows and covered with 5 cm (2 in) of soil; distance between rows: 25 – 30 cm (10 – 12 in). Distance between plants in rows: 20 – 30 cm (9 – 12 in), 3 rhizomes per spot. Young plants may need supplemental watering during their first summer. As nettles spread easily and fast they can instead be planted into meadows, where they can spread without disturbing other plants.

STINGING NETTLE IN INDIA

Experiences from Jakes Jayakaran

I established *Urtica dioica* in my garden 20 years ago by propagating European seeds. Since then, I have occasionally propagated these perennial plants using rhizomes from the existing stock, and planting them in new areas. Otherwise, I let them self-seed so they can spread around the garden.

In these tropical regions of India, nettle grows all year round. It prefers semi-shady conditions and black soils, rich in nitrogen. We harvest nettles twice a year, with the biggest harvest around July-August, followed by a smaller harvest after the heaviest monsoon rains towards the end of November. We cut back nettle plants twice a year around June, and later in the year in December, to promote new growth.

In India, as with other Asian countries, there are different local nettle varieties that I believe could potentially replace *Urtica dioica*. For example, I have propagated from seedlings a native variety found in the Shola forest, but we are yet to research its qualities fully before we use it for the biodynamic preparation 504. *Urtica parviflora*, on the other hand, a native variety that grows in the Indian Himalayas, has already been successfully used as a replacement here in India.

Urtica parviflora Northern India

PLANT HEALTH AND ECOLOGY

The plants are especially attractive to a number of butterflies and moths, and are host-plants for their caterpillars. The caterpillars are no problem at all; on the contrary, they contribute to the biodiversity of your farm. Many species of insects are associated with nettles. Nettle seeds are an important food source for many birds.

Red admiral butterfly (*Vanessa atalanta*). Their caterpillars use nettles as their food plant.

Caterpillars of the European peacock butterfly (*Aglais io*) can often be found on nettles in large numbers.

Green nettle aphids (*Aphis urticata*).

Nettle is subject to a limited number of pest and diseases. *Urtica dioica* is susceptible to powdery mildew (*Erysiphe urticae*), leaf spots (*Septoria urticae*) and nettle rust (*Puccinia urticata*). With unfavourable soil or climatic conditions, infestation with aphids may occur. About 18 different aphid species are feed on nettle, e. g. the dark green nettle aphid (*Aphis urticata*) and the black bean aphid (*Aphis fabae*). Aphid infestation often leads to retarded growth and leaf deformation caused through transmission of viruses. However, ladybirds, lacewings and other beneficial insects will benefit from this aphid infestation. Nymphs of the nettle bug (*Trioza urticae*) cause small, bladder-like galls on nettle leaves. The bugs are virtually ubiquitous in many parts of Europe. The larva of the small magpie moth (*Anania hortulata*) feeds from a rolled or spun nettle leaf. The nettle pouch gall (*Dasineura urticae*) develops mostly in leaf veins and flower stalks of nettles. In many African countries cutworms are a serious pest and can wreak havoc within a short time.

Powdery mildew (*Erysiphe urticae*).

Larva of the small magpie moth (*Anania hortulata*).

Nettle rust (*Puccinia urticata*).

HARVESTING

Wearing protective gloves is recommended. Nettles are harvested at the beginning of the flowering season, preferably on a sunny morning. The plants flower progressively from below upwards. Scissors, sickle or scythe can be used for cutting. The plants can be cut above yellow or spotted leaves. Thicker stems decompose poorly. It is therefore recommended to remove the leaves from the thicker stems and to use only the upper, soft parts of the stems. Alternatively, just the upper 30 – 40 cm (12 – 16 in) of the plants can be harvested and cut immediately, with no need to separate leaves and stems.

POST-HARVEST TREATMENT

After cutting back to soil level, plants vigorously sprout again and flower for a second time.

DRYING

If the nettles cannot be used when fresh, they can be dried and stored until use. Be careful during and after drying: Once the stinging hairs are dry they still contain silica and tend to be rather sharp.

Drying ratio: 6:1.

STORAGE

The dried nettles can be stored in a glass container or a paper bag until needed.

SEED HARVEST

Nettle plants produce abundant seed. Seeds can be collected in late autumn. The seeds have an oil content of 27 % and a protein content of 15 %. Nettle seeds do not pass through dormancy and can germinate just days after reaching maturity.

The nut-shaped, edible seeds are sandy-yellow to greenish-grey in colour and are about 1 mm in length, 0.5 – 0.8 mm in width and 0.2 – 0.4 mm thick. A single plant can produce up to 10,000 – 30,000 seeds. The seeds are distributed by animals and the wind. Open ground is preferred to support self-sowing.

TGW = 0.14 g (0.5 oz).

Urtica dioica ready for seed harvest.

FURTHER USES

Nettles are very beneficial plants. They have a long history as a source of traditional herbal medicine. The World Health Organisation (WHO) rates *Urtica* in its "WHO Monographs on Selected Medicinal Plants" (2004) as a valuable plant for medicinal uses. The plant is a well-known remedy in veterinary medicine. Historically, nettles were widely used to make clothing for almost 3,000 years. In recent years, efforts have been made to re-introduce and cultivate nettles on a larger scale for fibre production (*Urtica dioica convar. fibra*). Nettles can also provide natural dyes: green colour from the leaves and yellow from the roots.

Nettle as a feed component positively affects the health of poultry and other animals. Ruminants avoid fresh stinging nettles. However, when slightly wilted or dried, nettles are eaten by goats and sheep. Chickens like fresh nettle leaves.

Soaking stinging nettles in water, or cooking them, removes the stinging chemicals from the plants, so they can be handled and eaten without any problems. Young leaves or tops can be eaten as a vegetable.

The flavour of young leaves of *Urtica dioica* is similar to spinach and is rich in vitamins A and C, iron, potassium, manganese and calcium. As soup, in bread or mixed with porridge, nettles were once eaten in many parts of Europe. Nettle leaves can be put to use in cheese making and in fresh curd. They can also be used in dips or pasta sauce. The leaves can be dried and consumed as tea. The dried and finely ground nettle leaves can also be used for an aromatic herbal salt. Dried leaves of dandelion and yarrow are also ideal for this.

DELICIOUS NETTLE SMOOTHIE RECIPE

After rinsing the freshly harvested leaves of nettle, dandelion and yarrow, cut the leaves into smaller pieces, add turmeric or ginger, ground cardamom, pepper or cloves, moringa leaves, apples, bananas, oranges, pineapple or other seasonal fruits or berries with two cups of juice or water into the blender. You may want to add other ingredients, e.g. yoghurt.

Nettle pancake with asparagus and vegetables.

DELICIOUS PESTO RECIPE

Pesto is originally a recipe from Italy and used for pasta. It is an uncooked sauce made of crushed basil leaves, pine nuts, garlic and salt, all blended in olive oil and served with Italian parmesan cheese. Instead of the basil leaves you can use the young fresh leaves of yarrow, nettle and dandelion. You may want to add other "greens" such as leaves of carrots, broccoli or radish, parsley, coriander and fresh or sun-dried tomatoes. Pesto is best used fresh, but can be stored in the refrigerator for a few days.

STINGING NETTLE AS LIQUID FERTILIZER / PLANT TEA

Recipe: Stinging nettle is harvested with scissors or shears, chopped into smaller pieces and placed in a bucket or barrel full of water. The nettle must be covered by water. The liquid is stirred with a stick for some minutes once or twice a day. After one or two weeks, depending on temperatures, the rather smelly nettle manure is ready for application. Remove the remains of the plant material and sieve the mixture. Nettle manure must be diluted before being applied. Mix one part of manure with 10 litres of water.

The liquid can either be used as a foliar fertilizer or be applied to the soil at plant base. Application of liquid fertilizer onto the leaves is an interesting option in case of nutrient deficiencies, as plants absorb nutrients about 20 times faster through the leaves than through the roots. Application should not be carried out during the heat of the day; early morning or a cloudy day is best. Never apply liquid manure on seedlings or young plants. Do not over-use liquid manure. High dosages of liquid manure will weaken the plants and attract aphid infestation. The right balance for optimum plant development should be kept in mind. CPP can be used to improve the quality of liquid manure or plant teas.

BE AWARE

The plant genus *Urtica* is known for its tiny stinging hairs which can cause painful skin irritations. For harvesting, wearing protective gloves and long-sleeved shirts is recommended.

STINGING NETTLE

By Markus Sommer

The stinging nettle is one of the best-known plants in the cool and temperate regions of the Northern hemisphere. Every child has had at least one unpleasant experience with it, because even a slight brushing of the leaves leads to a burning sensation on the skin that often lasts for hours. The dark green leaves of the plant, which is usually a little over a metre high, are covered with tiny needles made of silica that break off when touched. Their sharp-edged tips penetrate the skin like fine hypodermic needles. This allows a poisonous fluid to be injected into the skin, causing the burning sensation. Anyone who has experienced this remembers the appearance of the plant well. The edges of its leaves are saw-toothed. The leaves are arranged in pairs, with the leaves in each pair diametrically opposed on the stem. The pairs of leaves are offset by 90° from each other, and so, looking at the plant from above, one has the impression the leaves standing in a square.

Although it is unpleasant to touch the leaves, they are used in many ways. When wrapped in a towel and rolled with a round piece of wood, the needles break off and are no longer effective. Cooking also destroys the plant's ability to damage the skin. Thus, nettles can be used like spinach or to fill dumplings. Since nettle contains a lot of protein, it's a valuable and inexpensive addition to the diet. But it also has many healing properties. For example, the plant is dried and used as a tea, which is slightly diuretic and therefore has a positive effect on mild water retention in the legs. Above all, however, the tea is used to relieve rheumatic complaints of the joints. To have an effect, the tea needs to be taken several times a day for a few weeks. Nettle roots are also useful against prostate enlargement in older men and can help when urination becomes more difficult, and frequent trips to the toilet are necessary at night.

Nettle is also a valuable addition to hay for many animals - for example, goats and sheep - because it contains a lot of protein. Protein requires nitrogen for its formation, and so the plant typically grows in places that are particularly high in nitrogen. Where there used to be stables or pastures, but also where human excrement was disposed of, large stands of stinging nettle often grow and help to put the one-sided over-fertilised soil in order.

On the other hand, nettles themselves make good fertiliser. Put some nettles in a bucket, fill it with water and wait for a few days until a "nettle slurry" forms. It has a rather unpleasant smell, but it's a nitrogen-rich fertiliser that can be used to fertilise flowers and vegetable plants. Alternatively, if the water is drained off after just one day, it's very suitable for combating insect pests on crops. For example, it can be used to repel aphids.

"This addition
[of the nettle preparation]
not only makes the manure
intelligent, it also makes
the soil more intelligent,
so that is individualizes itself
and conforms to the particular
plants that you grow in it.
Urtica dioica in this form
is really like an infusion
of intelligence to the soil."

RUDOLF STEINER, 1924 –
"Spiritual Foundations for the Renewal
of Agriculture"

OAK

Quercus robur | Biodynamic Preparation 505

"Now, one plant that contains plenty of calcium is the oak. Seventy-seven percent of its substance consists of finely distributed calcium. And oak bark, in particular, represents a kind of intermediate product between the plant and the living element, in the same sense as I already described the kinship between bark and living earth."

RUDOLF STEINER, 1924 – "Spiritual Foundations for the Renewal of Agriculture"

THE PLANT

Quercus, in the family *Fagaceae*, contains around 400 – 500 deciduous or evergreen trees and shrubs in the Northern hemisphere. Around 90 species are recognised in Northern America, and 27 in Europe. Oaks can mainly be found in forests with summer rainfall. They are widespread in Europe, North and Central America and in large parts of Eurasia, China, Southeast Asia and parts of the Mediterranean, including North Africa. *Quercus robur* has been introduced to other areas, e. g. Australia and South Africa. Oak trees can reach a height of up to 40 – 50 m (131 – 164 ft). They are long-lived trees and may live hundreds of years.

In the first 10 – 20 years the bark is light grey, smooth and shiny. As the trees mature, the bark becomes dark-brown and deeply fissured. *Quercus robur* has lobed and very short-stalked dark-green leaves approx. 7 – 15 cm (3 – 6 in) long. The leaves are curled at the leaf base.

Oaks produce pendulous catkins containing numerous small green-yellow coloured male flowers. The pollen is dispersed by wind. The small separate female flowers are tucked into a bud made of scales. The red flowers develop into acorns by autumn. The fruits or acorns are 2 – 3 cm (1 in) long, with one to four acorns on each stalk, and are held in a cup with a prominent stalk about 2 – 8 cm long.

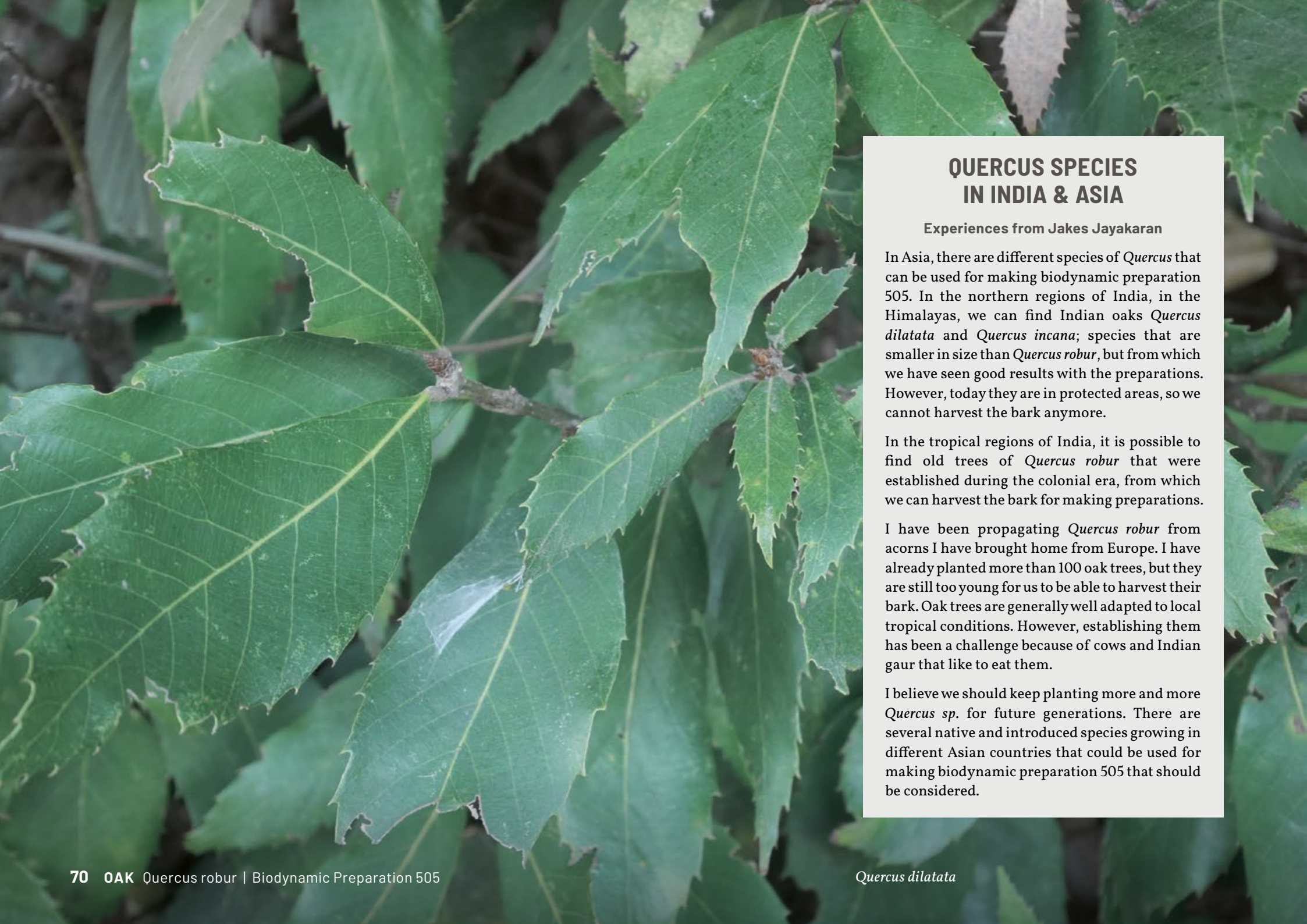
In North America the bark of the native White Oak, *Quercus alba*, is often used for the oak bark preparation and in North India it is the bark of *Quercus dilatata*.

Cross-section of *Quercus robur.*

Male catkins with pollen.

Female red flowers.

Small reddish female flowers will develop into acorns.



QUERCUS SPECIES IN INDIA & ASIA

Experiences from Jakes Jayakaran

In Asia, there are different species of *Quercus* that can be used for making biodynamic preparation 505. In the northern regions of India, in the Himalayas, we can find Indian oaks *Quercus dilatata* and *Quercus incana*; species that are smaller in size than *Quercus robur*, but from which we have seen good results with the preparations. However, today they are in protected areas, so we cannot harvest the bark anymore.

In the tropical regions of India, it is possible to find old trees of *Quercus robur* that were established during the colonial era, from which we can harvest the bark for making preparations.

I have been propagating *Quercus robur* from acorns I have brought home from Europe. I have already planted more than 100 oak trees, but they are still too young for us to be able to harvest their bark. Oak trees are generally well adapted to local tropical conditions. However, establishing them has been a challenge because of cows and Indian gaur that like to eat them.

I believe we should keep planting more and more *Quercus sp.* for future generations. There are several native and introduced species growing in different Asian countries that could be used for making biodynamic preparation 505 that should be considered.

Quercus dilatata

SITE

Quercus robur is very tolerant to soil conditions, but prefers fertile, nutrient-rich and well-watered clay soils. Flooding is tolerated for 2 – 3 months. As young trees they tolerate moderate shade, but with increasing age the trees need plenty of light. Oaks are excellent trees where there is plenty of space for them to grow and spread. Optimum pH level: between 5 – 8.

PROPAGATION

It takes 12 – 15 years from the sowing of the acorns to the first bark harvest. This may feel very slow in the short term, but it makes you independent of external sources in the long run.

In the Northern hemisphere, the mature acorns fall to the ground in October. Acorns are best collected and sown at this time. Acorns can be heavily infested with larvae of the acorn weevil. To separate germinable acorns from damaged ones, you can put the freshly harvested acorns in a bucket filled with water. Damaged acorns will float on top of the water, while undamaged acorns will sink to the bottom. Acorns lose viability when they dry out, and therefore they must be stored under moist conditions; i.e. in a zip bag. They must be surrounded by peat, damp sawdust or another organic material that can hold moisture. The bags should be placed in a refrigerator or a cool place. But regardless of the cool storage, most acorns will start to germinate after one or two months of storage.

Germination takes place about 4 – 6 weeks after sowing. The emerging roots need to be handled with care, otherwise they may easily get damaged. After filling pots or containers with good potting soil, the acorns can be planted just below, or at, the surface with the root facing down. In the following weeks the young plants should be watered frequently, never allowing the soil to dry out.

Oaks often produce a bumper crop of acorns, a process called masting.

OAK TREES IN BRAZIL

Experiences from Andrea D`Angelo

Oaks were planted in previous centuries by European immigrants in the southern part of Brazil.

For this reason, it is possible to find both mature trees and young trees, mainly in the southern part of the country, in private gardens and public parks.

From these trees, we can harvest the bark for making preparations, and collect the acorns, to grow new trees for planting in other regions.

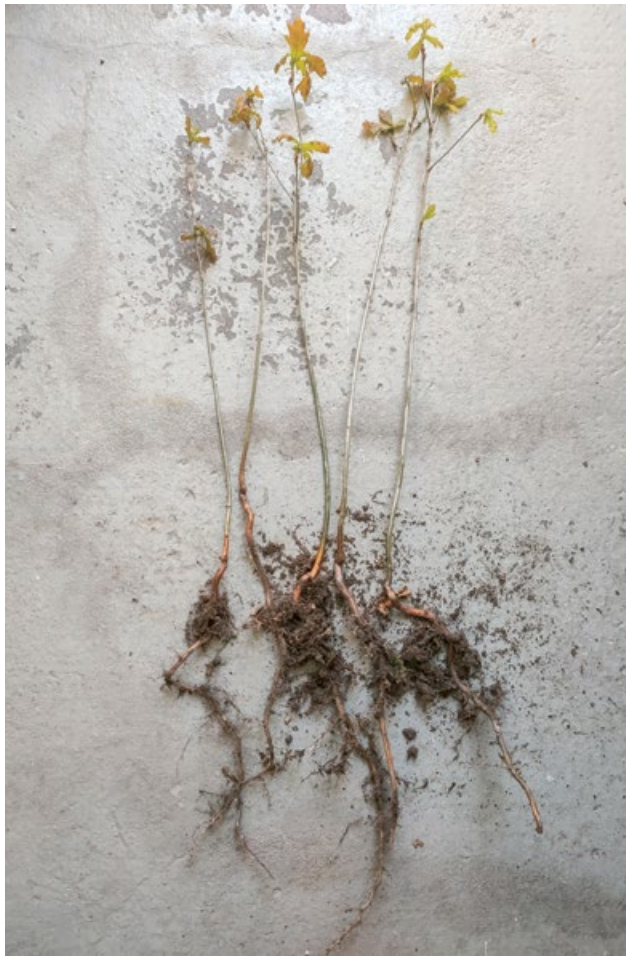
15 yers old oak tree

PLANTING

As *Quercus* is a long-lived tree, the selection of the planting site should be planned with care. Choose a location where the young plants will have room to grow even when they are mature.

Young plants need staking, and protection against various animals that feed on oak.

Before planting in the nursery, the young trees can be placed in a bucket filled with a CPP slurry.



These three-year-old oaks from self-seeding are ready to be planted in a tree nursery.

Nursery plants, about one year old.

PLANT HEALTH AND ECOLOGY

Oak trees are of considerable ecological importance as a significant food source for many species. *Quercus robur* supports the highest biodiversity of insect herbivores of any European plant. It is said that in the Northern hemisphere hundreds of animals, small or large, feed on oak bark, acorns or leaves, many of which specialize in *Quercus* species. Acorns are one of the most valuable food resources for many birds and small mammals, such as squirrels and chipmunks. Squirrels and jaybirds contribute to the dispersal of the acorns, burying them into the ground for winter storage, often far away from the parent plant. Bees and solitary bees collect pollen. Bees are also attracted by the honeydew that is caused by aphid infestation. More than 200 species of aphids feed on oaks worldwide, including about 34 species that feed on *Q. robur*.

Oaks are vulnerable to a number of insects, pathogens and abiotic problems. Leaf miners may damage the leaves. Oak lace bugs (*Corythucha arcuta*) suck juices from leaves. Acorn weevils (*Curculio glandinum*) are highly effective in damaging acorns, thus making them incapable of germination. Oak trees can be defoliated by the caterpillars of the oak processionary moth (*Thaumetopoea processionea*). Sawfly larvae (*Caliroa quercuscoccineae*) can cause significant damage to oak leaves. Oak trees are host plants for more than 70 species of gall wasps. Galls are caused by tiny gall wasps (*Cynipidae*) and do not cause significant harm to oak trees. Leaves can also be infested by powdery mildew (*Erysiphe alphitoides*). Unlike most other ladybirds which feed on aphids, adult and larvae of the 22-spotted ladybird (*Psyllobora vigintiduopunctata*) are one of the most important powdery mildew consumers.

Larva of the 22-spot ladybird (*Psyllobora vigintiduopunctata*) feeding on powdery mildew.

Powdery mildew (*Erysiphe alphitoides*).

Common spangle galls (*Neuroterus quercusbaccarum*).

Knopper gall (*Andricus quercuscalicis*).

Larva of the oak apple gall wasp (*Cynips quercusfolii*).

Leaf damage caused by larvae of the oak flea beetle (*Altica quercetorum*).

The ecological importance of oak trees and their relationship with other plants and animals is huge. The cracks in the fissured bark of older oak trees provide a great habitat for many species of insects. The texture of the bark also attracts many different mosses and lichens. More than 40 different lichen species can be found on oaks.

The oak has a greater multitude of fungal companions than any other tree species. Oak trees in the Northern hemisphere are host to several hundred fungi. Some of these are very aggressive and can be even destructive. The fungal disease ´sudden oak death´, caused by an invasive plant pathogen (*Phytophthora ramorum*), is a serious threat in Northern America and parts of Europe. It is estimated to have killed more than one million oak trees in the USA during the last decade.

Old oak trees can provide value for wildlife for many years. Even their deadwood is a rich, often unrecognized habitat. Numerous animals can be found in one handful of rotten wood inside a tree. Many insect and beetle species rely on deadwood. Hollows in old trees are used by nuthatches, owls, woodpeckers, bats and other animals. Larvae of the European stag beetle (*Lucanus cervus*) are found in holes in old oak trees and in dead trunks.

Male European stag beetle (*Lucanus cervus*).

HARVESTING/COLLECTING THE BARK

For the preparation, the bark of oak trees is used. The trees should not be too old. There are several ways to harvest the bark. The most common practice is to collect the bark directly from the living tree. The oak should have a trunk diameter of 25 – 50 cm (10 – 20 in). Before removing the bark, the trunk must be thoroughly cleaned of lichen and moss with a wire brush. A cloth is placed around the cleaned trunk to collect the bark. The outer layer of the bark is carefully harvested with the help of a drawknife and wood rasps. Take care not to remove too much bark, as this may damage the tree.

Using a fine grater or a coarse file, the outermost bark layer can be finely crushed and collected in a cloth. Another possibility is to use a drawknife to peel off the bark in thin layers directly from the tree. These bark strips are then crushed in an iron mortar or coffee mill.

Alternatively, branches with a diameter of 15 – 25 cm (6 – 10 in) can be sawn from older trees. The bark can be peeled off immediately, or some time after harvesting. Here, too, the branches must first be cleaned with a wire brush. Working with rasps and rough files the bark is collected in a cloth.

Oak bark can be crushed using a pestle and mortar or a coffee grinder.

POST-HARVEST TREATMENT

Oak trees can easily be pollarded or coppiced. Pollarding is a pruning system involving the removal of the upper branches of a tree at a height of about 4 – 5 m (8 – 10 ft). Coppicing involves cutting young tree stems down to 30 cm (1 ft) above ground level, resulting in multi-stemmed growth. Both pruning techniques are said to extend the tree's potential lifespan, if not its health.

Traditionally oak bark was much used in tanning. Oak forests used to be coppiced on a 20 – 24 year rotation system, with blocks of trees at varying stages of growth. Every year a block of trees was cut to the stool to produce tanbark coppice. Coppicing represents the oldest form of sustainable agroforestry systems and can be found all over the world. In Europe pollarding or coppicing is done in winter when the plants have a dormant period. Farmers used the cuttings not only for firewood, charcoal production or for harvesting bark, but also as fodder for their livestock, especially the fresh leafy branches. The foliage and twigs of oak trees are considered astringent and rich in tannins and are a nutritious supplementary feed for ruminants.

Thinning crowns of older specimens may require dead wooding.

The colour of the heartwood is pale brown, the sapwood is paler. One can smell the astringent tannic acid of a freshly felled oak tree.

DRYING

Usually the harvest-fresh bark is used for the preparation. If this is not possible bark can be dried without any problems. Drying ratio: 1.5:1.

STORAGE

Oak bark should only be stored for a very short time.

ACORN HARVEST

The ripe acorns can be collected directly from the tree or from the ground. They are 2 – 2.5 cm (¾ – 1 in) long, with an acorn stalk about 3 – 7 cm (1 – 3 in) long and with one to four acorns on each stalk or peduncle. Trees only produce germinable acorns from the age of 20 – 50 years upwards. One single mature oak can produce an abundance of acorns: up to 150 kg (330 lbs) or even more.

TGW = 3,500 – 5,500 g (105 – 195 oz).

FURTHER USES

Tinctures made of oak bark have a long tradition in medicine. Oak bark is also a remedy in veterinary medicine. The bark provides a brown dye.

Oak trees can harbour a number of epiphytes, including mistletoe (*Viscum album*). Mistletoe is an important medicinal plant in anthroposophical medicine for the treatment of cancer.

Acorns are rich in protein, fat and starch. They can be roasted, ground and used as a coffee substitute. In times of famine, acorns were ground and used as a substitute for bread flour.

Oak wood is very resistant to insect and fungal attack because of its high tannin content. Tannins are present throughout the plant body. The tannin content depends on the time of harvest and the age of the bark. In the past, oak bark was widely used for tanning animal rawhide and skins. Because of its hard, long-lasting and durable timber, oak wood has a large variety of uses. For centuries oak wood has been used for the construction of ships, furniture and barrels. Oak barrels were traditionally valued for storing wine, whisky and other spirits; maturing wine or spirits in oak casks contributes complex luscious flavours and enhances the quality of the liquids.

Another important member of the oak family is *Quercus suber*, the cork oak, which is native to the Mediterranean and is the primary source of corks for wine bottle stoppers and other uses, such as cork flooring.

In the past, it was a common silvopastoral practice in many European countries to bring pigs out to forage in oak forests in autumn, after the acorns had ripened. This practise is called "*pannage*" or "*common of mast*" and used to be an important part of forest ecology. The acorn fattening of pigs is still popular in Portugal ("*Montado*") and Spain ("*Dehesa*").

In ancient times sacred oak groves were important places of worship and could be found all over Europe. In some countries, oaks are important national symbols of strength and stability even today. Images of oak trees, their acorns or leaves adorn coins, banknotes and stamps, and decorate numerous buildings and churches. To this day, oaks are the "kings of the forest" and of great ecological and economic importance.

OAK

By Markus Sommer

While most preparation plants are herbs, the oak is a tree that grows up to 40-50 metres (131-164 ft) high. It's very long-lived, being able to survive for more than 1,000 years, and has one of the strongest, most durable woods, due to its high levels of tannins. Time and again, entire cities (for example, St. Petersburg, and Venice) have been built on marshy ground or even in shallow water after oak piles were driven into the ground as foundations.

The branches of the oak are rarely straight and elongated, rather they appear gnarled and twisted and each oak tree has an individual shape. The leathery, evenly indented leaves are unmistakable, tasting bitter and astringent due to their tannin content. When they first open in spring, they usually appear reddish, but soon take on a somewhat dull green. A considerable number of animals live in association with the oak. Its fruits, the acorns, which the tree only begins to produce when it is 20-50 years old, feed wild boar, deer and some birds. There are often outgrowths of different colours and shapes on the surface of the leaves; these so-called "galls" each contain the larva of an insect. Many different insects lay their eggs inside the leaf, causing the leaf to swell and surround the insect larva with plant tissue, in which the insect then matures. More than 100 species of butterflies alone are adapted to living with the oak, as are many birds and other animals. The oak is able to live together with them all without being significantly damaged; presumably, the tannins produced by the tree have a limiting effect on the browsing damage. The cracked bark of the oak is particularly rich in tannins which explains its use over many centuries to tan leather. Animal skins that would otherwise decay become permanently durable and supple after soaking in a decoction of oak bark.

It is also the bark in particular that can be used medicinally. It is usually boiled with water (about 50 g to a litre for 20 minutes) and this extract is used as a bath for itchy and weeping skin diseases. Baths with the addition of oak bark decoctions are also particularly effective for itchy eczema in the anal region. In anthroposophical medicine, such an extract, together with lime made from oyster shells, is also used against skin diseases. Weak concentrations of oak bark extract are occasionally used for diarrhoea. In principle however, all these preparations of oak bark should be used only for a short time.

Acorns are not only nutritious for many animals (whilst they are poisonous for others, including dogs!), they can also be roasted and used as a coffee substitute. In times of need, they have also been used again and again as a substitute for flour and in baking. For this, however, they must first be roasted and then soaked in water for several days. The water needs to be drained and refreshed repeatedly in order to remove excess tannins, which can otherwise have a toxic effect.

"When this material [the oak bark preparation] is added to your manure pile, it will truly provide the forces to prevent or arrest harmful plant diseases."

RUDOLF STEINER, 1924 –
"Spiritual Foundations for the Renewal of Agriculture"

DANDELION

Taraxacum officinale | Biodynamic Preparation 506

// The innocent, yellow dandelion is a tremendous asset because it mediates between the fine homeopathic distribution of silica acid in the cosmos, and the silica acid that is actually used over the whole region. The dandelion is really a kind of messenger from heaven."

RUDOLF STEINER, 1924 – "Spiritual Foundations for the Renewal of Agriculture"

THE PLANT

Taraxacum, in the family *Astercaeae*, consists of about 40 species worldwide. Dandelion (*Taraxacum officinale*) is originally native and widespread throughout the temperate climate zone, and can now be found in most climate zones all over the world. It has been introduced to America as a food crop and is now naturalized throughout North and South America, Australia, New Zealand, India and many African countries. It can grow nearly everywhere: in lawns and meadows, on roadsides, high up in the mountains or close to the coastline. With sufficient soil moisture dandelion even thrives in the tropics. Dandelion can grow from sea level to 2,500 metres (8,200 ft) in elevation. Dandelion is a herbaceous perennial growing from a thick, unbranched deep taproot. Because of its deep growing taproot it is difficult to eradicate.

The plants have a basal rosette of lobed or deeply lobed saw-toothed leaves approx. 5 – 45 cm (2 – 18 in) long and smooth, hollow stems that are typically 20 – 60 cm (8 – 24 in) tall, with a solitary golden-yellow flower head, composed only of ray flowers. Dandelions have both female and male organs on the same plant and pollinate themselves, resulting in offspring that are genetically identical to the parent plant. As a day-neutral plant, flowering occurs in a wide range of photoperiods and light intensities. All vegetative parts of the plant contain a milky latex. A dandelion plant can live up to 10 years and can develop a massive basal rosette 15 – 25 cm (6 – 10 in) across, forming a dense mat of leaves.

The taxonomy of the genus *Taraxacum* is complicated and the taxonomy and nomenclatural status of *Taraxacum officinale* not yet fully resolved. Dandelion is a species-complex with over 200 micro-species in Europe alone.

SITE

Dandelion can grow in a wide range of soils, but flourishes best in fertile loam or clay, and will tolerate poor drainage. The plant prefers sunny locations; light shade is tolerated. Dandelion is an indicator plant for high nitrogen content of the soil, and it prefers meadows and pastures rich in nitrogen. Optimum pH level: between 5 – 8.

Compost should be applied in moderation before the start of the growing season. If possible the compost should be worked in to the soil. Plants can be kept in a bed for up to five years before they need to be replanted on a different spot.

In subtropical and tropical climate conditions, dandelion plants need plenty of water for good growth.

Dandelion at 2,000 m altitude, Swiss Alps.

GROWING DANDELION IN BRAZIL

Experiences from Andrea D`Angelo

The dandelion is relatively common in the south and south-east of Brazil, and can also be found in certain areas further north in the country. When dandelions are cultivated in the vegetable garden, in healthy soils rich in organic matter, the plants and the flowers are, in fact, vigorous.

It is possible to harvest dandelion flowers almost year-round, right from the first year. If we sow the seeds direct in a bed or in a seed tray in late summer or early autumn (February – April) the plants develop very nicely, and can produce flowers after eight to ten weeks. The harvest of the flowers continues from autumn through winter and spring, until the beginning of the summer. In summer the dandelion dies back; the remaining leaves may look "burned" or dry on the field, but the plant is not actually dead. This is a good moment for mowing the beds.

When the seeds form they can spread all around through the wind, and give more plants and flowers in a short cycle.

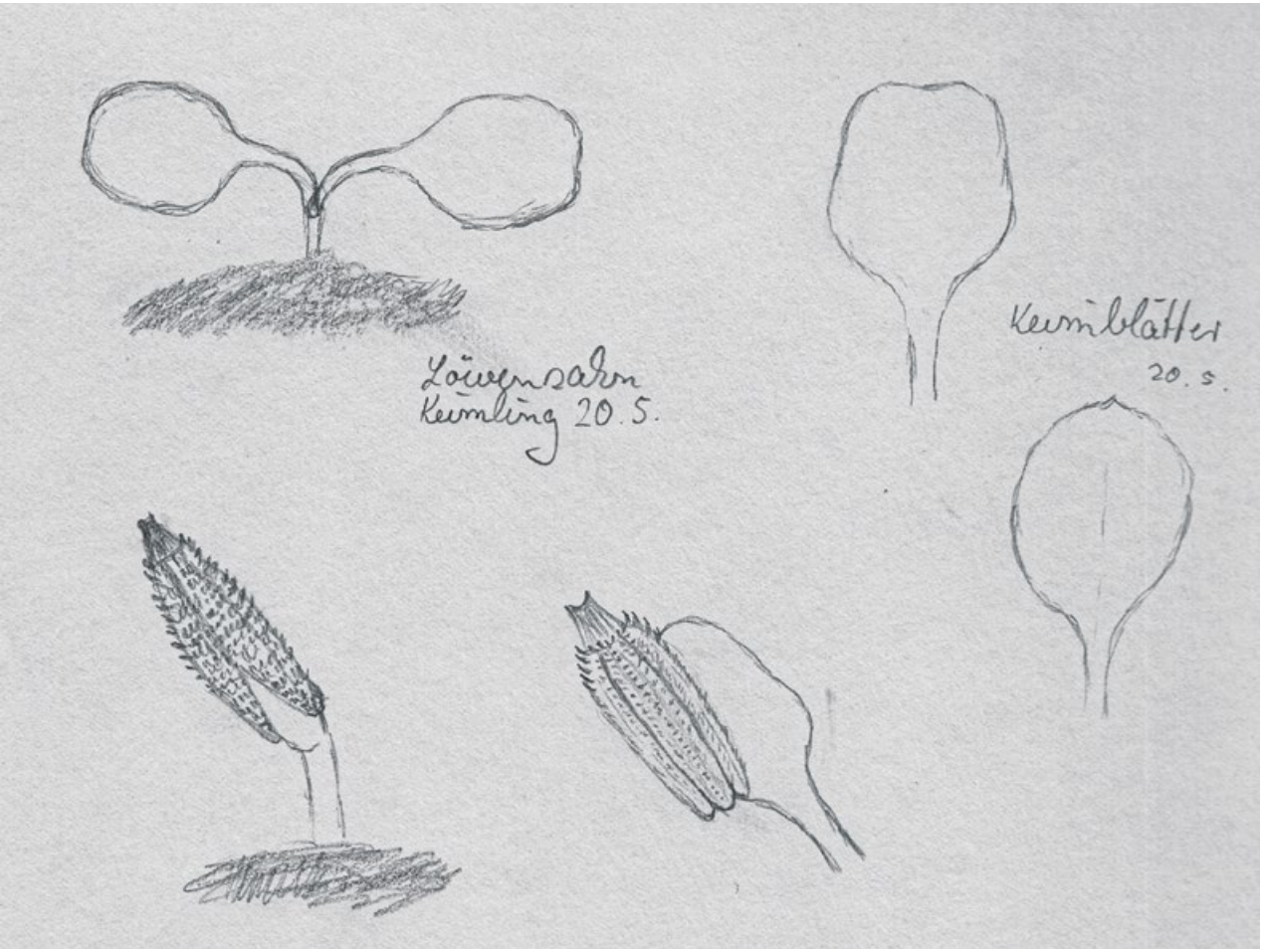
The flowers must be harvested early in the morning, when they are still not totally open. The drying process must be fast, in a warm and well-ventilated place. The best storage solution is to use vacuum sealing, the same as for yarrow and chamomile. In this way the dried flower can still smell like honey when making the preparation in autumn, in April.

PROPAGATION

For farmers in the Northern hemisphere, the cultivation of dandelions sounds unnecessary and even strange, because normally dandelion grows in huge numbers in their area and is easy to obtain. But in other parts of the world the situation is totally different and it can be very difficult to harvest the flowers. Dandelion grows readily from seeds and root cuttings. During the first growing season, seedlings will produce only leaves, while flowers form in the second year onwards.

VEGETATIVE PROPAGATION

The dandelion has a strong ability to regenerate, and roots remaining in the soil will grow into new plants. Because of this capacity to regenerate from any part of the sturdy taproot, propagation from root cuttings is the easiest and fastest way. Cuttings should be pencil-thick and about 5 – 10 cm (2 – 4 in) long.



SOWING

Dandelion can also be propagated from seeds. Sowing can be done in pots, seed boxes or multi-cell trays. The seeds should only be covered with a little bit of soil and then lightly pressed. Germination period 7 – 10 days.

PLANTING

Transplanting of seedlings is done in small bunches. The root cuttings can be placed in furrows and covered with 5 cm (2 in) of soil. Plant and row spacing approx. 20 – 25 cm (8 – 10 in).

Instead of planting dandelion into beds, the young plants can also be planted into meadows.

PLANT HEALTH AND ECOLOGY

Because of the early flowering of dandelion in the Northern hemisphere, dandelion is an important source of pollen and nectar for bumble bees, bees and solitary bees. Hoverflies, beetles and many different butterflies and moths are attracted to the bright yellow flowers. Dandelion flowers are used as food plants by a number of caterpillars and many different beetle species. Small, shiny, black common pollen beetles (*Meligethes aeneus*) can often be found in large numbers on dandelion flowers. Goldfinches and house sparrows eat the seeds.

Stems and leaves can be heavily infested by powdery mildew (*Podosphaera erigerontis-canadensis*), leaf spot (*Ramularia taraxaci*) and rust (*Puccinia taraxaci and P. variabilis*). Dandelion provides an alternative host to several viruses. Various aphid species can be seen on dandelions; e.g. bronze-brown dandelion aphids (*Uroleucon taraxaci*) can be found on the root collar and under the basal rosette leaves of dandelion.

Armyworms or cutworms can damage dandelion plants. They are the larvae or caterpillars of various species in the large family of moths (*Noctuidae*), for example the yellow-striped armyworm (*Spodoptera ornithogalli*). The black cutworm (*Agrotis ipsilon*) and the turnip moth (*A. segetum*) can be found all over Africa. Young caterpillars feed on leaves and stems, while mature caterpillars are capable of destroying the entire plant. There are a number of natural predators; e.g. parasitic wasps (*Enicospilus ssp.*) and parasitic flies (*Tachinidae ssp.*) such as the cutworm fly (*Gonia bimaculata*).

Honey bee collecting orange pollen (*Apis mellifera*).

White-tailed bumblebee (*Bombus lucorum*).

Map butterfly (*Araschnia levana*).

Powdery mildew (*Podosphaera erigerontis-canadensis*).

Dandelion leaf covered by uredina spores of dandelion rust (*Puccinia taraxaci*).

Larvae of black cutworm (*Agrostis ipsilon*).

HARVESTING

The blossom opens when the sun shines on it in the morning. With rising temperatures and sunshine, more and more flowers open. On days with temperatures of 12 – 18 °C (54 – 64 °F), plants will be in full bloom. The best time to harvest is just as the flowers have opened. Flowering times depend very much on the weather and temperature. On hot days with intense sunshine this can be early in the morning, between 8:30 and 9:30 a.m. The flowers can already begin to close around noon. In other places harvesting can take place around 10:00 a.m. The best time is just as the flowers have opened.

If harvesting is done too late, when the flowers are fully opened, they will develop white fluffy seed heads. Even during slow drying, flowers can go to seed. These are not suitable for the preparation. In most cases the flowers are dried for preparation.

Average weight: Ø 1 – 2 gm per flower head.

POST-HARVEST TREATMENT

Dandelion responds positively to repeated cutting. Cut down any scruffy leaves or stalks, but do not cut too close to the ground, because this may damage the plant.

Sufficient soil moisture is required for plants in the tropics to flower more or less continuously all year round.

DRYING

For drying, the flowers are spread out in a thin layer in an airy place. If drying is carried out too slow the flowers can easily go to seed. Turning the flowers during the drying process is recommended. Alternatively, you can use an electric dryer.

The drying ratio is 6:1.

DANDELION IN INDIA

Experiences from Jakes Jayakaran

I established dandelion in my garden initially by propagating seeds and cuttings from wild plants I found growing in my town. These dandelions are not native to my town Kodaikanal or India; I believe early British settlers have likely introduced them.

Dandelion seems to prefer limestone clay areas to fully develop. After transplanting, they can take almost two years to establish well before they start flowering for the first time. Dandelion flowers all year round in the tropics, but, similar to yarrow, they concentrate their flowering during the warmer and drier season from March/April, to the end of September when the heavy monsoon season starts.

The flowers need to be harvested early in the morning at sunrise. We do not normally cut the plants after harvesting.

I dry the flowers either using a drying rack kept in the shade, which could take 3 to 4 days, or with a small solar dryer, which is more efficient and dries the flowers in just one day. Solar dryers are a good option especially during monsoon season, reducing possible damage due to humidity. After drying, we store the dry flowers in zip lock plastic bags, or in stainless steel containers. A vacuum sealer is also a good option, but probably not economically feasible for everyone, especially on farms with limited infrastructure or no electricity.

STORAGE

The dried flowers can be stored in a glass container or a paper bag until needed. There should be no moisture left in the dried flowers. It is advisable to check the condition and quality of the harvested material occasionally.

Alternatively you can use a kitchen vacuum sealer for storing the airtight sealed flowers.

SEED HARVEST

The seeds are achenes, dry fruits that contain one seed. The ripe fruits of dandelion are equipped with parachute-like tufts of hairs that enable wind dispersal.

Harvesting seeds is easy. Seeds can be stored for two to three years or longer. The yellow-brown narrow-elongated seeds are 2.5 – 3.5 mm in size. A single flower can produce 200 seeds, a single plant about 3,000 – 5,000 seeds a year. Seeds can be damaged by larvae of the true weevil (*Ceutorhynchus sp.*).

TGW = 1 – 2 g (0.05 oz)

FURTHER USES

In North America, Europa and China dandelion is part of traditional herbal medicine. In China *Taraxacum mongolicum* (*Pu Gong Ying*) is an important medicinal plants in TCM (Traditional Chinese Medicine). Dandelion offers some culinary uses. The entire plant is edible and nutritious. The young, fresh dandelion leaves, full of vitamin A and C, iron, magnesium, phosphorus, can be eaten as salad. Especially in France, cultivars such as '*Sauvage*', '*Vert de Montmagny*' and '*Pissenlit à Coeur Plein Amélioré*' have been developed for their culinary use. Dandelion leaves are excellent for fresh curd or cottage cheese. To make the leaves more palatable, older leaves are often blanched to remove bitterness. The closed, hard, immature flower buds are a substitute for capers. Ground, roasted roots can be used to make a coffee alternative, the flowers or petals for jam, syrup, jelly ('*Cramailotte*') or dandelion wine.

Dried flowers can be ground into a yellow-pigmented powder and employed as a dye.

Because of their high mineral content, dandelion leaves are excellent fodder for cows, goats, horses, sheep and in particular for chickens and rabbits.

The Russian dandelion *Taraxacum koksaghyz* is the only dandelion that is available as an alternative source for natural rubber production. In 2020 a limited number of bicycle tires were made from latex of this species for the first time.

Avocado salad with dandelion leaves.

BE AWARE

Dandelion tends to self-seed vigorously.

DANDELION

By Markus Sommer

The dandelion transforms many meadows into a bright yellow-orange sea in April and May in the regions where it occurs. The large flower heads, composed of small tubular flowers, are carried on long, hollow stems that secrete a white milky sap when torn off. Like the flowers, the leaves arise from a point on the sturdy tap root, forming a regular rosette at ground level. The leaves are deeply and unevenly serrated, resembling "teeth". The leaves also secrete a white milk when torn off. After flowering, tiny seeds soon form, with hairy umbrellas suspended above them. The originally golden-yellow flower turns into a whitish ball from which the seeds detach themselves in the wind and are blown far and wide. In the process, they can rise high into the sky, becoming widely dispersed. Every child knows the joy of picking this "dandelion clock" and letting the seeds fly with a strong puff of breath. Even many adults sometimes can't resist helping the dandelion seeds to spread...

The leaves and flower stalks taste bitter; in comparison the flower is sweet. The flowers can be made into a yellowish syrup, which is used as a tasty spread[1], while the roots are dried and roasted and can be taken as a coffee substitute. The young leaves are used as a refreshing salad that stimulates the appetite. It tastes slightly bitter but becomes milder if the leaves are allowed to grow in the dark, either by putting a cardboard box over the plant for a few days or by digging up the roots in spring and letting them sprout in the dark in the cellar. The leaves are then pale-yellowish and can be prepared as vegetables. In this way, the whole plant can be used as food. But equally important, however, is its healing power.

Dandelion's bitter taste alone indicates that it has a positive influence on liver and bile disorders. In fact, experiments have also shown that the plant promotes a certain protection of the liver against toxins, and in herbal and anthroposophical medicine it is often used to mitigate the effects of drugs toxic to the liver. In addition, dandelion has a diuretic effect and, because of its bitter taste, it stimulates the appetite. Whenever you want to support the liver - for example to improve skin diseases - you can use dandelion. Even an effect against cancer cells has been proven in cell culture experiments and numerous anthroposophical doctors use dandelion preparations as part of a comprehensive therapy for the treatment of cancerous diseases. The dried herb can be used as a herbal tea that helps to start the day well. It can also be combined with other slightly bitter-tasting herbs - for example yarrow, which has already been mentioned here.

[1] Collect 3 handfuls of dandelion flowers, remove the green parts and boil with ½ litre of water for a few minutes. Depending on taste, you can also add some lemon slices. Once the liquid is cool, filter through a cloth and wring it out. Add 500 g of sugar to the dandelion liquid, and boil on a low flame until it has a syrupy consistency. Pour in to clean jars and seal.

"But if you treat the soil as I have described, the plants will be able to draw what they need from a wide area … Such an interplay can be brought about by giving the plants forces that the dandelion makes available to them."

RUDOLF STEINER, 1924 –
"Spiritual Foundations for the Renewal of Agriculture"

VALERIAN

Valeriana officinalis | Biodynamic Preparation 507

"And if you can still bring yourself
to do one more thing,
before using the treated manure,
press the blossoms from the valerian plant,
Valeriana officinalis, and greatly
dilute the extract with warm water."

RUDOLF STEINER, 1924 – "Spiritual Foundations for the Renewal of Agriculture"

THE PLANT

The genus *Valeriana* contains about 200 species and is native to Europe, Asia, North America and South America. The centre of their diversity is located in South America; predominatly in Argentina, Brazil, Chile, Ecuador and Peru.

The common valerian (*Valeriana officinalis*) occurs in a wide variety of forms and habitats, but grows best in full sun and partial shade, preferably on river banks, along waysides, in damp meadows and at the edge of forests.

It is a perennial herbaceous plant. In the first year, the plant grows exclusively vegetatively and can reach a height of about 30 – 50 cm (0.65 – 1 ft). In the second year the plant grows up to approx. 100 – 200 cm (3 – 6.5 ft). The stem is hollow. The lower dark green, sometimes reddish, leaves are about 20 cm long and form a leaf rosette on the ground. The leaves are pinnately lobed and towards the flower head become smaller and more filigree. The white pinkish densely clustered flowers are aromatically scented, and do not develop until the second year. The rhizomes also emit a strong aromatic scent.

The flowering season in Europe is in the summer months, from June to July. Valerian is a typical long-day plant; for flowering it requires long periods of light (daylight for 14 hours or more) and short periods of darkness. Short days promote vegetative growth, but delay flower formation. In regions where the daylight period is shorter, e. g. at the equator, valerian thrives and produces plenty of vegetation but does not flower easily.

The plants of the *Valerianaceae* family are now considered part of the *Caprifoliaceae* family. *Valeriana officinalis* is a variable species and divided into two or three subspecies which are sometimes regarded as being species in their own right.

SITE

Valerian thrives in almost all soils, but performs best in rich loamy, fertile soils. However, as the plants have shallow roots and require a lot of moisture, the location for planting should be carefully selected. Valerian will tolerate water-logged soil. The plants will grow best in full sun; semi-shade is tolerated. Optimum pH level: between 6.5 – 8.

VALERIAN IN INDIA

Experiences from Jakes Jayakaran

Growing *Valeriana officinalis* in the tropical regions of India has been a challenge. Initially we cultivated valerian on our farm at an altitude of 1,800 metres, from seeds we brought over from New Zealand. They established relatively well but the flowering was very poor, with only a few, small flowers developing.

In 2021 I brought some plants of *Valeriana officinalis* and *Valeriana jatamansi* from Darjeeling in the Himalayas. We planted them this time in our biodynamic garden in Kodaikanal at 2,100 m altitude. They seem to be adapting better to the high altitude and cooler temperatures. They started flowering five months after they were planted as bare root transplants. I am also currently experimenting with different valerian seeds brought from Europe, to see how they develop in these conditions.

Valerian is a challenging plant to grow in the tropics, but it is possible to establish and propagate it successfully if we find the right environment where plants can fully develop. If we collaborate more widely, valerian flowers could be produced in some areas (such as the Himalayas) and from there supplied to anyone who wants to make the biodynamic preparations in the rest of the country, or even to neighbouring countries. With this approach, it is possible to grow all the plants we need for our biodynamic preparations in the tropics.

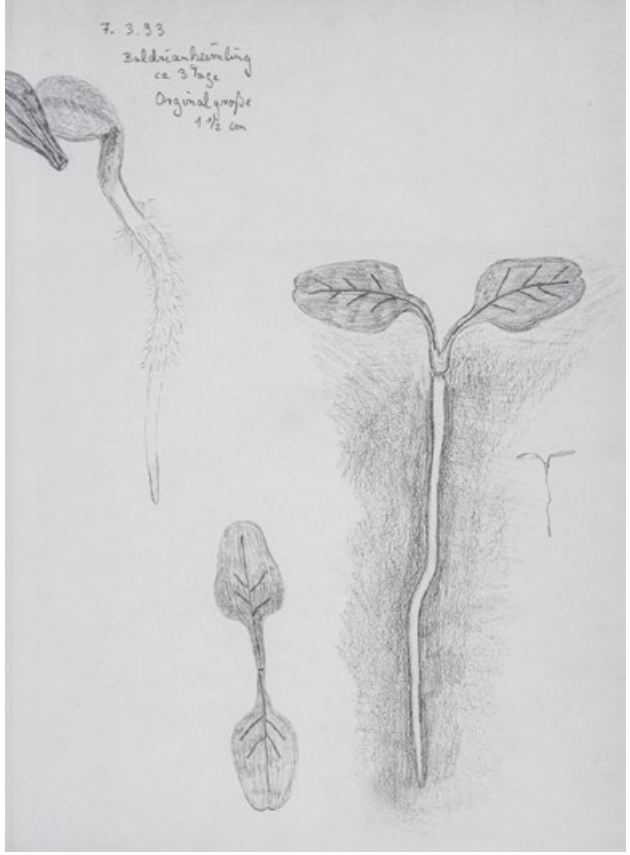
Valeriana jatamansi

PROPAGATION

Valerian can be easily propagated by seeds, or vegetatively by rhizomes.

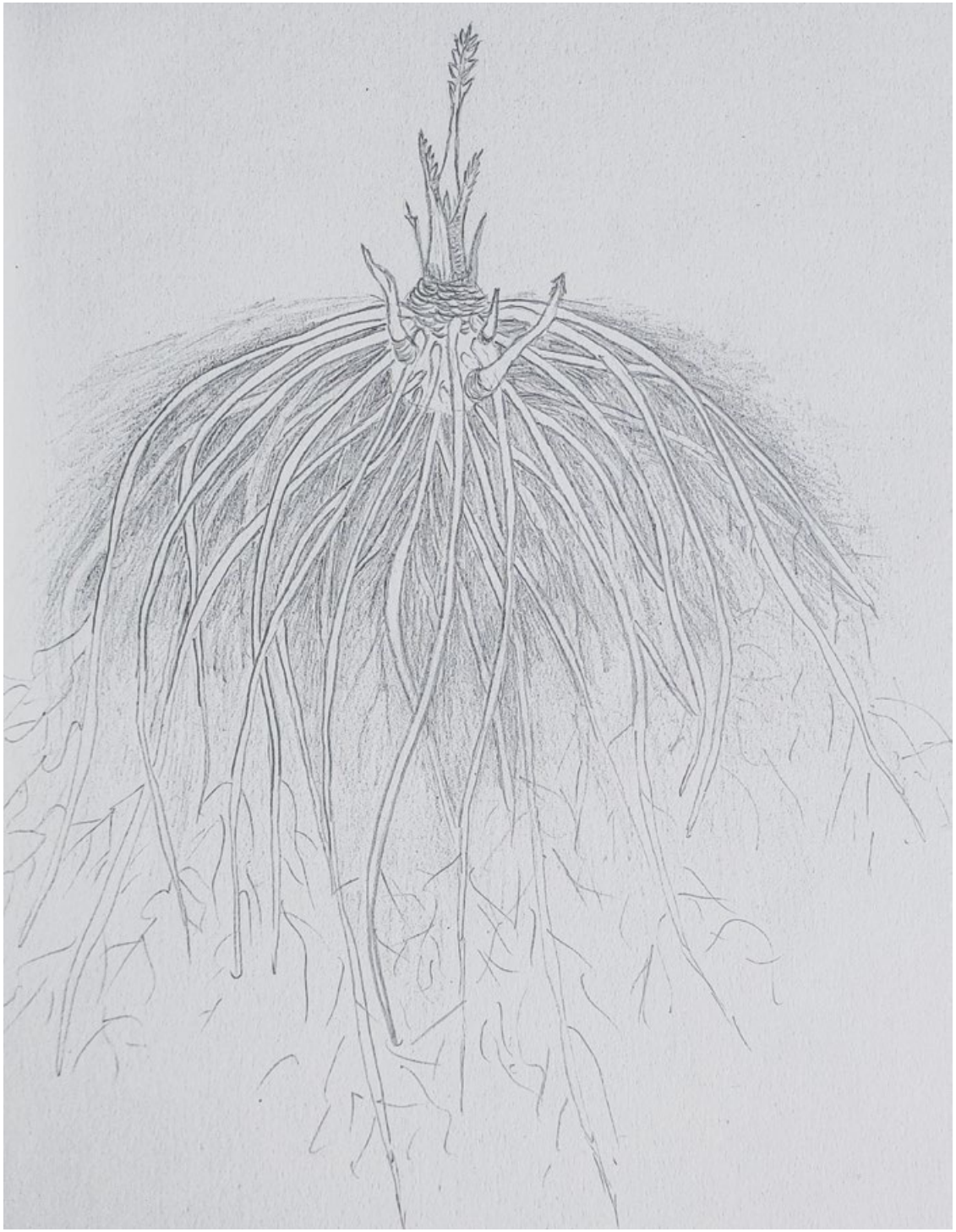
SOWING

Sowing can be done in pots, seed boxes or multi-cell trays. Seeds should only be covered with a little bit of soil and then lightly pressed. Germination takes 7 – 12 days. Similar to chamomile, care must be taken that the seeds are not washed into the soil by excessive watering or heavy rain. In the first few days the fine roots should not dry out.



VEGETATIVE PROPAGATION

Valerian grows from a fleshy, thick rhizome and is rich in fine roots. At the end of the flowering period, the central rhizome dies, but the plant has formed several smaller horizontally running white rhizomes – or stolons – around the central rhizome of the mother plant. If these small rhizomes remain on site, new plants will form the following year. These young rhizomes can also be removed and planted in a new location.



Rhizomes have formed around the rootstock of the mother plant. New plants emerge from these rhizomes.

Valerian plants at the beginning of the second year (End of April).

Same plants seven weeks later (Mid of June).

PLANTING

Initially, young plants grow very slowly. After about 10 weeks the young plants are well-rooted and can be transplanted into a bed: 40 cm (16 in) distance for plant spacing; single plants in 40 cm rows.

Runners should be planted early enough in the season to allow plants to become well established.

Before the start of the growing season compost application is recommended. Good soil moisture during growth is essential. In dry soils valerian plants will not perform well. A layer of mulch can help the soil to retain moisture and moderate temperatures in summer.

Valeriana salicariifolia.

GROWING VALERIAN IN BRAZIL

Experiences from Andrea D`Angelo

Valerian is a special plant in the tropics as it does not usually go to flower. Much effort has been dedicated in recent years to cultivating this valuable plant, including different experiments to evaluate the impact on flowering of intensive and periodic applications of silica and valerian preparations.

The best moment to sow valerian seeds in Brazil is in autumn, around April or May. In seed trays germination takes 21 days. It is also possible to sow in early spring, in September, but the germination rate is then lower.

Over time, valerian seems to develop in a completely non-standard way. We are still learning about the needs of the plants in the subtropics and about what influences growth and development. There are plants over three or four years old that have beautiful leaves and lush growth but do not bloom; other plants from the same origin, same generation, started to bloom after the third year, but then next season, failed to bloom again. On the same site, seeds of different origin, sown in autumn (April – May), started to bloom the following summer, at the beginning of December, at less than one year old.

We have been able to make a small amount of our own preparation 507 from these flowers as well as to collect some seeds. Otherwise, we have normally obtained valerian seeds from Northern hemisphere countries or from Argentina. Biodiversity and good soils are important for supporting vigorous, healthy valerian plants. However, we have experienced that when soils are rich in nitrogen and other nutrients, especially from manure, the plants can develop deformities of the leaves and stem.

Another aspect we have observed is that sometimes when valerian reaches flowering, the flowers and flower stem become dry, as if they were burned, before the flowers or seeds can be harvested. We believe that this could be related to the phosphorus process in the plant itself, or maybe to the intensity of the tropical sun, but we need to research it further.

When growing valerian, it is important to be aware of two challenges; fungus and ants. Mulching with straw or similar is essential on tropical soils, to regulate soil humidity and build soil health. However, mulches can also promote the development of harmful fungi such as Sclerotia, which can cause the loss of whole valerian plants. Leaf cutter ants (*Atta* and *Acromyrmes*) can also destroy the plants very quickly.

In the south of Brazil some farmers have experimented with making the preparation from the flowers of the native valerian, *Valeriana salicariifolia*. This native valerian grows in similar conditions to those of *Valeriana officinalis* in the Northern hemisphere. Even though there are differences between the two species in terms of their gesture, morphology, and the colour of the plant, positive observations have been made regarding the smell and the colour of the preparation made from *V. salicariifolia*. The effects of the preparation and other details are still being observed.

PLANT HEALTH AND ECOLOGY

The sweetly scented flowers attract many pollinating insects, such as bees, solitary bees, moths, butterflies, hoverflies and many beetles. They collect nectar and pollen.

Valerian generally grows trouble-free. But the leaves and stems can become infested by valerian leaf spot (*Ramularia valerianae*), verticillium wilt (*Verticillium dahliae*), downy mildew (*Peronospora valerianellae*) and powdery mildew (*Golovinomyces valerianae*), especially at the end of the growing season. The roots can become infested by rhizoctonia root rot (*Rhizoctonia solani*). At flowering time the stems can be hosts to black bean aphids (*Aphis fabae*) and spittlebugs (*Philaenus spumarius*). Aphids can cause distortion to the flowers and make harvesting difficult. Larvae of the valerian sawfly (*Macrophya albicinta*) can often be found on valerian flowers.

Larvae of the valerian sawfly (*Macrophya albicinta*).

Caterpillar of the garden tiger moth (*Arctia caja*).

Black bean aphids (*Aphis fabae*).

Powdery mildew (*Golovinomyces valerianae*).

HARVESTING

Harvesting should be done on sunny days in the morning. Optimum harvest time is when most of the flowers have opened. The flowers should be harvested without stems as far as possible, hand-picked or with scissors. If there are too many stems in the crop, they can be removed later. If only the petals are to be used, they can be plucked from the flowers on site.

POST-HARVEST TREATMENT

After harvest the stems should be cut back.

DRYING

Flowers can be dried without problem or loss of quality. The drying ratio is 6:1.

STORAGE

For good storage of the dried flowers a kitchen vacuum sealer can be useful. With the help of a vacuum packing system valerian flowers can be preserved in sealed bags with very good results, especially in places with high humidity. The flowers can retain their scent, colour and quality over a longer period of time. This is especially important in countries where valerian cultivation is difficult and the flowers have to be stored for some time. The dried flowers should be kept in a cool, dark place. If stored poorly, the flowers lose their quality very quickly.

SEED HARVEST

Valerian seeds mature unevenly. Therefore, seed harvesting is not easy. Only the mature, ripe seeds should be collected from the flower heads. However, there is a risk that they may fall off or will be blown away by wind before harvesting. Under favourable conditions the plants will self-seed.

The flat, elongated yellowish seeds are 3 mm in length, 1.5 mm in width and 0.4 mm thick.

Seeds can be stored only for a short time. After one year the germination rate is usually below 5 %.

TGW = 0.5 g (0.01 oz).

FURTHER USES

Valerian has been used as a medicinal herb since ancient times. In India *Valeriana jatamansi* (Tagar-Ganthoda) is used in Ayurvedic medicine. Valerian roots are used to make tinctures and extracts for medicinal use. Essential oil is made from flowers and used in perfumes.

The leaves are edible and can be used in salads. They are best picked fresh and young when they are tender. The taste is slightly reminiscent of corn salad (*Valerianella locusta*). The individual flowers are also edible. *Valerianella locusta*, a close relative of *Valeriana officinalis,* is a small annual leafy vegetable, known as corn salad and "mâche" in France. It is grown in many parts of Europe and North America during the winter months. Corn salad is very nutritious, with three times as much Vitamin C as ordinary lettuce.

Valeriana officinalis rootstock.

Valeriana jatamansi roots.

VALERIAN AS LONG-DAY PLANT

Valerian is a typical long-day plant, which means that for flowering it requires long periods of light (daylight for 14 hours or more) and short periods of darkness. Short days promote vegetative growth, but will delay or even prevent flower formation. Artificial lighting can be used for flower induction for long-day plants such as valerian.

Vigorous vegetative leaf growth. But even in the 4th year of growth these plants have not yet flowered (Kenya).

VALERIAN

By Markus Sommer

Valerian is an herb growing up to 2 metres (6.5 ft) tall often found along forest edges, in ditches and along watercourses, since the soil must always be moist for it to thrive. Its dark green leaves are evenly pinnate making them look like a staircase. At the end of a valerian shoot are the pink inflorescences, sweet smelling and honey-like, but also with a little of the aromatic, strange and heavy smell that is particularly intense in valerian root. It is noticeable that tomcats are attracted to this smell because it resembles the scent emitted by cats on heat. A gaggle of screaming tomcats fighting over a valerian root can be quite disturbing to neighbours ...

Extracts of valerian root are used medicinally because it calms, and promotes sleep. Although the calming and sleep-inducing effect of valerian is undisputed, it is not known exactly what causes it. As with some other plants, it does not seem to be a single active substance that causes the effect, but rather perhaps the combination of a number. More recently, it has been thought that so-called "lignans", which are contained in valerian, play an important part. When many lignan molecules combine they form "lignin", the main component of wood ("lignum" is Latin for wood). So, in a way, we can say that valerian contains a kind of diluted, dissolved precursor of wood, which helps us to release ourselves better into sleep when our soul is too much "stuck" to the body.

One aspect of the valerian preparation is that it's extracted from flowers that are harvested at midsummer, the height of light and warmth around the time of St John (End of June, beginning of July). Other preparations are also made from flowers, such as yarrow or dandelion. Unlike them, on the one hand, valerian flowers have a particularly intense fragrance, and on the other, whole flowers are not used, but just a juice pressed from them with the solid flower press-cake being discarded. In anthroposophical medicine, fragrance that separates from the physical-solid substance is considered to be an expression of sulphuric-phosphoric forces, i.e. forces associated with warmth and light. In fact, potentised phosphorus is also used in anthroposophic medicine to promote sleep, and sometimes it is combined precisely with flower extracts to increase the "phosphoric" and thus soul releasing effect.

Through this special relationship to the phosphorus qualities and hence to light and warmth, it's understandable that the valerian preparation has a role to play when cold temperatures threaten damage to frost tender plants.

"If this diluted valerian juice
is applied to the manure
in a very fine manner,
it will stimulate the manure
to relate in the right way
to the substance
we call phosphorus."

RUDOLF STEINER, 1924 –
"Spiritual Foundations for the Renewal
of Agriculture"

HORSETAIL

Equisetum arvense | Biodynamic Preparation 508

// As I told you earlier, the cosmic factor lives in the plant via silica. Just take a look at the Equisetum plant – it has an unusual ability to draw the cosmic forces into itself, to permeate itself with silica. It contains ninety percent silica acid. In Equisetum, the cosmic is present to excess, but in such a way that it does not manifest in the flower but shows up in the plant‘s growth lower down.”

RUDOLF STEINER, 1924 – “Spiritual Foundations for the Renewal of Agriculture”

THE PLANT

The genus *Equisetum*, in the family *Equisetaceae*, consists of only about 30 species, which are mainly distributed with a focus on the Northern hemisphere. Horsetail (*Equisetum arvense*) is a non-flowering plant, multiplying by producing tiny spherical spores, that are typically 50 µm = 0.05 mm in diameter. Horsetail plants have a fossil record extending back to about 300 million years. Horsetail spores are green, a characteristic that is not found in any other spore plant.

In Europe and North America, the fertile spore-bearing stems develop in March-April, followed by the green sterile non-reproductive stems. After the spores have been distributed, the sterile stems die. The erect stems of common horsetail reach up to 40 – 50 cm (16 – 20 in) high and about 3 – 5 mm (0.12 – 0.20 in) in diameter. Stems are hollow, rigged and jointed.

The plant will develop a deep-rooted and widely branched rhizome system which can spread horizontally and vertically over several metres. Due to its ability to multiply quickly from its extensive rhizomes, it is very difficult to eradicate and be quite bothersome.

Equisetum arvense must not be confused with other horsetail species. Some *Equisetum* species are even poisonous.

Fertile non-photosynthetic spore-bearing steams. The spores have a short germination period of only a few days.

NATIVE BRAZILIAN HORSETAIL

Experiences from Andrea D`Angelo

Horsetail grows in various regions in Brazil and there are two main native species used for the preparation: *Equisetum hyemale* and *Equisetum giganteum*. In both plants the vegetative shoots are the same as the spore-bearing shoots.

Many attempts were made to bring seedlings and cultivate the *Equisetum arvense* in Brazil, but to no avail. Some experiments have been carried out comparing the effectiveness of the native species *E. hyemale* and *E. giganteum* with *E. arvense*, when used as a tea and as a preparation in different crops such as tomatoes, strawberries and potatoes. All treatments with the native plants were found to be effective. Therefore, both of the native horsetail species are used for the biodynamic preparation.

Horsetail is best grown near a stream or pond where the soil is moist. Sometimes the plants can become invasive, and may need to be controlled.

Equisetum hyemale

SITE

Equisetum arvense grows in a wide range of climates and soil conditions; in open fields, arable land, waste places, along roads and railway tracks, preferentially in moist soils. Horsetail is an indicator plant for compacted, waterlogged soils with poor drainage.

The widely branched rhizomes have the ability to penetrate deep into the soil and can grow to a depth of 1.5 – 2.0 m (5 – 6.5 ft). Optimum pH level: 6.5 – 7.5.

PROPAGATION / PLANTING

Cultivation of *Equisetum arvense* is said to be very difficult. Due to the short-lived nature of the spores, this type of reproduction is not easy. The best way to propagate common horsetail is by collecting rhizome sections of about 10 – 15 cm (4 – 6 in). The rhizomes need to be planted about 5 – 10 cm (2 – 4 in) deep, 2 – 3 rhizomes per spot.

HARVESTING

The green stems can be harvested just above the ground with scissors or a knife. The plants can be used when fresh, but in most cases the plants need to be dried for later use.

DRYING

For drying, they are spread out thinly in a shady place. As soon as the plants are dry, they can be crushed into small pieces. Before being used, the crushed parts can also be ground into fine powder. Dried horsetail can be stored for a year after which it loses its effectiveness.

The drying ratio is 5:1.

USAGE OF EQUISETUM ARVENSE TEA

As a plant care product, *E. arvense* is characterised by its high silica content and therefore has a particularly preventive effect on fungal diseases. When spraying, the soil should be moist. Spraying is usually carried out before planting time. For one hectare you need about 100 g dried horsetail or 500 g fresh horsetail. 100 g of dried horsetail is soaked in 4 litres of clean water for 24 hours. The following day it is boiled and left to simmer on low heat in a covered pot for 60 minutes or even longer. The tea must be left to cool for some time. Before spraying, the liquid is filtered and diluted with water. A good dilution ratio is 1 part *Equisetum* tea to 9 parts of water. The tea can be stirred for 20 minutes before spraying.

For further reading see: "Biodynamic Preparations – Good Practice Manual" published by Biodynamic Federation / Demeter International, 2020.

OTHER USES

Equisetum arvense is rich in silica, potassium, calcium, manganese, magnesium, phosphorus, vitamin A, C and E and other chemical elements. Horsetail was traditionally used treating wounds and is still used nowadays as a herbal medicine.

The young plants are eaten raw or cooked, but considerable care must be taken, as some of the horsetail species can be poisonous! In Japan and Korea the fertile stems of some species are cooked and eaten like asparagus. The fronds of horsetail are covered with tiny crystals of silica and were once used to polish wood and pewter. Horsetail is still used today for sculpting the reeds of saxophones and clarinets.

BE AWARE

Horsetail is especially unwelcome in livestock pastures. It is toxic to livestock, particularly horses. Sheep and cattle are more likely to be poisoned by fresh plants, while horses are more susceptible to poisoning from hay.

HORSETAIL

By Markus Sommer

The field horsetail is a small, upright plant that is composed of many uniform, ray-shaped stems. They are like uniform building blocks from which the whole plant is assembled. Without leaves or recognisable flowers, it looks very simple and in fact it is one of the last descendants of a very ancient plant species that covered the earth a long time ago. Not only did horsetails once form large forests, but they could also grow to many metres in height and a large part of today's coal deposits are said to have once been formed from horsetail plants.

What makes the field horsetail special is its ability to bring one of the hardest mineral substances to life. If you run your fingers over the horsetail, it feels rough. This is due to fine scales of a quartz substance on its surface. Horsetail is able to collect quartz, a compound of oxygen and silicon, also known as "silicic acid", from the soil. While industrial processing of silica requires temperatures of well over 1,000 °C (for the production of solar cells and semiconductors), the horsetail's living interaction with it is unspectacular. If you observe horsetail plants in the early morning, you will see fine droplets on their shoots that glisten in the morning light. This water contains a high concentration of dissolved silicic acid; the horsetail brings it to its surface, where it leads to the rough sensation we feel. This characteristic also allows horsetail to be used for polishing soft metals such as tin, which is why it's called "pewter weed". However, the "intention" of horsetail is not to serve as a polishing agent; it forms the quartz substance on its surface as a kind of lens that focuses the incoming sunlight and guides it into the plant interior. In this way, the horsetail can absorb a lot of light even though it has no actual leaves. In addition, the siliceous substance on its surface is a protection from the outside, keeping pests and diseases at bay much as our windows do, providing a barrier while letting in the light.

The ability to form an outward protection can also be imparted by horsetail when we use it as a medicine or to strengthen plants. When boiled in water for a longer period of time, much of the quartz substance is extracted into the water. Such horsetail decoctions are used, for example, to treat skin rashes or to ward off fungi that do not seek the light themselves but thrive in the dark.

Another special feature of horsetail is its content of sulphur, which contrasts with the "cool", form-creating, light-permeable quartz side in it. Medicines containing horsetail have a positive effect on the kidneys and the sulphur compounds probably contribute to this.

"We need to relieve the soil of the excessive lunar force; we need to find some way reducing the waters mediating capacity, of giving the soil more earthiness so that the water that is present does not absorb the excess lunar influence. We accomplish this – though outwardly everything remains the same – by making a fairly concentrated tea of Equisetum arvense, which we then dilute and use as a kind of liquid manure on the fields where we want combat blight and similar plant diseases."

RUDOLF STEINER, 1924 –
"Spiritual Foundations for the Renewal of Agriculture"

THE GOETHEAN APPROACH TO PLANTS IN BIODYNAMIC PREPARATIONS

JEAN MICHEL FLORIN
Coordinator of the French Mouvement
d'Agriculture Bio-Dynamique since 1988
co-leader of the Agriculture Section
at the Goetheanum in Switzerland since 2010

To better understand the preparation plants, especially if you wish to cultivate them, it is very important to know the right environment for each plant. First, simply to ensure their good growth, but, above all, because medicinal plants develop their properties in relation to the environment in which they grow. Unlike cultivated plants, which need a fairly balanced environment, wild plants grow spontaneously in very different environments and most of the medicinal plants (like the six preparation plants) grow in relatively extreme environments (very wet, very dry, very thin soil, very rich soil, etc.), which they help to balance.

The philosopher E. Coccia says that the plant is „mixed" with its environment. In fact, if we try to imagine the plant's way of being in the world, we will see that with the exception of the seed stage, it is a being that is totally open to its environment, especially through its roots and leaves; organs that extend their contact surface, that stretch, and that spread their substance to achieve maximum openness and interaction with their environment. Some botanists now consider the root microbiota (all the microorganisms surrounding the root) to be an external organ of the plant, thus showing that in the soil it is impossible to make a clear separation between the plant and its environment. This is quite different from the animal and the human being who create an inner physical space (containing all the vital organs) and a psychic space (commonly called the soul).

The environment of choice, in the broadest sense of the term, comprises two aspects; the spatial and temporal. When considering the spatial aspect, we can ask: where does the plant grow? What are the plant's preferred conditions? And for the temporal aspect, we ask: when

does the plant grow? What are its growth dynamics? And at what time of the year and day does it reach the peak of the expression of its identity?

In general, the spatial environment of the plant is described by breaking it down into quantitatively measured factors: mm of rainfall for precipitation; lux for the intensity of light; chemical element content for the composition of the soil, etc. But this presentation takes us away from the reality of the environment, which is dynamic and ever-changing. It is our analytical thinking that breaks down the environment into a multitude of measurable factors that are a construct of the mind.

To gain a more qualitative understanding of the environment – the elements and forces -within which the plant lives, we can rely on our concrete sensory and bodily experiences. With this experiential approach we can begin to imagine how the plant experiences its environment; we are approaching the plant as a living being.

THE GOETHEAN APPROACH

Goethe (the prominent German writer and philosopher who developed a new approach to science) describes in his 1790 work "Vorarbeiten zu einer Physiologie der Pflanzen" ("Preparatory work on a physiology of plants"), a "double law" according to which plants are formed:

1. the law of internal nature, by which plants are constituted.
2. the law of external circumstances, by which plants are modified.

We can find the expression of the law of 'internal nature' in the identity of the plant species, in aspects such as the 'gesture' of the plant. This internal nature is what allows us to recognize a plant and say, for example, it's a dandelion.

To understand the law of external nature, consider how each plant develops in the vast earth-sky polarity. This earth-sky polarity can be described qualitatively according to four great polarities linked to the four elements:

- Earth element: polarity between rich or poor soil (organic or mineral soil, alkaline or acid, compact or friable, etc.)
- Water and air element: polarity between wet or dry.
- Heat element: polarity between hot or cold.
- Light element: polarity between a bright or shady environment.

Each of these polarities obviously has a very large number of possible nuances.

It should be noted that most of the „elemental" influences are mainly exerted on the vegetative, most malleable parts of the plant. In contrast, the flowers and fruits (generative organs) vary only slightly in general. They are much more the expression of the law of the internal nature of the plant, which can sometimes be polar to the environment.

There is a very interesting connection between the internal and external aspects at the moment of seed germination. We have to realize that, in a natural environment, in any given place, there are a lot of seeds of a huge diversity of plants. And each seed contains inside itself the potential of its species. Linked to this potential is a receptivity for very specific environmental conditions that will lift the seed's dormancy. The seeds of wild plants only grow under very specific conditions, which are different for every species. These conditions build a bridge between the internal nature and the external nature of the plant and express a lot about the specific quality and potentiality of the plant.

Each individual plant is, then, an expression of the inner nature or archetypal image, as modified by the external environmental. We recognise an oak tree as an oak tree through the colours, shapes, and textures of its bark, acorns, leaves and overall appearance. But this oak tree may, for example, have grown quite tall and thin in a more shady place, or it may have grown quite lopsided and stunted in a very windy location. In each case, it shows also a "picture" of its environment.

Yarrow
Achillea millefolium

Chamomile
Matricaria recutita

Dandelion
Taraxacum officinale

Greater Nettle
Urtica dioica

Oak
Quercus robur

Valerian
Valeriana officinalis

THE LAW OF INTERNAL NATURE: THE METAMORPHOSIS OF THE PLANT

Goethe outlines how his general law – the principle of metamorphosis – is specialized in each plant family and species. In order to describe the primordial forces at work in the plant kingdom, we will describe some aspects of the „original plant" Urpflanze, based on Goethe's work.

When a plant germinates, from the seed emerges a root that penetrates vertically into the soil; it stretches out towards the centre of the earth, actively follows gravity and, to do so, is even able to penetrate fairly compact layers of soil. The root goes towards the earth. This primary root will then branch out more or less, depending on the species, into numerous secondary roots, but the tendency to form a taproot will remain – though more or less marked.

Shortly afterwards, the embryonic stem emerges from the seed and shoots vertically upwards towards the sky, opposite the root, in the opposite direction to gravity, in the sense of „levitation". Thus the young plant is bipartite: it binds to the earth through its root and binds to the air and lightness through its stem. From the tiny spatial point represented by the seed, which contains all the potential of the plant to come, the plant begins to unfold in its primordial earth-sky axis by forming a stem – that is to say, a line from the geometric point of view – that goes towards the sky.

After the formation of this vertical axis, the first two organs appear; leaves, forming surfaces that are perpendicular to the incident light. In dicots, these are two symmetrical leaves, often very primitive in appearance: the cotyledonary leaves. And then the leaves follow one another in time and space as the stem continues to grow, usually in a spiral around the stem.

If we look closely, we can see that each leaf (usually) has a slightly different shape from the previous one and the next one: this is the metamorphosis of leaves.

Through the leaves, the plant enters into a relationship with its environment: the leaves assimilate, breathe and release water vapour.

Frequently the first round leaves with a successively lengthening petiole will also become larger and larger in an expanding gesture, which will then be followed by a contraction manifested by a decrease in the size of the leaves but also by an ever greater differentiation of their shape, to frequently end up with point-shaped leaves. At the top of the stem of a „typical" plant, the flower bud appears, which completes and stops the vegetative growth. This bud, when it opens to reveal the flower, will show a second expansion with the sepals and petals, and also a qualitative expansion through the perfumes and the shining colours, followed by a second contraction expressed by the stamens and pistil.

Finally, in the centre of the flower, the fruit will form, with a tendency to expand. It contains the seeds, which are the third and final contraction of the plant. This general picture of the plant is modified in countless ways in all species of flowering plants.

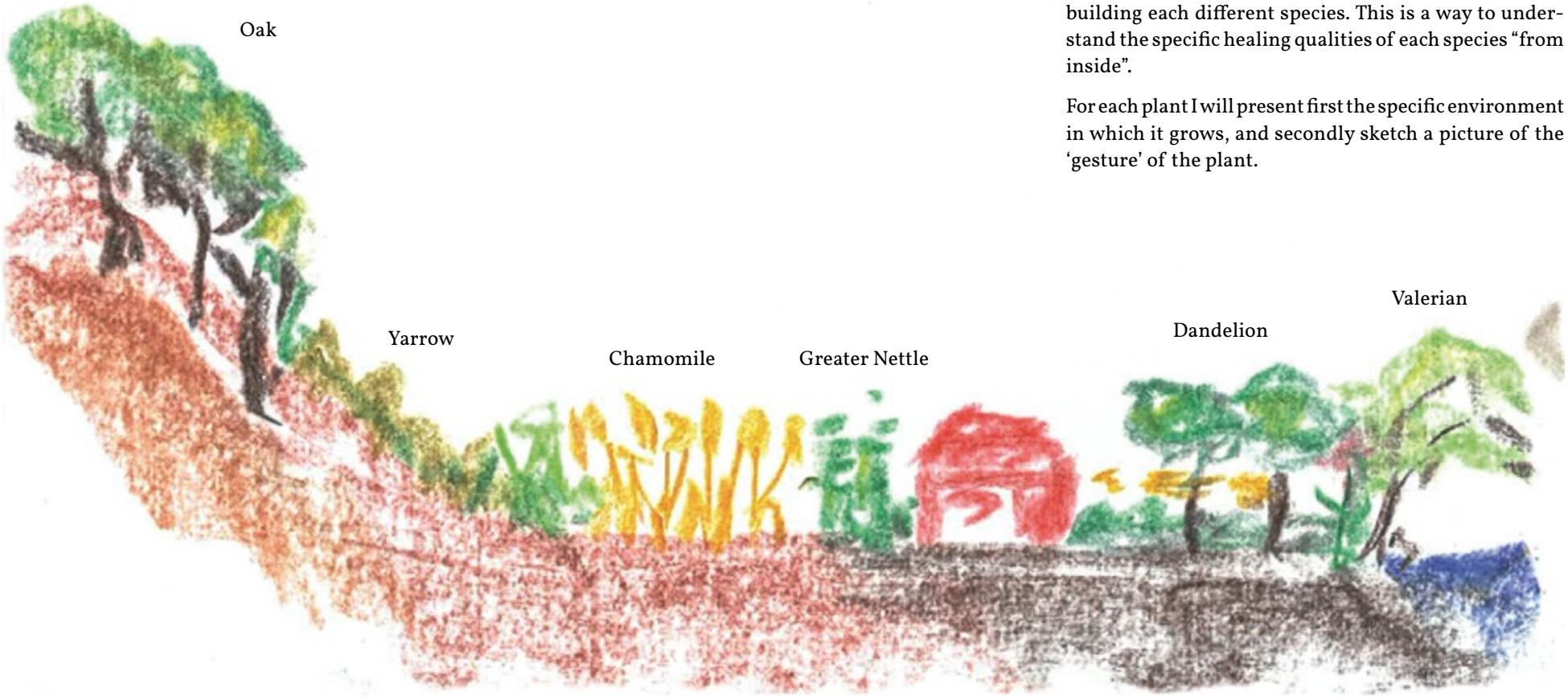
Heat and light promote the ultimate expression of the plant, found in resins, essences and essential oils. These substances have undergone the process of ‚refinement of the juices' described by Goethe in "The Metamorphosis of Plants"; first absorbed by the roots, then ‚vegetalised' in the leaf, and finally refined in the flower or seed, producing very specific substances like colours, perfumes, essential oils or fat oils. Goethe evokes a ‚gradation' of this refinement, from the leaves, to the flowers and fruits.

It is interesting to note that it is typically the flowering process, the peak of the plant's expression, which produces the perfumes; the quintessence of the plant. With the exception of the nettle and the oak – both of which have very little expressive flowering – we always use the flowers in biodynamic preparations. However, the floral process can also develop in other organs of the plant, as in the case of valerian, which concentrates aromatic principles not only in the flowers but also in the roots.

PORTRAITS OF THE PLANTS OF THE PREPARATIONS IN THEIR CONTEXT

I will now describe each of the preparation plants from a Goethean perspective. We will see how the inner picture of the "original plant" in each preparation plant transforms, as it meets its environment. I will give you a feeling of the specific formative forces which are building each different species. This is a way to understand the specific healing qualities of each species "from inside".

For each plant I will present first the specific environment in which it grows, and secondly sketch a picture of the 'gesture' of the plant.



YARROW – HEALING AND GATHERING

Yarrow's preferred environment is pasture or sheep moorland; places with soil that is easily eroded; soil that disintegrates, without cohesion; soil with a tendency to lose humus through damage to the vegetation, for example through overgrazing. These are often dry, hot, fast-drying soils.

If we look in the soil, the root of yarrow is quite shallow, which is surprising for a drought-resistant plant. On the other hand, numerous purplish-coloured underground stems colonise the ground in all directions, the points of which emerge at the surface to form new rosettes of leaves. This growth pattern allows it to form thick mats in pastures or on embankments that are resistant to both sheep and machine traffic. The primary root dies fairly quickly and many fine, rather unbranched adventitious roots (from the stem) are formed. Thus yarrow is anchored in the ground less by roots than by a system of horizontal stems just below the soil surface. It is almost as if the stems had been spread out and crushed. This gives the plant great resilience, and brings life to a 'dying' soil.

In meadows, in dry years, yarrow it is one of the most drought-resistant plants, and can thus take over. The presence of yarrow can be considered as healing the soil, protecting it from drying out, and avoiding the 'hemorrhaging' of the living humus layer and the destruction of the plant cover.

Yarrow takes on a very variable habit depending on the site where it grows, thus seeming to show great sensitivity to the surrounding conditions, be it the nature of the soil or the intensity of light and heat.

In yarrow the link between the structure, smell, colour and texture of the plant, and the time of its flowering is particularly strong. Yarrow flowers in summer, at the moment when the sun, having passed the solstice at Midsummer, stagnates a little and begins to descend again. Many of the flowers blooming around this time form umbels (or false umbels), bringing together a multitude of small, mostly white flowers, plateau flowers. It is as if they were expressing, by this flattened form, the fact that the sun is coming down after the upward spring aspiration, which was, earlier in the year, expressed by the spiky spring flowers on ever higher stems. The whole atmosphere of yarrow is summery: dry heat and aromatic air surround us with a large mass of dense flowers which don't release their smell. This evokes the atmosphere of the ripening and hardening processes that accompany the formation of fruit and seeds in the height of summer.

From this point of view, one almost has the impression that the yarrow inflorescence is a 'fruit' process, in the sense that it gives off little fragrance but rather concentrates, closes, dries out, densifies. Until winter, and even the following spring, the shoots and seeds of the past year remain in place, dry and persistent.

If we take up the overall gesture: strong anchorage to the ground, which it covers with a dense, finely differentiated green carpet to 'heal' it, and, upwards, a very fine division of the organs (leaves and flowers), which nevertheless remain vital and are nevertheless joined together to form a whole in a straight, rigid stem. This gesture evokes the ability to bring together dispersed elements, while at the same time organizing, finely structuring the whole, and enlivening and regenerating it. The presence of yarrow offers a kind of quiet strength, a friendly presence linking a rigid, dry aspect with very fine chiselled forms.

Yarrow
Achillea millefolium

CHAMOMILE – BRINGING LIFE BACK TO DEAD, MINERALIZED SOIL

The chamomile can be found in gardens, in fields, along roadsides and even on motorway embankments. It is particularly fond of soils that have been disturbed, worked and often compacted. It grows well in silty soils that tend to be compacted (bear in mind the phenomenon of soil compaction after rain, which affects silty soils in particular). All these places have in common that they are totally open to light. Chamomile germinates in the light, on a bare soil. Even where chamomile grows in cereal fields, the dominant vertical growth of the cereals allows more light to penetrate than in meadows.

We can describe the preferred environment of chamomile as a field open to full light with a packed, even compacted, totally mineral, dead soil. The soil is compact and airless, alternately waterlogged and parched. It is not breathing; there is no exchange between earth and sky.

The fleshy, finely segmented leaves, which follow one another on the plant's many branches to form a voluminous, rounded tuft of flower heads, which are themselves rounded, give the image of an intense life activity which develops and is closely linked to the surrounding air space. This life is not directed towards hardening but metamorphoses in the formation of flowers and seeds, containing the perfume. Each stage (leaf, flower, seed) is fully expressed, brought to its ultimate end, before giving way to the next. Compare this to the dandelion, which always retains a great deal of life in its various vegetative organs; its root retains a great deal of vegetative strength and its leaves remain green after flowering.

Chamomile blooms from the end of May to July/August in the Northern Hemisphere, when the whole landscape is brightly lit. It has the character of intense sunlight, and seeks an environment full of light. It is truly a plant that is linked to light and air.

The composite flower head, whose receptacle swells and bulges, and whose single florets turn completely downwards, shows this gesture of total completion of the floral stage in the most obvious way. This same gesture of 'bulging' can also be found in the whole of the chamomile tuft, which is dispersed and almost dissolves in space.

Chamomile gives the impression that, in its flowering, it opens up, turns over, totally exteriorizes itself and abandons itself to the air space, both in its gesture and in the odour exhaled. The plant completes its tendency to lose itself in the air, as only small seeds remain, which fall back to the ground and are ready to start a new cycle.

All the remaining vitality has gone into the seed, which is why the plant dies, drying out in the air and light as soon as the seed is dispersed. Seeds can germinate very quickly in the light after falling to the ground. They will stop germinating as soon as the soil has been revitalized and improved.

With its finely branched roots and aerial leaves, chamomile brings the elements of earth, water and air and light together, revitalizes dead soil and perfumes the atmosphere with the scent of its flowers. Chamomile allows a soil that has become a compact and impervious wall to become a sensitive membrane that breathes between earth and sky.

Chamomile
Matricaria recutita

NETTLE – BRINGING ORDER TO CHAOS

The nettle grows from early spring to late autumn and always looks green as if it were spring. It grows back with increased vigour as soon as it is cut back. It is often found at the edge of a field, along walls in semi-shade and in cool, even damp places. It appears as soon as fresh organic matter accumulates: manure, abandoned compost, accumulated dead leaves. It can also colonise areas where the soil has been disturbed, and where piles of stones, iron or rubbish have been abandoned.

In short, it can be said that the nettle appreciates sites where the soil is not yet homogeneous and alive but, on the contrary, is still a simple mass of various materials.

Pulling a nettle stem out of the ground reveals a vast network of yellow rhizomes; underground stems from which the various stems of the clump emerge. Underneath these rhizomes, numerous fine roots penetrate the area of organic matter or rubbish intensively. The nettle does not penetrate deeply into the soil; it remains in the material to be transformed, and has a great capacity for vegetative multiplication through its underground rhizomes.

Early in the spring, the tender young shoots of the nettle emerge from the ground and rise directly without forming a rosette. The plant immediately takes up a vertical position. The square, fluted stems grow longer with characteristically toothed heart-shaped leaves from the start. The alternating stems (internodes) and leaves are very structured, but very vigorous, and the pairs of opposite leaves form a kind of cross around the stem. The metamorphosis of the leaves is limited: the contraction of the leaves is limited to an elongation of the blades towards the top of the stem.

It is interesting to observe the shape of the leaves more closely, as they are clearly structured. Held together by well-marked and fairly rigid veins, each leaf is stretched horizontally in space with great assertiveness. The leaf shape shows a fine balance between the forces of substance (which, when fully expressed, form large amorphous leaves) and the forces of structure (which are expressed by forming very finely chiselled leaves like those of the wild carrot for example).

An interesting polarity is found in the nettle between the substance in its leaves, which is very rich in nitrogen, and the formation of dry fibrousness in the stems, which were once used to make ropes. In addition, nettle forms complex substances similar to insect poisons (containing acetylcholine, histamine, etc.) in its stinging hairs. Nettle is the medicinal plant with the highest iron content and it has a particular affinity for iron. The iron content of the plant varies greatly over the course of the year (it is highest in spring and autumn), and also depends on the location. According to Rudolf Steiner, nettles can regulate the action of iron in the soil.

Nettle shows by the rigorous, almost military structure of its leafy shoots how it brings order to a totally chaotic terrain. It takes this powerful gesture underground through its horizontal rhizomes, which bring living, organising processes underground. It is one of the fastest plants to transform organic matter into a black humic substance.

In nettle, the vegetative process is expressed in the way that the plant grows almost all year round, as well as through the density of the nettle clumps and the intense photosynthetic capacity of the leaves.

The floral process of specification is expressed at the periphery of the plant by the fine cutting of the teeth on the leaves, by the very marked veins, and by the formation of the stinging hairs present on the whole green plant. The yellow colour of the rhizomes can also be considered as a kind of flowering that brings light to the soil.

Nettle has a vegetative process that is always very powerful and active which keeps it, so to speak, always 'juvenile' in its substance. This is manifested in the richness of proteins in the plant, combined with its great vitality, and vigorous vegetative growth. However, this vegetative process is constantly controlled from top to bottom by a very special 'peripheral' specification process, expressed, for example, by the special teeth of nettle leaves. This specification process does not penetrate the substance to devitalize it (which would cause either the formation of hard spines or the discolouration of the leaves) but rather accompanies the vegetative growth.

Greater Nettle
Urtica dioica

OAK – MASTERED POWER

While most annual plants spend the winter in a concentrated seed state, trees do not disappear, and continue to mark the landscape with their silhouette. Life remains in the cambium, the thin layer of living cells between the bark and the wood, and in the buds, which can be thought of as the 'seeds' of the future twigs that will grow on the tree. From year to year, these seeds create their own 'soil'; the trunk and the branches on which the new leaves will grow each year. Through its solid woody trunk and branches, the tree becomes a constituent element of the landscape, halfway between the fleeting plant world and the more permanent and fixed mineral world. Each tree creates its own three-dimensional environment. To experience the atmosphere created by the oak tree, you only need to sit under its crown for a while.

Although the pedunculate oak (*Quercus robur*) can grow in relatively humid environments, it remains the tree of choice for intermediate environments, preferably with deep, rich soil. It hardly ever climbs the mountains, remaining a typical tree of the plains and hills. Foresters consider it to be a light tree because acorns and young oaks need a lot of light to grow, unlike beech (*Fagus sylvatica*), which can grow in the shade of other trees.

In contrast to the tiny, light seeds of, for example, maple and birch, the relatively large, heavy, and closed acorn of the oak allows the seedling tree to grow from its own reserves in the first year. It is still 'closed' to the outside world. The young tree's first move is to orient itself on an axis, between earth and sky. It is only when it has exhausted the reserves of the cotyledons that it will begin to truly connect with the earth and its new environment.

After orienting itself between the earth and the sky, the young tree penetrates the surrounding space in all directions to 'appropriate' it and, little by little, form its own interior space delimited by the crown of leaves in summer. A 100 – 150 year old mature tree shows the characteristic shape, with the long horizontal branches running in all directions and changing direction abruptly, the irregular crown and the massive trunk covered with thick cracked bark. In order to understand the genesis of these twisted forms, one must observe the buds that give rise to the future branches, and the branches themselves. Instead of developing with buds evenly distributed over the shoots, the oak extends a long shoot at the end of which three, four or five buds gather to form a dense bunch of shoots pointing upwards as if in opposition to the forces of gravity. The main shoot, extending the branch, does not emerge from the central terminal bud in the continuation of the previous year's shoot. Each year, the shoot that extends the branch

changes direction. The characteristic gnarled and twisted shape is the result of a constant alternation between the death of certain buds and branches and the strong growth of new shoots. This characteristic feature of the oak becomes even more obvious if we compare it with a tree with a more harmonious crown, like the maple, with its symmetrical buds and radiating branches.

The contrast between the small, discreet flowers of the oak and the large size of the tree is astonishing. Is there not a special relationship to be discovered here? Let's compare this tree, with such discreet flowering, to an annual plant, which often has much larger and more visible flowers. In the case of the annual plant, all the vegetative force represented by the leaves ends up and spreads out, so to speak, in the flower, which is a kind of completion of the plant. Flowering means the death of the annual plant. In trees, on the other hand, flowering, which may occur before the leaves appear, or simultaneously, uses only a minimum of vegetative forces. The vegetative production of trees, which develops throughout the summer, is instead gathered and concentrated in the process of wood formation. There is also a kind of death of the vegetative process expressed in the foliage at autumn time.

The irregularly lobed shape of oak leaves reveals a predominance of the forces of earthly matter over the cosmic structuring forces, which fail to chisel the shape. If one collects a few leaves, one will notice that they are all different; they do not follow a precise pattern but only have a common style. The material is too exuberant for the form to impose a strict outline.

The first character of the oak is its vegetative power, which is expressed in its impulsive and disorderly growth; it does not have enough space to unfold all the substance of the leaves and not enough formative force to model all the leaves on a fixed pattern. The massive trunk, the tough and chunky acorns, the lobed leaves, all show an excess of material that can hardly be held back, which is somewhat unstructured. This vegetative force is also revealed by the size of the oak, which is one of our largest forest trees. It can reach 50 metres in height.

The oak, to a much larger extent than most other plants, creates its own environment. It does this both in the earth through its symbiosis with fungi, and above ground through its large crown and its relationships with animals such as the jays, wild boar, squirrels and even the insects that lay their eggs to create the galls. This creation of its own 'personal' environment can be seen as an act of closure by the oak. It is reflected in the tannic character of the bark, leaves and acorns. Tannin is a substance that closes tissues, that tightens, preserves, mummifies and kills. This is where we find the hardness and durability of the oak. By closing itself to its environment, each oak takes on an individual character.

The oak is the site of a constant struggle between opposed forces. The exuberant vegetative forces, which are very powerful 'life' forces, surge outwards. Other forces of restraint, of structuring, of 'death' are just as powerful. These forces of restraint can be seen in the hardening of the wood, the high tannin content of leaves, bark and acorns, and in the calcareous bark which accumulates on the outside (and which can form very thick layers in the case of the cork oak).

One phenomenon shows this dynamic clearly. When leaves grow from little shoots on an old oak stump, the exuberant vegetative forces are not balanced by the structuring forces of the wood and bark. The leaves don't have the classic oak shape and are very often covered with powdery mildew, a fungal disease revealing the imbalance.

Rudolf Steiner indicates that the preparation of oak bark added to compost enables him to fight plant diseases preventively. It seems that because the oak is constantly fighting against the risk of excess vegetative forces, it can transmit this skill to the plants in our farms and gardens, through compost.

Oak
Quercus robur

DANDELION – SPRING SUNSHINE IN WATERLOGGED SOIL

If the environment of the yarrow is dry sheep pasture, the preferred environment of the dandelion is rich cow pasture, with cool, moist, compacted soil, full of fresh, animal, organic matter. One could say that these are soils suffering from indigestion, and lack of air and warmth. In early spring, when the weather is still cold and the sun is not very strong, the dandelion covers the meadows with a yellow carpet of countless little suns.

The dandelion develops vigorous rosettes of bright green, juicy leaves, which are toothed in a lion's tooth pattern, revealing their receptivity to light influences. The powerful yellow, eye-like heads open in sunny weather and close as soon as the direct sunlight disappears. The dandelion is always seeking the sunlight, so much so that it closes its flowers as soon as the clouds pass across the sun. All this builds a picture of a plant with a strong connection to light forces.

Dandelion displays huge contrasts between three key aspects. First, it develops a deep root, which often grows in soil that is too rich, and almost overloaded with fresh organic matter on the surface. This taproot crosses the surface zone rich in organic matter, and goes very deep into the soil, as if it wanted to touch the bedrock. Second, on the surface grows a rosette of many soft green, highly vegetative leaves filled with bitter white latex. And thirdly, towards the sky, it develops the sunlike flowering which then forms a splendid sphere of seeds. In contrast to the thick fleshy root and lush leaves, the seed head is light, dry, and penetrated by light, opening up completely towards the periphery and abandoning itself to the light space.

Where the dandelion grows, it brings qualities of structure and finesse in a rich and heavy soil, and helps the soil to reconnect with the cosmic forces of light. Intimately experiencing this gesture of the dandelion, one can perhaps sense why Steiner, in his lecture to farmers, calls it the „messenger from heaven".

The general medicinal character of the dandelion stems from this gesture: it is detoxifying, reorganizing, and regenerating, bringing vitality and youth forces.

Dandelion
Taraxacum officinale

VALERIAN – AN ENVELOPE FOR MATURATION

To find Valeriana officinalis, you need to go to damp places: the edge of a ditch or river, the edge of a forest, marshland. Valerian seeks a half-shade, half-light situation, avoiding both brightly lit meadows and shady undergrowth. It also needs sufficient summer heat. It is often found in the company of large marsh plants: willowherb (Epilobium angustifolium), loosestrife (Lythrum salicaria), marsh thistle (Circium palustre), meadowsweet (Filipendula ulmaria), angelica (Angelica sylvestris), nettles (Urtica dioica).

To sum up, valerian grows in a soil rich in 'blocked' organic matter, with anaerobic conditions due to the constant presence of water. The air and the heat are missing in the soil.

The vegetative and generative phases are clearly distinguished in the growth of valerian. In the first year it forms roots and a rosette of leaves. After the winter, the stem rises with strictly ordered leaves that become more and more refined on the way to flowering, fruiting and fragrance.

As the vegetative growth densifies into a structured form, and clearly separates itself from its surroundings with its upright, up to 2 m high stem, the juices are refined into the floral fragrance.

As a perennial, valerian forms new rosettes or stolons next to the old flower stalk in autumn, from which new rosettes grow. The fragrance of valerian is concentrated in the roots and in the rhizomes. In spring, it is one of the first plants to form new leaves, and the flower stalks rise from the centre of these leaves.

It is at the end of May and beginning of June that, at the bend in a path along a wetland, we can suddenly be hit by a flood of odours that are both sweet, and almost aggressive, disgusting; an ambivalent smell. We then discover the rather slender pinkish flowers of the valerian, which appear almost phosphorescent against the dark green background of the exuberant vegetation. Many other plants at this time of year have inflorescences of a similar type, composed of numerous small flowers with rather heavy, sweet scents; scents that reinforce the impression that nature wants to exhale at this time of year. Valerian, which is the largest, clearly marks the vertical direction, as if it were rising on tiptoe to flower.

The inflorescence of valerian appears at the top of the stem as a large, undifferentiated bud, still surrounded by the upper leaves. However, it soon becomes apparent that these are numerous small buds that will form a corymb, or flat cluster of flowers. The individual flowers in the round bud stage are completely surrounded by three small bracts and tightly packed together. They are mostly white to light pink. The crowns of the open flowers show five petals fused to the white to light pink base. The specific scent of the roots, which disappears more or less in the vegetative organs of the plant, initially reappears now at the flower pole, opposite the root, in a more refined form.

While the first flowers open, wither and fruit, the inflorescence continues to unfold and form new flowers at each stage. Thus, some flowers wither before the inflorescence is fully developed, while the flower stalks continue to branch in stages. In this way, up to 2,000 flowers can gradually form on a corymb. During flowering and fruit ripening, the top of the inflorescence is still growing; it enlarges by repeated branching in opposite directions. In this way the corymb forms a thin canopy that closes the shape of the valerian upwards. The plant then appears light and airy in its fruiting stage.

The concentration of the valerian fragrance in the roots of the plant intensifies as the rosette prepares for autumn and winter. The fresh leaves have a green smell, but when dried they also give off the typical valerian scent. Thus the whole plant is permeated with this scent. The strong scent can last for decades in dried specimens in herbariums.

The smell of valerian in autumn, especially in the morning, is related to the smell of healthy fruiting processes. Amazingly, most of the known fruit aromas, such as banana and strawberry, are substances known to scientists as 'valerianic' or 'isovalerianic' acid esters.

These aromas are also related to a healthy humification process; the transformation of organic matter in to stable soil humus. In fact, they are as much an expression of a general soil ripening process as of a fruit ripening process. We can now see how the root sphere of valerian has the capacity to stimulate ripening processes in the soil.

Valerian has a strong tendency to overgrow. This is reinforced by cultivation or when the soil has a very high humus content. It then begins to have an overgrown vegetative development that can cause the plant to lose its normal shape. Double leaves appear, three leaves instead of two per node, a tendency to form thick banded stems, swellings and spiral stems. But the floral impulse brings an opposite tendency, which increases in action and materialises as best described in the formation of the filigree inflorescence, in the order of the leaves and the hardening of the stem.

In the wet and cold places where it grows, valerian creates a warm sphere in the soil around its roots and in the atmosphere, helping to digest and transform high levels of organic matter and encouraging the 'maturation' or ripening processes necessary for good humus formation.

Valerian
Valeriana officinalis

THE PLANTS IN BIODYNAMIC PREPARATIONS – A COMPOSITION TO COMPENSATE FOR ENVIRONMENTAL IMBALANCES.

Earlier in this chapter I described four environmental polarities; rich-poor soil; wet-dry; hot-cold; bright-shady. Each of the six preparation plants (the exception being the oak, which creates its own environment as a tree) grows in a relatively extreme environment, which is far removed from the intermediate conditions favourable for agriculture. Each plant in its specific environment has developed 'skills' to compensate the imbalance. For example, the yarrow builds a network to protect the soil, and the chamomile enlivens the soil with its roots. Each plant brings these balancing skills to the preparations. The same qualities can be accessed through using the plants as herbal teas sprayed on the fields.

We can consider that, together, the preparation plants constitute a general remedy to rebalance the environment.

- Soil too rich in animal organic matter, and lacking light: dandelion.
- Soil too mineralized, with excessive light: chamomile
- Waterlogged soil, with a wet, cold environment: valerian
- Soil subject to erosion and excess heat: yarrow.
- The nettle is the plant that manages to transform all organic waste of animal or vegetable origin into good soil.
- And the oak brings its woody, anti-fungal character.

In order to complete this study, it would be possible to consider other aspects that allow us to understand this brilliant composition of the six plants, such as the link between each plant and the chemical processes mentioned by Rudolf Steiner in the agricultural course.

In order to obtain fully effective plants, it seems to me essential to understand their specific action in their environment so that, if they are to be cultivated, the most appropriate conditions can be found. This study of the gestures of each plant could also help, if necessary, to find substitutes for these plants in areas where they do not grow spontaneously, and where it is difficult to cultivate them.

ABOUT THE AUTHORS

ROLF BUCHER

Rolf Bucher trained in biodynamic agriculture in the late 1970s and has been practising Biodynamics ever since. For 30 years he worked as a farm manager in Germany; his work focused on the cultivation of medicinal plants. For the last ten years Rolf and his partner Anne have been working as biodynamic advisors in India and various African countries.

ANNE BUCHER

Anne Bucher was trained as a biodynamic gardener in the early 1980s. For 25 years she cultivated biodynamic medicinal plants in Germany. Since 2012, Anne and her partner Rolf have been working as biodynamic advisors internationally. Their focus is on training small farmers, and establishing school farms, as well as educating Waldorf horticulture teachers.

JEAN MICHEL FLORIN

Born in Alsace, France, Jean-Michel Florin has been the coordinator of the French Mouvement d'Agriculture Bio-Dynamique since 1988, and co-leader of the Agriculture Section at the Goetheanum in Switzerland since 2010. He lectures and runs training courses in biodynamics and Goethean science in many countries and is the author of numerous articles on biodynamics and related subjects.

ANDREA D'ANGELO

Andrea D`Angelo is an international Demeter and biodynamic advisor and trainer at the ELO institute in Brazil. She has extensive experience across the entire process of growing, making and applying biodynamic preparations. Her contributions to this manual are drawn from her own experiences and those of her peers working in biodynamic agriculture in the south and southeast regions of Brazil.

MARKUS SOMMER

Markus Sommer is a doctor, working in anthroposophic medicine in Munich. His admiration for healing plants has connected him with the use and application of biodynamic preparations. He has written several books on anthroposophic medicine including "Healing Plants: Herbal Remedies from Traditional to Anthroposophical Medicine". He is a former deputy chair for the commission for anthroposophic remedies at the Federal Institute for Drugs and Medical Devices, and current editor of "Der Merkurstab. Journal of Anthroposophic Medicine".

JAKES JAYAKARAN

Jakes Jayakaran is an international biodynamic and Demeter advisor, and an experienced biodynamic farmer. He has more than 25 years of experience growing herbs and making biodynamic preparations on his farm at altitude in South India. In the last 15 years Jakes has promoted biodynamic farming and worked in Demeter advisory projects in many Asian countries including China, Malaysia, Taiwan, Sri Lanka and Thailand.

BIBLIOGRAPHY/ EDITORIAL

BIBLIOGRAPHY AND FOR FURTHER READING

BOOKS

"A Colour Atlas of Pests of Ornamental Trees, Shrubs and Flowers".
Alford, D. (2012) 2nd edn.,
London: Manson Publishing, UK

"A Natural History of Nettles".
Wheeler, G.R.K. (2007)
Trafford Publishing, USA

"A Tropical Garden Flora".
Staples, G.W. and Herbst, D.R. (2005)
Bishop Museum Press, Honolulu, USA

"Anbau- und Qualitätsanforderungen ausgewählter Arzneipflanzen".
Marquardt, R., Kroth, E. (2001)
Bergen: Agrimedia, Germany

"Anthroposophische Pharmazie".
Meyer, U., Pedersen, P.A. (2016) 2nd edition.
Berlin: Salumed, Germany

"Biodynamic Preparations – Good Practice Manual."
Bucher A. & R. (2020),
Biodynamic Foundation/Demeter International.
Available at: *www.sektion-landwirtschaft.org/arbeitsfelder/praeparate/news/biodynamic-preparations*
Accessed: 18.05.2021

"Brennnesseln".
Fischer, L. (2017)
Berlin: Matthes & Seitz, Germany

"Dictionary of Gardening".
Griffiths. M. (Ed.), (1992)
London: MacMillan Press, 4 vol., UK

"Enzyklopädie der Gartengehölze".
Bärtels, A. (2001)
Stuttgart: Ulmer Verlag, Germany

"Extraordinary Plant Qualities for Biodynamics".
Bockemühl, J., Järvinen, K. (2006)
Edinburgh: Floris Books, UK

"Flora Britannica".
Mabey, R., (1988)
London: Sinclair & Stevenson, UK

"Gehölzkunde".
Bärtels, A. (1982)
Stuttgart: Ulmer Verlag, Stuttgart, Germany

"Handbuch der Samenkunde".
Brouwer, W., Stählin, A. (1975)
Berlin: DLG Verlag, Germany

“Handbuch des Arznei- und Gewürzpflanzenanbaues”.
Heeger, E. F. (1956)
Berlin: Deutscher Bauern Verlag, Germany

“Handbuch des Arznei- und Gewürzpflanzenanbaues”.
Hoeppe B. et. al. (2012)
Vol. 4 & 5, Bernburg: Saluplanta, Germany

“Healing Plants: Herbal Remedies from Traditional to Anthroposophical Medicine”
Sommer, M. (2014)
Edinburgh: Floris Books

“Herbal Harvest”.
Whitten, G., (1999) 2nd edn.,
Hawthorn: Bloomings Books, Australia

“Illustrierte Flora von Mitteleuropa”.
Hegi, G. (1979-1987)
Volume III.1., VI.2., 3. & 4.,
Hamburg: Parey Verlag, Germany

“International Oaks”.
The Journal of the International Oak Society, Issue No. 31 (2020), No. 30 (2019), No. 26 (2015),
Petersburg, USA. Available at:
www.internationaloaksociety.org/ios-journal-archive
Accessed: 03.06.2021

“La vie des plantes.”
Coccia E. (2016)
Editions Rivages

“Les Plantes Médicinales en Biodynamnie”.
Florin, J.-M. (2020)
Colmar: Éditions du Mouvement de l’Agriculture Bio-Dynamique / Lamaro.
Les Cahiers de Biodynamis n° 22, France

“Life of an Oak”.
Keator, G., (1998)
Berkeley: Heyday Books & Californian Oak Foundation, USA

“New eyes for plants”.
Colquhoun M. & Ewald A. (1996)
Hawthorn Press

“Pflanzenwurzeln”.
Sobotik, M. et. al. (2020)
Frankfurt: DLG Verlag, Germany

“Praxisleitfaden Krankheiten und Schädlinge im Arznei- und Gewürzpflanzenanbau”.
Meyer., U. et. al. (2010)
Braunschweig: DPG Selbstverlag, Germany

“Spiritual Foundations for the Renewal of Agriculture”.
Steiner, R. (2004)
London: Rudolf Steiner Press, U.K. and (1993)
Kimberton: Bio-Dynamic Farming and Gardening Association, USA

“Taschenbuch der Heil- und Gewürzkräuter”,
Simonis, W.-C. (1976)
Frankfurt: Vittorio Klostermann Verlag, Germany

“The Agriculture Course.”
Steiner R. GA 327 (1924)

“The Biodynamic Spray and Compost Preparations Production Methods”.
Wistinghausen von, C., Scheibe, W., König, U. J. (2000)
Stroud: Biodynamic Agricultural Association, UK

“The Botanical Garden”.
Phillips, R., Rix, M. (2002)
London: MacMillian Press, 2 vol., UK

“The British Oak”.
Miles, A. (2013)
London: Constable & Robinson, UK

“The Nature of Oaks”.
Tallamy W. D. (2021)
Portland: Timber Press, USA

“The Plant”.
Grohmann, Gerbert (1989)
2 vol., 3rd edition. Kimberton: Bio-Dynamic Farming and Gardening Association, USA

“Vorarbeiten zu einer Physiologie der Pflanzen.”
Goethe J.W. (1790)

“Weeds”.
Richards, G. (2021)
London: Welbeck Publishing Group, UK

“Wildnis Eiche”.
Zankl S. & Ludwig M. (2015)
München: Frederking & Thaler, Germany

“Worldwide Practice of the Biodynamic Preparation Work”
Hurter, U. et. al. (2019)
Section for Agriculture, Goetheanum, Switzerland
Available at: *www.sektion-landwirtschaft.org/fileadmin/landwirtschaft/Pr%C3%A4parate/The_biodynamic_preparations_in_context_web.pdf*
Accessed: 18.05.2021

“Wurzelatlas”.
Kutschera, L. (1960)
Frankfurt: DLG Verlag, Germany

“Wurzelatlas”.
Kutschera, L., Lichtenegger E. (2002)
Graz: Stocker Verlag, Austria

LINKS

Annual International Conference of the biodynamic movement
Section for Agriculture, Goetheanum, Switzerland
Available at: *www.sektion-landwirtschaft.org*
Accessed: 18.05.2021

Biodynamic Federation – Demeter International
Online available at:
www.demeter.net
www.you-will-grow.net
Accessed: 18.05.2021

PICTURE CREDITS

Pages photos *Jakes Jayakaran*:
Page 13, 32, 100, 111

Pages photos by *Andrea D’Angelo Lazzarin*:
Page 18,34, 50, 74, 91, 99 (larger photo),
112 (bottom right), 116, 130

Pencil drawings by *Anne Bucher*
Page 29, 33, 72, 93, 112, 113.

Coloured pencil drawings by *Jean-Michel Florin*:
140, 142, 143, 144, 145, 147, 148, 150

Photo credits of photo of *Georg Soldner*:
Goetheanum, Freie Hochschule für Geisteswissenschaft, Medizinische Sektion

Photo credits of photo of *Petra Derkzen*:
YOOL

All other photos were taken
by *Anne* and *Rolf Bucher*.

EDITORIAL

Published by:
Biodynamic Federation –
Demeter International e.V., 2021

Editors:
Petra Derkzen & Paz Bernaschina

Authors:
Anne & Rolf Bucher, Jean-Michel Florin,
Jakes Jayakaran, Andrea D'Angelo Lazzarin,
Markus Sommer

Translation:
Ian Henderson

Proofreading:
Hannelore Bucher, Jessie Marcham

Layout:
Gabriele Roth

OPEN SOURCE PUBLICATION

CONTACT

secretariat@demeter.net

Biodynamic Federation – Demeter International
Brandschneise 1 | 64295 Darmstadt

www.demeter.net

Precisely from the example of agriculture, we can see how necessary it is to derive forces from the spirit, forces that are as yet quite unknown. This is necessary not only for the sake of somehow improving agriculture, but so that human life on Earth can continue at all.

Rudolf Steiner, 20. June 1924